

HEINLEIN TIP:

"A human being should be able to change a diaper, plan an invasion, butcher a hog, conn a ship, design a building, write a sonnet, balance

Accounts, build a wall, set a bone, comfort the dying, take orders, give orders, cooperate.

Act alone, solve equations, analyze a new problem, pitch manure, program a computer, cook a tasty meal, fight efficiently, die gallantly. Specialization is for insects." Robert Heinlein

WATER WARNING:

Since most of the common diseases in a survival situation are water-born, pollution of drinking water **MUST BE rigorously AVOIDED.**

SO MAKE SURE YOU BOIL IT FOR 10 MINUTES.

JUST MOISTENING YOUR LIPS WITH 1 DROP OF IMPURE WATER WILL AT THE LEAST SO SICKEN YOU TO THE POINT WHERE YOU CAN'T TRAVEL!

ORGANISING THE CAMP:

In many survival situations there will already be someone in a position of responsibility who will head the organization of the camp and lead the development of survival plans.

If no established command structure exists among a group of survivors, an organized committee should be established and individuals nominated & elected with particular responsibilities perhaps on a rational basis if it is a large group and rescue does not come quickly.

Experience **MUST BE** pooled & immediate steps taken to discover what skills individuals can contribute.

A roaster is **ESSENTIAL** for such daily chores as collecting firewood & water, foraging, cooking, latrine digging and maintenance tasks, and for hunting and trapping.

In a group of survivors there may be all kinds of people of different ages and experience. People will have varied skills and enjoy doing different tasks.

Everyone who is fit and able should take their turn at the unpleasant tasks, unless their skills are so much in demand that it would be a waste of their abilities.

But individual should do what they are good at, and be encouraged to develop skills for which they show an aptitude.

Not only should everyone do their fair share but keeping busy eliminates boredom and keeps up morale.

Anyone who is sick or injured gets the lightest jobs and is best employed around camp until they have recovered

In a group there should **ALWAYS** be someone in camp, and they should be able enough to operate the signals should a search aircraft appear.

If you have sufficient numbers do NOT venture from the camp in less than pairs.

Except in the desert, where the day will be largely spent sheltering from the sun and early mornings & evenings are the times for activity, daytime is likely to be fully occupied.

Evening however, may drag if not occupied by hunting. A gathering around the camp fire will help establish a pattern and provide a sense of discipline and normality.

It will give an opportunity to debrief on the day's events, to plan for tomorrow and to discuss new strategies.

Music can be a great morale booster. If no instruments were carried or survived, simple ones such as percussion or pan-pipes can be easily improvised, and everyone can sing after a fashion.

Sing-songs, dancing, charades, quizzes and story-telling and even praying all have their place and you may have talents that can create more elaborate entertainment.

For private recreation any books will be invaluable particularly this one and you can make pieces for board games such as draughts and chess, using stones for counters or carving simple playing pieces.

Even the lone survivor requires discipline and order. A regular routine will help morale and exactly the same care **MUST BE** taken to ensure that the camp is kept in good order.

At first there may be so much to do that the individual is too tired to think of recreation, but boredom is even more **DANGEROUS** for a person on its own an objective should be set each day whether practical or for amusement.

CAMP HYGIENE:

Keeping healthy is an important factor for survival, so strict hygiene should be practiced, not only personally but in the planning and running of a camp.

Rubbish and latrines **MUST BE** kept away from the camp to reduce the threat from flies.

Since most of the common diseases in a survival situation are water-born, pollution of drinking water **MUST BE RIGOROUSLY AVOIDED.**

Food scraps and other rubbish should be burned in the fire if possible.

CAMP LAYOUT:

Select sites for all camp activities so that they do not interfere with each other or pollute the living and cooking even "cook-King" areas.

If you are camped by a river or stream, fix specific sections for activities & keep to them.

Latrines should be dug downhill of the camp and away from the water supply so that there is NO possible risk of seepage polluting either.

ACTIVITY AREAS:

Establish a water point from which drinking water will be collected and ensure that No one wash, cleans pots, scrubs clothes or otherwise uses the stream upstream of this point.

Downstream choose a wash point for personal ablutions and clothes washing and farther downstream of that select a place to be used for cleaning cooking utensils.

REMEMBER: NEVER URINATE OR DEFECATE IN OR NEAR YOU WATER SUPPLY.

LATRINES AND RUBBISH DISPOSAL:

Latrines and rubbish disposal should be well away from the camp and preferably downwind.

But not so far away that is inconvenient and people are tempted to go elsewhere. If necessary cut a track to it to make access easier.

It is important that proper latrines be established, even for the lone survivor. With a group separate latrines for the sexes may make a mixed group feel more comfortable and as much privacy as possible should be provided.

Rubbish, after checking that it really has no **USEFUL** value, should be burned, and what cannot be burned should be buried.

Even if you have it, do not use disinfectant in a latrine. Lime or disinfectant would kill the **USEFUL** bacteria that break down and then it will start smelling! After defecating cover the shit with earth. Add small amounts of water that will promote the bacteria.

Make a latrine cover to keep out flies and **REMEMBER ALWAYS** to replace it, or flies that have walked all over shit may walk all over your food, & start a cycle of infection.

If, after a time, a latrine starts to smell, dig a new one. Fill in the old latrine. Build a new seat and burn old timbers & covers.

DEEP TRENCH LATRINE:

Dig a trench about 1.25m (4ft) deep and 45cm (18in) wide. Build up the sides with logs or rocks and earth to make a comfortable sitting height, sealing the gaps between them.

Lay logs across to leave only a hole for use or (several if you are a large group and making a communal latrine).

Empty wood ash on the logs to make a seal. It will also deter flies. Make a lid of smaller wood to cover the opening (A) or use a large flat rock or a large leaf weighted down with stones.

ALWAYS REMEMBER to replace it.

URINAL:

Dig a pit about 60cm (2ft) deep. Three-quarters fill it with a large stone and then top up with earth, with a cone made from bark set into it as a funnel. Site it close enough to the camp to ensure that people bother to use it.

INCINERATOR:

If there is too much waste for the camp fire to burn, make a separate fire in the latrine area. If a large can is available use it as an incinerator. Bury any unburned refuse in a garbage pit.

CAMP DISCIPLINE:

Do not prepare game in camp: bleed, gut and skin on the trap line.

This attracts game to the traps where you want them, not into your camp. Keep food covered and off the ground. If kept in trees **MAKE SURE** it is proof from tree-dwelling animals.

Replace lids on water bottles and containers **IMMEDIATELY** after using them. Stow spare clothing and equipment in your shelter. Do not leave it lying where it can get wet or burned.

Have a place for everything & keep things tidy. A tree for mess tins & cooking utensils-hook them on twigs and branches, a place for mugs and spoons & keep everything off the ground. Fix a box as cupboard on a tree trunk.

NEVER LEAVE THE FIRE UNATTENDED

SOAP:

Washing with soap removes natural oils, leaving the skin less waterproof and more prone to attack by germs. In survival circumstances it is a mistake to wash with soap too often.

However, soap is the most widely used antiseptic, better than many others, such as iodine, which destroy body tissue as well as germs.

It is ideal for scrubbing hands before administering first-aid for wounds. Save supplies for this.

SOAP MAKING:

Two ingredients-an oil and alkali- are needed to make soap. The oil can be animal fat (including fish) or vegetable but not mineral. The alkali can be produced by burning wood or seaweed to produce ash.

METHOD:

Wash ash with water. Strain and boil with the oil. Simmer until excess liquid are evaporated and allow to cool.

This soap will clean the skin but it is not antiseptic. Adding Horseradish root or pine resin to the brew will make it antiseptic.

Experiment will be necessary to get the balance in the mixture right. Start with more oil than alkali because too much alkali will dry the skin, leaving it sore.

SEATS:

NEVER SEAT ON DAMP GROUND!

Use something, even if it is only a log. If there is no ready-made seat available, lash together a couple of low A-frame support and rest another bough across them. Make a simple box frame with cross-members linking legs from short lengths of wood.

TO MAKE A SEAT:

Weave vines or twine back and forth or sew on a piece of canvas or plastic with thongs. Failing these, try a flat piece of wood or metal laid across, or thin springy saplings lashed to the frame and interwoven.

CAMP CHAIR:

A comfy camp chair can be made in 10-15 min. and will give hours of comfort. Select 2 stout forked sticks 4 feet long and 3 inches thick.

The forks **MUST BE** at wide angle and cut with the straighter of the 2 prongs about 9 to 10 inches long and the other wide angled prong about 12 to 15 inches.

Cut another stout forked stick about 4 feet in length and leave the prongs of this sufficiently long to hold the 2 sticks you have cut before.

SHOWING THE 3 MAIN STICKS REQUIRED FOR CAMP CHAIR:

Across the seat portion of the chair lash straight sticks about an inch thick & continue these up the back of the chair.

On the seat portion they **MUST BE** close together but on the back they can be spaced 2 or 3 inches apart.

SHOWING THE FRAMEWORK OF A CHAIR USING HOOKED STICKS:

There may be difficulties in finding 2 sticks with wide angled prongs in which case you can make your chair by using 2 hooked stakes.

The crotch of the hook should be 8 inches above the end of the stick and the sticks themselves should be about 3 feet 6 inches long.

2 poles each about 5 feet long are laid one each through the hooked portion of the sticks that have their upper ends lashed together.

These 2 poles are lashed together behind the chair and a forked pole leading from the upper end where the hooked stakes are lashed comes back to these 2 side poles and is lashed again. This gives you the framework for your chair.

A good bushman makes himself comfy wherever he may be. The simple seat of course is either to roll up a log or select a site where a fallen tree will serve you. Also you can use a few stones to build up a platform and between these you can lay 2 or 3 poles for your seat.

CAMP SEAT:

A very comfy fireside camp seat can be made by driving 2 short stakes into the ground so that the forks are pointing outward that is away from the opposite stake.

The bottom of the forks should be from 8 to 10 inches above the ground level. 2 back forked stakes about 3 feet 6 inches long are driven into the ground 15 to 18 inches behind these 2 short stakes.

These back stakes should be driven in on a slight angle, leaning away from the 2 forward forks. The forks of the rear stakes should point outward.

Both short and long stakes should be not less than 2 inches thick and the fork at least 1 and half inch thick.

The short stakes should be at a convenient distance from the fireplace anything from 3 to 6 feet depending upon the size fire you usually build.

Cut 2 cross bars each about 3 inches thick and cut nicks in these so they fit snugly in place in the forks & connect front & rear forks.

Length ways lay straight smooth sticks, 1 to 2 inches thick. These **MUST BE** close together. Along the back that is to the tall stakes, lash similar sticks from 2 to 3 inches apart.

This makes an excellent fireside camp seat and the comfort it gives well repays the 1/2 hour it took to build.

CAMP BEDS 10 MINUTES:

A sound night's rest is worth 10 min toil. Time spent in making a camp bed that will keep you both comfy and warm are time well spent even for Rambo. Cut 2 poles 6 to 7 inches thick & about 7 feet long.

Lay these parallel to each other 3 feet apart & to prevent them from rolling put pegs at head and foot, driven well into the ground with about a foot of the peg above the pole.

Cut about 20 or 30 straight strong sticks 3 and half feet long and lay these every 4 inches across the 2 poles. Now on top of these cross sticks place 2 poles 3 to 4 inches thick and 7 feet long.

They should lie against the peg driven in to hold the 2 bed poles secure. At the head end of the bed lay about 6 cross sticks on top of these last 2 poles.

Now cut green brushwood, fern or waste green stuff such as sucker growth or weedy bushy material and put this so that the main stalks are length ways along the bed.

Pile it high between the top poles and lying across the cross sticks. The resulting bed will be as springy & comfy as any you have ever slept in your life.

TRAVOIS:

For bringing fuel or your prepared kill back to camp, or for other loads a travois will work if the ground is fairly smooth-it will not on rough and boulder strewn terrain.

Choose two boughs with some spring to them and lash cross-piece as for the ladder. Add additional struts to provide closer support.

Pull the load on its runners like a sled. If you are pulling loads over a short distance, lash the runners to come to a single grip (A) For a larger version leave the last space clear or fit leather or fabric shoulder straps to haul it by (B).

SHOWING THE FRAMEWORK WITH TABLE TOP POLES AND SEAT POLES:

For the framework select 2 forked stakes at least 3 inches thick & 4 to 5 inches long. The length depends upon the soil and how far you will have to drive the stakes into the ground to make them quite secure.

The lower end of each stake is sharpened and the head beveled.

The first stake should be driven well into the earth so that the lowest part of the crotch of the fork is 3 feet above the ground.

The prong of the fork should be pointing out from the length you want your table say from 4 to 7 feet and drive in the other stake with its prong also pointing outward that is away from the first stake.

This stake **MUST** also be driven the same depth into the ground as the first stake. Cut 4 strong straight stakes 4 feet 6 to 5 feet in length and at least 2 1/2 inches thick.

Place these with one end in the crotch of the forks and at right angles to the line of the forked stakes.

Note where the sticks cross each other in the forks and scarf out cuts in each so that the 2 will nest together in the crotch.

These side poles carry the table poles and the seat poles so they **MUST** seat securely in the forks.

On to these side poles and about 2 feet above ground level 2 strong poles 2 inches thick are securely lashed.

These poles are for the table and later straight sticks are laced side by side across these poles for the actual table top. 15 inches above the ground level 2 very strong poles 3 inches thick and 7 to 8 feet in length are lashed.

These lashings **MUST BE** very tight to make these 2 poles secure to the 2 side poles and also to the forked stakes you first drove into the ground. These poles serve both as a bracing to carry the seat.

Your table is now ready for finishing. Cut short straight sticks for the top. You will need 8 sticks for every foot in length of table top.

The seat-sticks at least 3 to 4 inches thick are cut 1 foot longer than the length of the table.

You will need at least 3 of these seat sticks for each side. They are not lashed to the cross poles but allowed to lie on them so that the distance of the seat from the table can be adjusted by either pulling or pushing them in.

SHOWING HOW TO BRACE YOUR TABLE IF THE GROUND IS SOFT OR SANDY:

If the ground is soft or loose sand your table will require bracing and this can be done simply by 2 diagonal braces from the table level of each of the forked stakes to the foot of the other. Where the bracing cross they should be lashed.

An alternative is to cut 2 five foot forks of the stakes in the ground. Their own butts **MUST BE** firmly seated on the ground & held from slipping by a stout peg driven well in the ground.

This type of structure is recommended for a portable table. When securely lashed the whole table is **EXTREMELY** strong. A fly thrown over the top bar can be used to give shade.

OTHER TYPE CAMP TABLE DRY COUNTRY:

It is simply to dig 2 trenches, 2 or 3 feet apart on their inside edges and at least 10 to 12 inches deep.

Only suitable when earth is clay or firm enough to be dug in clean sods. Sods are used to give height to the seat.

STICK HAMMOCK:

A camp loom is set up and the hammock is woven using vines, twisted bark fibbers, grass rope etc. for the weaving and sticks about 1 inch thick for the cross parts. The hammock should be at least 3 feet wide by 7 feet long.

The end 2 spreaders should be 2 inches thick & from these short lengths of rope are brought to the central rope by means of which the hammock is suspended.

Ropes from each of the 4 corners will also serve to suspend the hammock. A grass mattress also woven on the camp loom makes an excellent cover for the hammock.

CAMP LOOM:

2 stout forked stakes about 2 inches thick are cut and driven into the ground with their lower prongs 3 feet above the ground and facing away from the direction you wish to work.

The distance between the stakes should be at least 6 inches wider than the widest article you want to weave. Across the forks a cross bar about one inch thick is laid. It is advisable to trim this cross bar of twigs and roughness and it should be fairly strong.

8 or 9 feet from the cross bar and on the side farthest from the prongs a row of straight smooth stakes each about 4 feet long is driven into the ground so that there are about 2 inches between the centers of the stakes.

These stakes should be trimmed of any side twigs or roughness. A weaving bar a few inches longer than the width of the row of stakes is cut and laid on the ground parallel and about 6 inches in front of this row of stakes. Your camp loom is now ready to be set up for a weaving.

An alternative to the row of stakes and a considerable improvement if a situation is available is to select a site where 2 trees are at a convenient distance apart.

At ground level and about 7 feet above the ground, 2 stout cross bars, 2 inches thick are lashed to the tree trunks and to these crossbars a series of smooth vertical sticks are lashed at the top & bottom. These sticks are about 2 inches apart at centers.

TO WEAVE ON CAMP LOOM:

Lengths of the weaving material are tied to the stakes are shown brought back over the crossbars & then forward & between the stakes & then tied to the weaving bar in front of the row of stakes (this is the "weft" of your weaving).

A ball of material is tied to the outside strand and then passed between the 2 rows of strands (this is the warp) with the weaving bar lying on the ground.

The weaving bar is lifted above the weft and the ball returned again between the weft threads. Repeat by alternatively lifting and lowering the weaving bar.

CAMP MATTRESS OR STICK HAMMOCK:

The weft or long strands are set up as for weaving, but instead of warp (cross strands) tufts of grass, fern or other material or sticks for a stick hammock are passed between the weft.

In weaving a camp mattress it is advisable to put in a warp tie every second or third lift. This binds the sides and prevents the outside weft strands spreading.

Strands of sun dried grass, loosely spun can be woven into a covering for a camp bed if you are without blanket.

When weaving for this purpose **MAKE SURE** that the warp strands are pushed closely up to each other.

Do not try and make a camp blanket too heavy. It is far better to make 2 light grass covering than one heavy one since it is a number of layers rather than extreme thickness of 1 layer which keeps you warm

WEAVING A CAMP HAMMOCK:

Normally a hammock is made by using the netting tie and netting needle, but a serviceable hammock can be woven on the camp loom from bush materials.

The ball of warp is passed around the weft threads to form an overhand knot on the lower lay of the weft and these knots pulled tight make the weaving secure.

LADDER:

Food collecting, shelter building, trap setting and a whole lot of other task will be easier with a ladder. This one is easily made by lashing cross-piece to two long poles. Because these are set an angle, not parallel, the rungs will not be able to slip down.

BUSH LADDER:

Easily made. Select 2 long straight poles cut to equal length. Lash the thin ends together.

Spread the butts or thick ends so that they are about 2 1/2 to 3 feet apart.

To these lash the rungs & **MAKE CERTAIN** that the lashings are good and tight. Lashing the rungs is made easier if you lift the butts on to a log or a couple of big stones.

It will be easier to pass the lashing material under the poles. **MAKE SURE** that the top end is narrower than the bottom end, it is more solid that way.

SINGLE LADDER ROPE:

Cut as many hard wood chocks 1 1/2 to 2 inches thick as you require for you ladder. These are placed every 15 to 18 inches apart. The chocks should be about 4 inches across and can be cut from either square or round timber.

Bore a hole through the center of each chock. This hole should not be more than 1/8 inch larger than the diameter of the rope.

Thread the rope through the holes in the chocks and then starting at one end open the strand of the rope and slip in a 1/2 inch thick hard wood peg about 3 inches long.

Bind the rope below the peg. Slide the chock down and measure off the distance to the next step.

EMERGENCY LAMP:

A CANDLE HOLDER FROM A BOTTLE:

Open flame is **DANGEROUS** in a tent, so cut off the base of a clear glass bottle. A very easy way to cut the glass cleanly is to heat a piece of thin wire to red hot.

Bend this around the bottle where you want to cut it alternatively tie a piece of grease-soaked string round the bottle and burn it.

Then when the hot wire or burning string is around the bottle, immerse the bottle in cold water. The glass will break off evenly at the place where the wire or string encircled it.

CAMP BROOM:

A bundle of green straight sticks each not much thicker than a match stick is collected and bound tightly to a central handle, the business end of the broom is then trimmed off.

BUSH HOE: (EFFICIENT!)

Select a dead or half dead branch of hard wood, 4 to 6 inches thick with a side branch from 5 to 6 feet long & 1 inch & half thick coming off it at a fairly wide angle. Trim the side branch so that it's smooth.

With your machete trim the main branch so that it is a hook to the handle part. See that it is sharpened to a chisel edge. This bush hoe is quite an efficient digging tool particularly if the digging end is fire hardened.

BUSH SLED:

There are occasions when it **IS NECESSARY** to move a heavy load and a bush sled can be easily made from a forked branch of a tree. The branch is cut with the prongs of the fork a couple of feet behind the end of the main branch.

A rope or other means of towing the sled is fastened on to this main part of the branch & across the forks a few straight sticks are laid & the load placed on top of these.

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Notes of the co-author Ropes & Knots missing here to find a translator meanwhile use the little we have from knots.htm

see **knots.zip**

PHILOSOPHY ??? OF ROPE: YES !

ROPES AND LINES HAND ON & ON sas161

Ropes can be made from any pliable, fibrous material producing strands of sufficient length & strength.

Nylon rope have the advantage of great inherent strength,lightness, resistance to water, insects and rot.

However nylon rope should not be the automatic choice if choosing equipment.

Nylon has the disadvantage that it can melt if subjected to heat and friction on a rope produces heat.

It is also slippery when wet. While its tensile strength is good, nylon also tends to snap if subjected to tension over an edge - it does not have to be a very sharp edge either, so **BE CAREFUL** of this.

TYPES OF ROPE:

Kernmantel type encloses a central core of strands in an outer sheath. Easier to handle, except when icy or wet, but no stronger as hawser. It can unravel if cut.

Traditional Hawser-laid rope has 3 bundles of fibres twisted together. If one is severed the others may hold.

CHOOSING ROPE:

Match type, thickness and length of rope you carry to the demands you expect to make on it.

Nylon will have advantages in very damp climates and when weight is critical but **REMEMBER** its drawbacks. Thickness of 7mm (5/16in) and below are difficult to handle.

Rope about 9-10mm (3/8in) is usually recommended for Lashing, Throwing and **Mountaineering**.

It can be used for safety lines and for climbing, provided belay and abseiling techniques are used.

It is not thick enough for a hand over hand and foot grip. A length of 30-40m (100-125ft) would then be as much as can be carried without encumbrance.

Climbing rope MUST BE elastic, to absorb some of the shock, without putting enormous strain on anyone who falls. 2 rpt in climb..

See if it has the approval of official mountaineering bodies or conforms to the British Standard 3184 (for Hawser laid ropes)

TAKING CARE OF ROPE:

Rope MUST BE protected from unnecessary exposure to damp or strong sunlight and in case of natural fibres from attack by rodent and insects.

If it does get wet do not force-dry it in front of a fire. Do not unnecessarily drag it along or leave it on the ground.

Dirt can penetrate and particles of grit work away at the fibres from inside the rope. If weather conditions will make drying possible, it is worth to wash a **very** dirty rope in clean water.

Try to keep a rope for the job for which it was intended. Do not use climbing rope as clothesline or lashing if you can **AVOID** it.

Though in survival situation you may have to use the same length for many purposes.

Whipping the end of the rope will prevent fraying. To prevent a rope becoming tangled, store and carry it in a coil or skein.

It will be easier to handle and to pay out when needed. Rope is a valuable equipment. You may have to trust your life to it. Do your best to keep it in good condition

SIMPLE COIL:

Make a coil of rope 35-45cm (14-18in) in diameter, keeping each circle of the rope alongside the next without twisting or tangling. Leave a length at each end ready for fastening.

1): Bend one end (a) back along the coil and wrap it with the other end (b).

2) Feed the "wrapping" end through the loop (c) and pull (a) to secure (3): Tie off with a reef knot shown later (4)

FOR LONGER ROPES:

If you wish to carry long ropes over your shoulder or suspended from a belt or from a pack, form a skein.

Loop the rope backward and forward over your arm, letting it hang down about 35-60cm (18-24in) long. Leave the ends free (A).

Take both ends together and wrap them several times around the skein (b). Make a loop and take this through the top part of the #skein# (c) and finally pass the ends through this loop (d) Now tie off on to your pack with a reef knot.

THROWING A ROPE:

It is easier to throw a coil of rope than to attempt to sling a loose end - whether you are throwing upwards or outward - and it helps to split the coil so that it does not tangle.

Have a large knot or weight on the throwing end. **MAKE SURE** that you keep hold of the other end ! Think about the anchored end and what will happen to it when the other end reaches target.

If throwing a lifeline for instance to a fast-moving raft on water, are you going to be pulled into the water yourself? Anchor the end to a tree or weight.

ALWAYS over-throw a line so that the recipient stands a good chance of catching part of the rope even if they miss the end.

Coil half the rope on to the fingers and the palm of the right hand, then raise the index finger and coil the remainder on the other fingers only.

Pass the second coil back to the left hand. As you throw release the right-hand coil a split second before the left.

Anchor your end if you think there will be sudden strain on it and your position is precarious.

FOR A LONG THROW:

Tie a suitable missile to the end of the rope (a) Coil the rope **carefully** on the ground or loop it loosely over the other hand so that it will pay out freely as you throw the missile. Don't risk losing your end of the rope.

Tie that to an anchor, a heavy stone for instance. Use a Killick Hitch (later). If throwing a weighted rope over a branch keep out of its path as it swings back towards the throwing point! If throwing a lifeline PLEASE don't knock out the person that you are trying to help.

ROPE MAKING:

THE MA-KING OF ROPES & CORDS:

Almost any natural fibrous material can be spun into good serviceable rope or cord and many material which have a length of 12 to 24 inches or more can be braided or plaited.

Ropes of up to 3 and 3 inches diameter can be laid by four people & breaking strains from bush made rope of 1 inch diameter range from 100 to as high as 2,000 or 3,000 lbs.

BREAKING STRAINS:

Taking a three lay rope of 1 inch diameter as standard the following table of breaking strains may serve to give a fair idea of general strengths of various materials.

For safety sake **ALWAYS** regard the lowest figure as the breaking strain unless you know otherwise.

Green grass= 100 to 250 lbs. / Bark fibre= 500 to 1,500 lbs. / Palm fibre = 650 to 2,000 lbs. Sedges= 2,000 to 2,500 lbs. / Monkey ropes (liana)= 560 to 700 lbs.

Lawyer vine (calamus)= 1/2 inch diam = 1,200 lbs. Double the diameter quadruple the breaking strain. Halve the diameter & you reduce the breaking strains to 1 fourth. (1/4).

PRINCIPLE OF ROPE MAKING MATERIALS:

To discover whether a material is suitable for rope making it **MUST HAVE 4 qualities:**

It **MUST BE** reasonably long in the fibre. It **MUST HAVE** strength. **MUST BE** pliable and **MUST HAVE** grip so that the fibres will bite onto one another.

3 SIMPLE TESTS:

There are 3 simple tests to find if any material is suitable; First pull on a length of the material to test it for strength.

The second test via strength is to twist it between the fingers and roll the fibres together; if it will stand this and not snap apart tie a thumb knot in it and gently tighten the knot.

If the material does not cut upon itself but allow the knot to be pulled taut then it is a suitable for rope making providing that the material will bite together and is not slippery or smooth.

You will find these qualities in all sorts of plants in ground vines, in most of the longer grasses, in some of the water reeds and rushes, in the inner barks of many trees and shrubs and in the long hair or wool of many animals.

Some green freshly gathered materials may be stiff or unyielding. When this is the case try passing it through hot flames for a few moments.

The heat treatment should cause the sap to burst through some of the cell structure and the material thus becomes pliable.

Fibres for rope making may be obtained from many sources; Surface roots of many shrubs and trees have strong fibrous bark.

Dead Inner bark of fallen branches of some species of trees and in the new growth of many trees such as willows. In the fibrous material of many water and swamp growing plants and rushes.

In many species of grass and in many weeds (pot!?!). In some sea weeds. In fibrous material from leaves, stalks and trunks of many palms & in many fibrous leaved plants such as the aloes.

GATHERING AND PREPARATION OF MATERIALS:

In some plants there may be a high content of vegetable gum and this can often be removed by soaking in water or by boiling or again by drying the material and teasing it into thin strips.

Some of the materials have to be used green if any strength is required. The material that should be green include the sedges water rushes and should be cut **NEVER** pulled.

Cutting above ground is harvesting but pulling up the plant= destruction. It is advisable no to denude an area entirely but to work over a wide area location and harvest the most suitable material leaving some for seeding and further growth.

For the gathering of sedges and grasses be particularly careful therefore to harvest the material that is to cut what you require above the ground level and take **only** from the biggest clumps.

By doing this you are not destroying the plant but rather aiding the natural growth since you are truly pruning. It is easiest method.

Many of the strong leafed plants are deeply rooted and you can not simply pull a leaf off them.

Palm fibre in tropical and sub tropical area is harvested. You will find it at the junction of the leaf and the palm trunk or lying on the ground beneath many palms.

Palm fibre is natural for making ropes and cord. Fibrous matter from the inner bark of trees and shrubs is generally more easily used if the plants is dead or half dead.

Much of the natural gum will have dried up and when the material is being teased prior to spinning the gum or resin will fall out in fine powder.

There may be occasions when you will have to use the bark of green shrubs but **AVOID** this unless it is **ABSOLUTELY ESSENTIAL** and cut **only** a branch here and there.

NEVER cut a complete tree just because you want the bark for a length of rope.

TO MAKE A ROPE BY SPINNING WITH THE FINGERS:

Use any material with long strong threads or fibres which you have previously tested for strength and pliability.

Gather the fibres into loosely held strands of even thickness. Each of these strands is twisted clockwise. The twist will hold the fibres together.

The strand should be from 1/8 inch downwards for a rough and ready rule, there should be 15 to 20 fibres to a strand.

2, 3 or 4 of these strands are later twisted together and this twisting together or laying is done with an anti-clockwise twist while at the same time the separate strands which have not yet been laid up are twisted clockwise.

Each strand **MUST BE** of equal twist and thickness. The person who twists the strands together is called the layer and he **MUST** see that the twisting is even. That the strands are uniform and that the tension on each strand is equal.

In laying he **MUST** watch that each of the strand is evenly laid up that is that 1 strand does not twist around the other two. (A thing you'll find happening the first time you try to lay up.)

When spinning fine cords for fishing lines, snares etc considerable care **MUST BE** taken to keep the strands uniform and the lay even.

Fine thin cords of nor more than one thirty second of an inch thickness can be spun with the fingers and they are capable of taking a breaking strain of 20 to 30 lbs or more. Normally 2 or more people are required to spin and lay up the strands for a cord.

Yet many natives when spinning cord do so unaided, twisting the material by running the flat of the hand along the thigh with the fibrous material between hand and thigh and with the free hand they feed in fibre for the next spin.

By this means one person can make long length of single strands. This method of making cord or rope with the fingers is slow if any considerable length of cord is required.

A more simple and easy way to rapidly make lengths of rope of 50 to 100 yards or more in length is to make a rope walk and set up multiple spinners in the form of cranks. See photo 259b.

In a rope walk, each feeder holds the material under one arm and with one free hand feeds in into the strand which is being spun by the crank.

The other hand lightly hold the fibres together till they are spun. As the slightly spun strands are increased in length they **MUST BE** supported on crossbars.

DON'T let them lie on the ground. You can spin strand of 20 to 100 yards before laying up. Do not spin the material in too thickly. Thick strands do not help strength in any way rather they tend to make a weaker rope.

SETTING A ROPEWALK:

When spinning ropes of 10 yards or longer it **IS NECESSARY** to set crossbars every 2 or 3 yards to carry the strands as they are spun.

If cross bars are not set up the strands or rope will sag to the ground and some of the fibres will tangle up with grass, twigs or dirt on the ground.

Also the twisting of the free end may either be stopped or interrupted and the strand will be unevenly twisted.

The easiest way to set up crossbars for the rope walk is to drive pairs of forked stakes into the ground about 6 feet apart and at intervals of about 6 to 10 feet.

The crossbars **MUST BE** smooth and free from twigs and loose portions of bark that might twist in with the spinning strands.

The crossbar "A" is supported by 2 uprights and pierced to take the cranks "B". These cranks can be made out of natural sticks, morticed slab and peg or bent wire if available.

The connecting rod "C" enables one man to turn all cranks clockwise simultaneously. Whatever turns your crank boy!

Crossbars supporting the strands as they are spun are shown "D". A similar crank handle to "C" is supported on a fork stick at the end of the rope walk.

This handle is turned in reverse(anti-clockwise) to the cranks "C" to twist the connected strands together. These are laid up by one or more of the feeders.

ALWAYS MAKE IT A RULE TO TURN THE FIRST STRAND CLOCKWISE; then the laying up of the strands will be done anti-clockwise and the next laying will again be clockwise. Proof that your rope is well made will be if the individual fibres lie lengthways along the rope.

In the process of laying up the strands, the actual twisting together or laying will take some of the original twist out of the strands which has not yet been laid. Therefore it **IS NECESSARY** to keep twisting the strands whilst laying together.

When making a rope too long to be spun and laid in one piece, a section is laid up and coiled on the ground at the end of the rope walk farthest from the cranks.

Strands for a second length are spun and these strands are married or spliced into the strands of the first section and then the laying up of the second section continues the rope.

The actual marrying of the strands is done **only** in the last lay which when completed makes the rope. The ends where the strands are married should be staggered in different places.

By this means rope can be made and extended in section of great length. After your complete length of rope is laid up.

Pass it through fire to burn off the loose ends and fibres. This will make your rope smooth and most professional looking.

LAYING THE STRANDS:

(Stranded on a sea-shore?)

The strands lie on the crossbars as they are spun. When the strands have been spun to the required length which should be more than about a 100 feet they are joined together by being held at the far end. They are then ready for laying together.

The turner who is facing the cranks twists the ends together anti-clockwise at the same time keeping his full weight on the rope end which is being laid up.

The layer advances placing the strands side by side as they turn. Laying up is **very** fast when the layer is experienced. He quickly gets the feeling of the work.

It is **important to learn to feed the material evenly, and lay up slowly** thereby getting a smooth even rope.

Do not try to rush the rope making. If you do you will have uneven, badly spun strands and ugly lays and poor rope.

Speed in rope making **only** comes with practice. At first it will take a team of 3 or 4 up to 2 or more hours to make a 50 yard length of rope of 3 lays, each of 3 strands.

That is 9 strands for a rope with a finished diameter of about 1 inch. With practice the same 3 or 4 people will make the same rope in 15 to 20 minutes.

These times do not include the time for gathering the material. In feeding the free ends of the strands twist in the loose material fed in by the feeder.

The feeder **MUST** move backwards at a speed governed by the rate at which he feeds. As the feeder moves backwards he **MUST** keep a slight tension on the strands.

MAKING ROPE WITH A SINGLE SPINNER:

2 people can make a rope using a single crank. A portion of the material is fastened to the eye of the crank as with the multiple crank and the feeder holding the free end of this trend against the bundle of loose material under his arm feeds in, walking backwards.

Supporting crossbars as used in ropewalk are required when a length of more than 20 or 30 feet is being spun.

FEEDING:

If the feeder is holding material under his left arm, his right hand is engaged in continuously pulling material forward to his left hand which feeds it into the turning strand.

These actions done together as the feeder walks backwards govern the thickness of the strands.

(His left hand lightly closed over the loose turning material **MUST** feel the fibres biting or twisting together.)

THICKNESS OF STRANDS:

Equal thickness for each of the strands throughout their length & **equal twist are important**. The thickness should not be greater than **IS NECESSARY** with the material being used.

For grass rope the strand should not be more than 1/4 inch in diameter for coarse bark or palm not more than 1/8 to 3/16 and for fine bark or hair or sisal fibre not more than 1/8 inch.

For cords the strand should be **NO MORE THAN** 1/16 inch diameter. Fine cords cannot be made from grass unless the fibres are separated by beating out and combing. The correct amount of twist is when the material is hard that is the twist is tight.

FAULTS COMMON WITH BEGINNERS: (EVE-hand Begin-Hers?)

There is a tendency with the beginner to feed unevenly. This wispy sections of strand are followed by thick husky portions. **Such feeding is useless.**

Rope made from such strands will break off with less than 1/4 of the possible strain from the material.

The beginner is wise to twist and feed slowly and to make regular even strands rather than rush the job and try & make the strand quickly. Speed with uniformity of twist and thickness come **only** with practice.

In a short time when you have the feel of feeding you will find you can feed at the rate of from 30 to 60 feet/min. **Thick strands do NOT help.**

IT IS USELESS TO TRY AND SPIN A ROPE FROM STRANDS AN INCH OR MORE IN THICKNESS.

Such a rope will break with less than half the potential strain of the material. Spinning thick strands does not save time in rope making.

LIANA, VINES & CANES:

Mondo Cane? or ask Tarzan or Jane!

Liana and ground vines are natural ropes and grow in sub-tropical regions scrub and jungle.

Many are of great strength and **USEFUL** for bridging, tree climbing etc. The smaller ground vines when plaited give great strength and flexibility.

Canes and stalks of palms provide excellent material if used properly. **Only** the outer skin is tough and strong and this skin will split off easily if you bend the main stalk away from the skin.

This principle applies to the splitting of layer cane (calamus), all the palm leaf stalks and all green material.

If the split start to run off, you **MUST BEnd** the material away from the thin side & then it will gradually gain in size and come back to an even thickness with the other split side.

BARK FIBRES:

(To bark or not to bark?)

The fibres in many barks which a suitable for rope making are close to the innermost layer. This the bark next to the sap wood.

When seeking suitable barks of green timber, cut a small section about 3 inches long and an inch wide.

Cut this portion right from the wood to the outer skin of the bark. Peel this specimen and test the different layers.

Green bark fibres are generally difficult to spin because of the gum and **it is better to search around for wind fallen dead branches.**

And to try the inner bark of these. The gum will probably have leached out and the fibres separate **very** easily.

Many shrubs have excellent bark fibre and here it is advisable to cut the end of branch and peel of a strip of bark for testing.

Thin barks from green shrubs are sometime difficult to spin into fine cord and it is then easier to use the #lariat plait# for small cords

Where **IS NECESSARY** to use green bark fibre for rope spinning if time permits you will find that the gum will generally wash out when the bark is teased and soaked in water for a day or so.

After removing from the water allow the bark strips to partly dry out before shredding and teasing into fibre.

PLATING:

One many may need a considerable length of rope and if he has no assistance to help him spin his material.

One can often find reasonably long material (1 to 3 feet or more) and using this material he can plait or braid and so make a suitable rope.

The usual 3 plait makes a flat rope and while quite good, has not the finish or shape nor is it as tight as the 4 or #lariat plait#.

On other occasion it may be necessary to plait broad bands for belts or for shoulder straps. A general rule for all plaits is to work from the outside in to the centre.

3 PLAITS:

Take the right hand strand and pass it over the strand to the left. Then take the left hand strand and pass it over the strand to the right and repeat alternatively from left to right.

FLAT 4 PLAITS:

Lay the 4 strand side by side. The right hand strand as in fig 1 and lay it over the strand to the left.

Now take the outside left hand strand as in fig 2 and lay it under the next strand to itself and over what was the first strand.

Now take what is now the outside right hand strand and lay it over the first strand to its left. fig 3.

Take the outside left strand and put it under and over the next 2 strands respectively moving toward the right.

Thereafter your right hand strand goes over one strand to the left and your left hand strand under and over to the right as shown in fig 4.

BROAD PLAITS:

To start, take 6 or 7 or more strands and hold them flat together. Take a stand in the centre and pass it over the next strand to the left as in fig 1.

Take the second strand in the centre to the left and pass it towards the right over the strand you first took so that it points toward the right over the strand you first took so that it points towards the right as in fig 2.

Now take the next strand to the first one & weave it under and over as in fig 3 see also fig4.

Weave the next strands from left and right alternatively towards the centre as in fig 4,5, 6. The finishing plait should be tight and close as in fig 7.

ROUND OR LARIAT PLAITS:

4 STRANDS:

1) Lay the 4 strands together side by side as in fig 1 and cross the right hand centre strand over and then around the left hand strand.

2) Take the left hand outside strand & pass it over the 2 crossed strands and then under the right hand one of the 2 so that it is pointing towards the left as in fig 2.

3) Take the free right hand strand and pass it over the 2 twisted strands to the left & completely round the left hand one of the 2 as in fig 3.

4) Repeat this with the outside left hand strand as in fig 4 / 5) repeat with the right hand strand as in fig 5 6) The finished plait should look like this. fig 6

CAUTION: ALWAYS TEST IT.

Prior to trusting your life to a bush made rope, ALWAYS TEST IT. Use your mother in law or this lousy travel agent.

Tie one end to a tree and put 3 or 4 fellows onto the other end, hang your mother in law, if it works then it is good (don't do this).

Have them take the strain gently until finally all their weight is on the rope. If they can not break it then it is safe for one man at time to use it to climb or descend a cliff face. When climbing up a bush made rope **ALWAYS** use the foot lock p261 & when descending.

NEVER slide down the rope. Climb down using the same foot lock to **AVOID** burns.

The foot lock offers a measure of safety and the climber is so secure that he can actually stand on the rope and rest without his body weight being carried entirely on his arms.

To prove this, use the foot lock and clasp the rope to your body with your arms. You will find that you are standing on the rope and quite secure.

FOOT LOCK:

By means of the foot lock you can climb to any height on the ropes, stopping to rest when your arms tire.

The foot lock is made by holding onto the rope with both hands lifting the knees and kicking the rope to the outside of one foot.

The foot on the opposite side to the rope is pointed so that the toe picks up the rope which is pulled over the foot which was against the rope and under the instep of the foot which picked it up.

The 2 feet are brought together and the rope is now over the instep of one foot & under the ball of the other.

Then to secure the grip and lock the rope the feet are place one on top of the other so that the rope is clamped down by the foot on top.

By straightening the knees and rising the hands the body is lifted and a fresh grab taken for the next rise.

In descending the body is bent the hands lowered and the foot lock released and a fresh grip taken with the feet at a lower level on the rope.

It is advisable to wear boots or shoes when climbing bush made ropes.

This method of descending is much SAFER than sliding. In sliding there is **grave risk** of bad rope burns to hands or legs.

#ABSYLE# FOR ROCK DESCENT:

The #Absyle# is used for rock descent work generally at times it also can be used to climb up or ascent.

In the #Absyle# the body is upright but the legs are stretched out and the feet pressed against the rock face.

The rope passes down between the thighs, around one thigh and diagonally up and across the upper half of the body and over the shoulder opposite then coming down at the back to be held by the left hand to check speed along with the right hand which is the master guide.

KNOTS TO LEARN AND TO SHOW PHOTO:

Joining knots: sheet bend, reef knots, fishermen knots. Securing knots, timber hitch.

SINGLE ROPE LADDER WITH STICKS:

A single ladder is made by opening the lays of the rope and inserting cross sticks each about 8 inches long as shown with an equal amount protruding on either side of the rope.

These cross sticks **MUST BE** secure to the rope and it **IS NECESSARY** to lash to the rope above and below the sticks. The distance between the sticks should be from 15 to 18 inches.

To climb a rope ladder hold the rope with both hands, bend the knees and draw both feet up together and lay them with even pressure on the next cross sticks.

When the footing is secure raise the hands and continue the action which is somewhat like that of a toy monkey on a string.

Bush single rope ladders have the advantage that they can be used easily by people who may not be able to climb by ordinary means.

They provide an easy means of ascending and descending a cliff or a look out. Go for it Jane!

SINGLE ROPE LADDER WITH CHOCKS: (Shoc-king?!)

This type of ladder has the advantage of being portable and quickly made. The chocks of hardwood are about 6 inches in diameter & 2 inches deep and are suitably bored to take the diameter of the rope.

Splice an eye at the top end and seize in a thimble to lash the rope head securely.

To secure the chocks put 2 strands of seizing between the strands of the rope and then work a wall knot.

NOTE ABOUT #CHARDON# (THISTLE)?:

They can make you an **emergency** rope even rabbit snare, split the stalk and weave a rope.

ROPE BRIDGE NOTE:

The first "A" frame is hooked onto the ropes and pushed forward with a stick.

The footing a straight sapling is dropped down onto the crotch of the frame and the bridge builder walks out along this and hooks on the next "A" frame pushing it out the required distance and repeats the process till the far bank is reached.

ROPE BRIDGES MUST NEVER BE OVERLOADED, ONE AT A TIME IS A SAFE RULE.

If Monkey vines, Liana or Lawyer vines (Calamus) are available instead of bush made rope use any of these. They are much stronger and will make a bridge strong enough for 4 to 6 men.

TO MEASURE THE DISTANCE ACROSS A RIVER OR GORGE:

Select a mark on the opposite bank "A" and then drive a stake on the near bank "B".

Walk at right angles for a known number of paces and put in another marker stake C and continue an equal number of paces and a third marker "D".

Turn at right angles away from the river and keep moving back until the centre marker stake and the mark on the other side of the river are in line "E".

Measure the distance from the third or last marker peg "D" to this point "E" and this distance will equal the distance across the river.

TO GET A ROPE ACROSS A NARROW DEEP RIVER:

Fasten a stout stick to the end of the rope. The rope **MUST BE** in the middle of the stick. Select a forked tree on the opposite bank.

Throw the free end of the coiled line with the stick across the river to the tree. After many cast when it has caught; test it with 2 or 3 people to **MAKE SURE the line is secured.**

Fasten the near end of the rope to a convenient anchor and then the person crossing the line, the lightest of the party hangs onto the line lifts his legs and hooks them over the rope with his feet toward the opposite bank.

By this means he can work himself across the river and do all the work which has to be done on that riverside.

SAFETY LINE FOR RIVER CROSSING:

A bush rope can be spun to serve as safety line for crossing flooded or fast rivers.

The rope is taken across by a team member and fastened to an anchor on the opposite bank. As a safety line it should be above the water level.

The person crossing should stand on the downstream side of the rope and face upstream, he crosses by moving his feet sideways.

One step at a time and holding all the time to the rope which helps him keep his balance if by chance the current is so strong that it sweeps him off his feet his grip on the line will save him from being washed downstream then he can regain his footing and proceed.

1-2-3- ANCHOR:

A **very** stout stake is driven into the ground at an angle of about 45 degree and to the foot of this the main rope to be anchored is fastened.

To the head of this stake 2 ropes are secured and these are fastened to the foot of 2 stakes to the rear.

The heads of these stakes are in turn tied back to the foot of 3 other stakes. This anchor will hold secure under almost all conditions.

ANCHORING A PEG IN SAND or SNOW:

The **only** way to anchor a rope into soft sand is to attach it to a peg and bury the peg in the sand.

Scrape a trench in the sand to a depth of between 12 to 18 inches deeper if high winds or **very** stormy weather are expected.

Pass the rope round the centre of the peg scratch a channel for it at right angles to the peg trench.

Fill in the trench and rope channel and fasten the free end of the rope to the standing end with a stopper hitch and pull taut.

The buried peg should hold a tent rope in sand under all normal weather conditions. Same applies in snow.

BUSH WINDLASS:

A bush windlass capable of taking a **very** heavy strain on a rope can be made by selecting a site where a tree forks low to the ground with the fork facing the direction in which the pull is required.

Alternatively a stout fork can be driven in and anchored with the 1-2-3 method. The windlass portion is a forked log. The forks are notched to take the lever up to 7 feet long.

The rope is passed round the roller a few times so that it locks upon itself. (If fork of the roller is long the rope may pass through the fork). This type of bush windlass has many uses.

ROPE MAKING: TIP 2 MAKE-KING?

Vines, grasses, rushes, bark, palms and animal hairs can all be used to make rope or line.

The tendons from animals legs also make good strings, but they tend to dry hard (**very USEFUL** for binding on arrow and spear heads).

The stems of nettles make first class ropes and those of Honeysuckle can be twisted together to make light lashing.

The stronger the fibre, the stronger the rope. Some stiff fibres can be made flexible by steaming or by warming.

While pliable vines and other long plants stems can often be used, as they are, for short term purposes, they may become brittle as they dry out. A rope made from plant fibres twisted (spun) or plaited together will be more durable.

SOURCES OF FIBRES:

NETTLES: (URTICA DIOICA)

They are an excellent source of fibres but require preparation. Choose the oldest available plants and those with the longest stems.

Soak them in water for 24 hours, then lay them on the ground and pound them with a smooth stone.

This will shred the outer surface exposing the fibrous centre. Tease and comb to remove the fleshy matter. Hang to dry.

When dry, remove and discard the outer layer. (Spin) fibres into long threads. Plaiting or twisting together to make as strong rope.

PALMS:

Usually provide a good fibre. Leaves, trunks and stalks can all be used. The husk of coconut is used commercially to make ropes and matting.

DOGBANE: (APPOCYNAM CANNANINUM) PHOTO NEED

Stems also provide good fibres, with which it is easy to work.

BARKS:

Willow bark especially produces **very** good fibre. Use the new growth from young trees.

The dead inner bark of fallen trees and tree branches should not be overlooked. But if the tree has been down too long it may have decayed too much, so test it for strength.

ROOTS:

The surface roots of many trees make good lashings. Those that run just under, or even on the surface are often pliable and strong.

The roots of the Spruce are **very** strong. The Indians of North America used them to sew Birch bark together to make canoes.

LEAVES:

Plants such as those of the Lily family, especially Aloes have **very** fibrous leaves. **Test by tearing one apart.**

If it separates into stringy layers it can provide fibres to make into ropes. Soak to remove the fleshy parts.

RUSHES, SEDGES & GRASSES:

Should be used when still green. Pick the longest specimens available.

ANIMAL TENDONS:

Are **USEFUL** for tying one thing to another. **THEY MUST BE USED WET.**

SPLITTING CANES:

BAMBOO, RATTAN AND OTHER TYPES OF CANES, VINES AND BARK;

ALL need to be split to be used for any kind of rope making. If you try to pull away thin strips, these tend to run away to nothing.

To **AVOID** this problem pull on the thick part to separate it from the thin. It saves both time and ENERGY.

TESTING FIBRES:

Tie 2 lengths together using an overhand knot. Try pulling it apart, using a reasonable amount of strength.

If it snaps the fibre is too brittle. If it is too smooth, it will slip apart. Suitable fibre will "Bite ME BABY!" and hold together well.

PLAITING ROPE:

An easy method for the less experienced is to twist and plait strands. If you make 3 thin plaits, these can be plaited together again for thicker, stronger rope.

If you are lengthening the strands as you plait, stagger the places at which you feed in new fibres.

Take a bundle of fibres, tie the ends together, anchor it firmly and split into 3 separate strands (a) Bring the left strand into the centre (b) then the right over it (c).

Then bring what is now the left strand to the centre (d) & so on (e-f) Keep twisting the strands & keep the plaiting as tight and even as you can make it.

SPINNING A ROPE:

Twist fibres together (shown here clockwise, but **what is important** is to keep to the same direction).

Feed in lengths of new fibres as you go so that their ends are staggered. When you have produced 3 lengths of fibre, anchor all 3 at one end and continue to twist each of them until quite tight.

Temporarily fastening a toggle to the end of each will make twisting easier. Now draw all 3 strands together and twist all three clockwise - the opposite direction.

Continue to add and twist until you have produced the amount of rope you needed. You will need to secure a completed section in a cleft stick to keep it tight as you work.

Wrap the rope around a tree trunk to keep the working length short. To make a thicker rope repeat the process with 3 ropes you have already made or plait 3 simple ropes together.

REMEMBER:

When making a rope try to keep the thickness of the strands equal and even along their lengths. It is where a lay has a thin section that the rope is most likely to break.

WHIPPING ROPES: (OUCH!)

The end of a rope **MUST BE** secured in some way so that it does not unravel. To prevent the strands from fraying, bind the rope with twine.

Good binding or "whipping" **MUST BE** tight and neat to be effective. If it is too slack it will work loose or fall off. It is difficult to make a good whipping with thick cord and very? this is prone to slip.

Experience will enable you to match the thickness to the job. Use the whipping techniques to add a comfortable grip to handles of axes and parangs or, thicker to replace handle of a knife.

- 1) Lay a length of twine along the side of the rope, leaving its end (a) projecting a hand's length beyond the rope's end.
- 2) Whip the twine (b) around the rope, working towards the end, and gradually covering the piece you have laid along it.
- 3) Now form the loose end of the twine (a) into a loop and lay it back along the whipped section.
- 4) Carry on with the whipping covering the loop until you have nearly reached the end of the rope.
- 5) Now pass the end (b) whipping through the loop and pull the short end (A) tight. Trim off ends neatly.

KNOTS: ??? NUT SO FAST ???

There is a knot for every job and it is **important** to select the right one for the task at hand.

You **NEVER** know when you may need to tie a knot so learn their uses and how to tie each one - well enough to tie them in the dark and under all kinds of conditions.

Learn to untie them too. The **only** thing that is worse than tying a knot that comes undone is a knot that CANNOT be undone at a crucial moment.

In the instructions for individual knots that follow the end of the rope or cord being used to tie the knot is referred to as the "live end" to distinguish it from the other end of the rope or "standing part".

NETTING (NOT KNITTING):

#NOEUD DE TISSERAND#:

USES: Confection of nets, hammocks, snares. Knot 2 different size of ropes.

#Fold the strand the small one under the big one fig 1. Grab the fine cord and coiffer# its end as fig 2.

Then pass the big strand in the loop thus formed fig 3. Pull taut by pulling on A fig 4

NETTING TIP 2:

Hammocks and nets are made by the use of netting needle and a mesh stick.

Either of the 2 types of netting needle shown in fig 1 are suitable and easily made from a thin piece of hardwood or bamboo.

The netting needles may be about 8 to 9 inches long and from 3/4 to 1 inch wide.

The mesh stick may be about 5 inches long oval 3/4 X 1/4 the netting cord is put on to the netting needles as for an ordinary shuttle with needle B & with needle A the cord is looped round the pin in the centre of the eye.

At one end of the string tie a loop and place the knot on a conveniently high nail or hook. The mesh stick is put under the loop and the needle with cord passed through as in fig 3.

The needle and cord are passed in front of the loop formed in fig 3 and under the original loop while at the same time the other end of the cord is held on to the mesh stick with the thumb of the left hand.

The knot is pulled taut. A succession of these loops are formed until the requisite width is reached then this first series of loops are placed through a rod or cord and the loops are netted on to them until the requisite length is reached.

NET MA-KING:

SNARE MAKING TOO!:

Net can be made either by making knots along a pre-cut lengths of line or by knitting mesh row by row. They are not **only USEFUL** for fishing.

A gill net can also be hung between trees to catch bird and purse net, made from twine can be placed over animals burrows .Use the same technique to make a hammock from strong twine.

GIL NET:

Make this from parachute cords or from two thickness of twine. Parachute cord consist of inner core of fine line within an outer core.

Pull the fine inner line out and cut it into manageable and equal lengths or cut lengths of thinner strings.

Their length will determine the dept of your net, which will be about 3/8" that of the length of the line. Decide how wide you want your net and set the 2 poles that distance apart.

Tie a length of parachute cord outer or thicker twine between the 2. Cut a piece of wood about 3-5cm (1 1/4in) across. Use this as a gauge to space out the thinner vertical threads (inner core).

Fold each length double and use the bight to make a Prusik knot over the top cord and repeat across its length.

Slide the Prusik knots along to space them out equally using your gauge.

For the first row, working from left to right, ignore the **very** first individual strand, but take the second of the pair.

Hold it with the first strand of the next pair and tie both together in an overhand knot. Take the remaining strand with the first of the next pair and knot.

Continue along the line, using your gauge to control spacing. Proceed to the next row in the same way but this time include the outside lines to produce a row of diamonds. Continue until the line is used up.

To finish off the bottom, stretch another thicker line across between the supports and tie off all the inners (or thinner strings) in pairs around it.

Carry each pair around it twice, Separate the pair and tie off around the pair.

Complete the pair by securing the top and the bottom lines at each corner of the net so that the net will not slip off the ends.

Any surplus can be used for attaching the net to supports and weights to keep it in position when in use.

KNITTING A NET:

A method suitable for nylon fishing line or any other fine line. you need a horizontal sting between posts, a main gauge, and a needle. (or just call the nearest hardware store!!!).

Make the needle (A) about 15cm long by 2.5cm wide (6 X 1in) from hardwood or bamboo.

Make a notch at either end and wind line around the whole needle; or try something more traditional like the lower drawing.

The needle **MUST BE** smooth. The line is gradually unwound as you make the net.

To make the net, tie a top of required length between uprights. Begin by tying a clove hitch thinner line (C) take the needle behind the top line and bring it forward to make another clove hitch (D).

Repeat along the line, spacing the knots out with your gauge. (E)

When the rope row is complete go to the other side of the post (easier than working backward) and make the next row. Make each new loop large enough to form a square of mesh (half square at each side).

Take the needle through the loop of the row above from behind, round the back of the loop and then through the front of the loop it makes. (F).

Adjust the depth with your gauge before you tighten. (G). Switch sides again and work back in the opposite direction for the next row and continue until the nest is the required length.

Tie off the bottom line with another thicker twine using the make knot but keeping the line straight without loops.

Leave some free line at both ends. Tie in the ends at the top corners and the net is completed.

NET HAMMOCK:

Make a net about 75cm (2 1/2 ft) across and wider than your height. Use a good strong twine or rope for the loop and bottom lines- double twine would be a good idea.

The ends have to carry your weight. Leave those ends long enough to suspend the hammock by.

Cut two spacer bars to keep the hammock open. Notch the ends and slip the cords into the notches (A).

To simplify hanging the hammock you could tie each pair of end lines to a fixed loop such as a Bowline.

Then fix one end with a round turn and two half-hitches, the other with a quick release knot in case you ever need to leave the hammock in a hurry if Caesar is at the door !

FISHING KNOTS:

HOOK ON TO GUT = TURTLE KNOT:

Soak the gut, Thread it through eye of a hook. Make an overhand loop and pass a bight through it (A) to form a simple slip knot. (B) Pass hook through slip knot (C) and pull tight around shank.

HOOK ON TO NYLON #1 = HALF LOOP KNOT:

Tread end through eye. Make 4 turns around standing part. Pass live end through the loop formed next to the hook (D). Pull taut and sniff off fairly close to end (E).

HOOK ON NYLON #2 = TWO TURN TURTLE KNOT:

Thread the hook. Pass the live end around the standing part to form a loop and through it. Twist live end around side of loop.

Hold the loop and pull the twist tight. Pass the hook through the loop. (F) Pull on standing part to tighten loop on hook. (G)

JAM KNOTS: (GUITAR!)

For securing improvised hook to guitar or cord.

WITH AN EYE:

Thread gut, make 2 turns around hook and bring live end up through turns (H). Ease tight and test for strength.

WITHOUT AN EYE:

Make a loop around lower part of shaft. Make 2 half-hitches from upper end downward and pass live end through lower loop (I). Pull on standing part to tighten.

LOOP IN NYLON #1 OR DOUBLE OVERHAND LOOP:

Double the line to make a bight. Tie an overhand in it. (A). Twist the end through again (B) Pull tight (C) and snip off end.

LOOP IN NYLON # 2 = BLOOD BIGHT:

Form a bight. Twist the end of it back around the standing part (D) Bring end back through new loop (E) Pull tight and snip off the loose end.

JOINING LOOPS:

CAN BE USED IN NYLON LINE BUT WILL WORK FOR DIFFERENT STRONG MATERIAL.

A fishermen's knot is recommended for gut, which probably could not stand the strain of this method.

WITH FREE ENDS:

Pass each line through the other loop (F) and pull tight (G).

WITH ONLY ONE FREE:

Make loop on one line. Take the live end of the other line through the loop, around it, and back through and then tie off with either of the knots for hooks on to nylon.

JOINING NYLON = DOUBLE 3 FOLD BLOOD KNOTS:

Place ends alongside and twist one 3 times around the other. Bring live end back and pass it through the space where the 2 lines cross over the other line and under its own standing end. (H)

Do the same in the opposite direction with the other line. The live ends end up pointing in opposite direction (I) Ease tight.

ROPE MAKING:

#CORDELIERE:#

Before starting making a rope you **MUST** use a #cordeliere#. Once you have chosen a series of strand as long and as solid as possible you tie them to a fix point.

At the other end you fix a stick or pen which will be used as a #manivelle#.

Against this stick you #enserre# the strands without blocking them and with the other hand index you turn the #manivelle# (1).

When the torsion is strong enough you will suspend a weight which has a hook in the middle of the #torsade do not rapproche both ends tout en les maintenant bien tendues#. Under the weight tension the #cordeliere# will then enrolle regularly#. (2).

The hook permits to remove the weight without having to cut the #cordeliere#.

For this work you can also use a hand drill which you have install a hook replacing the normal drill bit.

However the strands having a limited resistance do NOT exaggerate the torsion.

To have more #souplesse# it is best to put the strands in the water before starting your rope making.

#CORDELETTE#:

To make it you **MUST** first make a #rouet de cordier#. In a pressboard or strong cardboard cut 3 plates of about 8cm square.

In each of these board make 3 holes in a triangular position. In 2 of the boards which will be used as leaders you will pass 3 wires which **MUST BE** fairly rigid and which will end by a hook. The third board will be used as #passe-fils# (4).

Here is how you build the whole thing up. Each of the 3 #fils de caret# is tied to a fixed point.

They are then pull through the #passe-fils # holes and come to tie themselves to the wire hooks. Each #fil de caret# can be formed from one or many strands.

One can add many of them by tying them with a #tisserand# knot which will loose itself in the rope making. The #fonctionement du rouet# is very simple.

Using your left hand you grab the board which is on the side with the hooks and with your right hand you turn the other by making a rotation movement with each hooks.

During that time a helper will maintain the #passe-fils near la torsade qui se forme.#

The helper is feeding it **very** slowly as he feels that there is sufficient #torsion# strength. The #torsion de caret# and its reunion into one rope is what is referred as "commettage" or committing. (Rope making) .

AXE ESSENTIAL TO SURVIVAL:

THE MOST IMPORTANT PIECE OF SURVIVAL EQUIPMENT SECOND TO THE SIGNAL MIRROR & SURVIVAL KIT = AXE. (not T-AX!)

This an IRREPLACEABLE TOOL EVEN MORE NECESSARY THAN A GUN:

A man lost in the forest can with an axe snare nearly all games, construct shelter, cut wood and survive where there are no chances of doing so just with a rifle.

Even on a well know path, the axe becomes indispensable to mark well the trees as you go on, and if you want to come back without using a compass.

Also it can be used as a pick or hook on very hard ground, use it as hammer etc. **KEEP IT SHARP & SAFE SO AS NOT TO GET HURT.**

CAUTION:

This most important piece of survival equipment is also the most abused. In the battle of man against nature the odds greatly favour the person who is able to utilise available equipment to the full and knows how to care for it.

It has been found that some persons have failed to survive even under reasonably good conditions not from lack of equipment but from failure to care for it and use it to the best advantage.

BEFORE USING AN AXE ALWAYS MAKE THE FOLLOWING CHECKS:

1) ALWAYS CHECK HEAD FOR TIGHTNESS OF HANDLE.

If it is loose either drive the wedge further home or make a new wedge using hard wood.

Soaking the head is another method but it is not recommended for winter time as ice may form on the handle and inside the head allowing the head to slide off and cause possible injury.

To drive the head further into the head. Stir the end of the handle, not the head of the axe.

2) ALWAYS CHECK FOR SHARPNESS:

A dull axe can be DANGEROUS for 2 reasons. First it will not bite properly and will tend to glance off the wood being cut. Secondly when blunt it **IS NECESSARY** to use more force which usually means a sacrifice of control.

3) Check that the handle is **not cracked or split**. A **serious** cut of sliver might be received

4) When carrying an axe **BE SURE** that the sharp edge is held **AWAY** from the body so that in the event of a fall there will then be less chance of injury.

HOW TO SHARPEN AXE etc.:

To do the job well you **MUST** use a file & a wet stone, if no file then the stone will do the job but not as good. **Use the file every 2 or 3 days and the wet stone is used after you have use your axe.**

Start by wetting the blade & sharpen it with the file by doing rotary movements towards the exterior of the cutting edge.

To soften the slicing edge one **MUST** make rotary movements starting at the centre of the blade going toward the edge.

So to keep your axe sharp, hone it regularly with a sharpening stone and touch up the edge when needed with an 8 inch flat mil file.

For honing hold the head of the axe in one hand in such a way that the handle points up away from you & rub the dry stone over the edge with a circular motion from one end of the edge to the other.

Then turn the axe over with the handle now pointing down and hone the other side in the same way until the edge is so keen that it no longer shows up as a bright line when you look at it.

For filing, lean the axe head against a log or against a peg driven in the ground. Kneel on one knee and place your other foot on the handle to keep the axe steady.

Place the file on the edge & push down hard. File the whole edge with long even straight strokes working along the blade from one end of the edge to the other, soon you will get the hang of it.

Holding the iron in full hands be very weary about the handle, the thumb under it and the fingers doing pressure on the grin stone as near as the biting edge as possible.

The filing is done in 3 movements, rotation of a wet stone, pressure of the fingers lateral moving #altering on the biting of the ground stone.#

We recommend to make the grind stone in the sense of the arrow. However with a certain habit with an in reverse flashing against the iron the grind stone will absorb most of the #morfil#.

The biting edge MUST NOT be too sharp, obtuse nor #fuyant# The fig shows 12 shows by exaggeration the main 2 faults to **AVOID** AB B where C is normal. Handle with soft wood the angle can be more #aigu# than hard wood pix 1 shows the #morfil#.

It is a #fine pelliculle# that clings to the iron thus the only way to get ride of it is the use of small oiled up stone or water stone as the harvester use.

SHARPENING: USUALLY DONE IN 3 STEPS:

1) You **MUST** or should use a grind stone to reduce or thin the centre of the biting edge but not on all its width.

You **MUST** let about 1/2 inch on each side of the edge at its natural thickness. This will make it more solid and wood chips will come off easier.

The grind stone **MUST BE** watered down A LOT so as not to permit the steel to heat up.

This is why one **MUST NEVER** sharpen an axe nor a knife on an electrical grindstone since it turns too fast and heats up the steel and will ruin the blade strength.

2) Second step is the file, a flat one about 8 inches long with a handle is desirable.

Placing the axe in a vice and facing it, hold the file handle in your right hand and the end of the file in your left hand preferably protected by a strong glove.

Then you file from up and down starting behind the biting edge going forward in a 10 degree angle.

#The file **MUST** bite only in the movement up going down and not to touch the steel in its down upward movement#.

Once a side is done then turn the blade in the vice and start all over again starting this time from the front part of the cutting edge going toward its back & in the same angle as before.

3) The third step is using a soft stone. Letting the axe in the vice start to polish the edge using the rougher side of the stone then finish it with the softer side which you then add a little oil.

You sharpen in the same direction as when using the file but this time do it in a circular fashion & with full contact, not letting the stone off the blade. Such a blade is less **DANGEROUS** & much more efficient than a badly sharpened one.

One last precaution, **MAKE SURE** that the sheath is very strong & thick so as to protect it from stones or other steel. You **MUST** also have a spare handle because you might need it.

HOW TO SHARPEN SNOW KNIFE:

To sharpen a snow knife all you need is a file, but for all others use a wet stone, place the blade slightly inclined on the stone and push toward the exterior then change side. You will get a better result by gradually diminishing the pressure.

If you have no wet stone any piece of sandstone will do. A grey stone will give better result than pure quartz.

Use any crystal stone except marble which is too soft. Rub the 2 granite piece together till they become soft then use them as whetstone.

USE OF AXE:

You would learn more from a good axe man in one day than many weeks by yourself. Don't try to cut a tree with a single blow.

IT IS MORE IMPORTANT TO AIM WELL AND TO KEEP A GOOD RHYTHM THAN TO USE TOO MUCH STRENGTH.

If you use it correctly the axe own weight will give you all the power needed to do the job.

MAKE SURE BEFORE using the axe that **NOTHING on top or sides hinder your movements. ALWAYS** check for branches or liana that could defect the blow and may hurt or kill you.

USING AN AXE: TIP 2:

Most people have a natural prime hand and swing. Use an axe in a way that's comfortable to you, swinging it an ark that feels natural with a firm grip and **ALWAYS** away from your body, legs and hand.

MAKE SURE that, if you miss the tree or other point of aim and follow through, the axe will not strike anyone else. Don't throw an axe on the ground. Sheath it or bury the blade in a log

WHEN FALLING A TREE PROCEDURE TO DO:

Before beginning clear the tree of lower limbs and remove the underbrush from around the bottom of the tree. This is to ensure that the axe is not deflected during the swing.

Check your distance form the tree to **AVOID** under reaching or overreaching.

Overreaching can result in breaking the axe handle and under reaching in a cut foot. Take up a comfortable stance **MAKING SURE** that both feet are firmly set.

The first cut should be made on the side of the tree facing the direction of the desired fall often decided by the lean of the tree. This cut should be not more than half-way through the tree.

The back cut should be started slightly above and opposite the first cut. It is **SAFER** to cut the tree off not over a foot above the ground. (Below 1 feet)

ALWAYS keep the axe handle low and parallel to the ground where the blades strikes the cut.

When using short handled axes or hand axes bend carefully at the hips or kneel on one knee.

When splitting wood do not lay the piece to be split on the ground but support it so as to **AVOID** chopping into ground, thus blunting the axe or prevent injury to leg or feet.

AXE HEAD OFF: BROKEN HANDLE!

Using an axe takes practice and while gaining experience axe handle often get broken-usually because the head misses the target and the handle takes all the blow (A).

To remove a broken handle, the easiest way is to put in a fire, burying as much as possible of the metal in the earth to prevent it loosing temper- single-headed (B) doubled headed (C).

Since it is very difficult to remove a broken handle from the axe head; **THE BEST METHOD** is to place the axe head in the ground and to burn the handle.

You bury the biting edge down to the height of the handle. Make a small fire on the head of the axe.

The biting edge protected by the ground will not be affected and the handle heated white by the fire will come off with no trouble at all.

THE OPERATION MUST BE DONE VERY QUICKLY TO SUCCEED WELL; but MAKE SURE that the earth is **WET** surrounding the axe iron. The wet earth prevents the slicing edge to loose its hardness.

MAKE SURE that you put the whole axe after in cold water. Or have spare handle then insert it in the axe **MAKING SURE** that the head is well perpendicular to the handle.

To insert the handle, hold it using the left hand and hit the butt with another axe or hammer or stone if need be, the handle will come up by itself very well.

This operation **MUST BE** done quickly and then as soon as possible put the whole axe iron in cold water.

Don't hit the head down on the handle but the other way around, you will then note that the end of the handle comes off the axe by a few inches this is to allow the insertion of a "corner" which will prevent the head from coming off.

If you don't have a "corner" then you have to make one up, **ITS ESSENTIAL**. Use the excess part that you cut off for this purpose. Use hard wood only as material.

#Now using a hacksaw you cut off the excess but it is good practice to let the handle overshoot by a few lines should you need to adjust the "corner" once more later on.

This is where you get your "corner" from the excess handle part that you cut off you use part of it as your "corner" to insert in the slit and hammer it down in the axe head. #

NOTE ON BROKEN TOOL HANDLE OFF:

Nothing is easier to remove a broken tool handle which has blocked the head.

Cut the handle as near the head of the tool as possible, bore a hole deep enough in the broken part of the handle and in this hole pour some kerosene which you then light up.

The wood being impregnated of kerosene will burn easily and all you then have to do is to remove the ashes and fix a new handle.

However I would prudent to use such a method for an axe since the fire would probably affect the tempering quality of the steel.

AXE NATURAL HANDLE:

If you **MUST** replace a handle use a straight handle rather than a curb one, you **will save time and effort**. Give a rough shape to the handle and make a slit at the end which will receive the blade.

Once the handle well in place strengthen the whole thing by inserting a thin slice of wood in the slit that you have made, try the axe and knock in again the slice of wood to make it stronger holding.

AXE ADDED NOTE:

The usual 1 1/4 pound axe on a hickory handle will be light enough to carry & to do the work intended to whereas the 3/4 axe is a two handle tool and is designed for cutting larger logs for pioneering projects.

Keep the edge or "bit" sharp not just sharp enough to chew but to bite and keep the handle tight, if it gets loose drive in the wedge harder.

NEVER LET YOUR AXE TOUCH THE GROUND. Driving into the ground will nick it & leaning it against the ground will rust it.

ALWAYS have a chopping block under the wood you are chopping or splitting and when you are through using it for short period stick in the chopping block or put it back in its sheath.

On a hike carry the axe in its sheaf or lashed to your pack and carry it around camp by holding the handle near the heads with the edge down and out.

HOW TO USE AN AXE:

The old backwoodsmen were as expert with their axe as they were with their rifles and they were just as careful in the selection of these tools as they were in the selection of their arms. They **NEVER** even lent their axe to anyone.

Many a times I have seen them pick up a store axe sight along the handle and then cast it aside contemptuously aside.

They demanded of their axes that the cutting edge should be exactly in line with the point in the centre of the butt end of the handle.

They also kept their axe so sharp that they could whittle with them like one can with a good jack knife furthermore they allowed no one but themselves to use their own particular axe.

It is not expected that the modern vacation pioneer becomes an expert consequently the few simple rules and suggestions will be here given to guide the amateur.

And he **MUST** depends upon his own judgement and common sense to work out the minor problems which will beset him in the use of this tool.

All edges tools are **DANGEROUS** when in the hands of "chumps" **DANGEROUS** to themselves and to any one else who is near them.

For instance only a chump? will use an axe when its head is loose and is in **DANGER** of flying off the handle. (NO joke or pun here! It happened to me once, I did not check it OOPS).

Only a chum? will use his best axe to cut roots or sticks lying flat on the ground where he is liable to hit stones and other objects and take off the edge of the blade. Only a chum? will leave an axe lying in the ground for people to stumble over.

If there is a handy stump at your camp and you are through using it, stick the blade into the top of the stump and leave the axe sticking there, where it will be safe from injury.

REMEMBER before chopping down a tree or before using an axe at all to see that there is enough space above and below and around to enable you to swing the axe clear.

Without the **DANGER** of striking bushes or overhanging branches which may deflect the blade & cause accidents more or less serious.

TREE FELLING:

Check overhead for dead branches, which may fall and injure you, and for hornet's nest. Clear the branches or creepers which could deflect your blows.

If roots or the bole spread out at the bottom build a platform to reach thinner-diameter trunk and reduce the effort of chopping. Ensure such a platform is stable and that you can jump off it quickly if the tree falls the wrong way!

Work at a comfortable height and try to cut downward at 45 degrees, although every now and then a horizontal blow is needed to clear the cut.

Cut from both sides of the tree, first chopping out a notch an angle of about 45 degrees and another on the opposite side at a lower level, on the side to which you want the tree to fall (a).

Do not cut through more than half the tree BEFORE starting the other notch.

If two people are at work on opposite sides this is particularly important.

A leaning trunk or a tree with most of its branches one side will fall in the direction of its weight and the placing of the cuts will not affect it.

A steady rhythm of blows will cut more effectively than trying to make a fewer big blows.

If you put too much effort behind the axe your aim will suffer and you will soon tire. **Let the weight of the axe do the work.**

Alternating the angle of stroke will prevent the axe from jamming. Too steep an angle will cause the axe to glance off the trunk (A) Dead on will make it jam, or be inefficient (B) Aim for 45 degrees (C).

DON'T STAND BEHIND A TREE AS IT FALLS: (Timber-her!?!)

For the boughs may strike those standing tree causing the butt to shoot back or kick an many a woodsman has lost his life from the kick of falling tree.

Before chopping a tree down, select the place where it is to fall, a place where it will not be liable to lodge in another tree on its way down. **DON'T try to fall a tree against the wind.**

Cut a notch on the side of the tree facing the direction you wish it to fall fig 113 p274 and cut it half way to the trunk. Make the notch or kerf large enough to **AVOID** pinching your axe in it.

If you discover that the notch is going to be too small cut a new notch X fig 166 p274 some inches above your first one.

Then split off the piece X Y between the two notches and against make the notch X Z and split off the piece Z W Y fig 116 p274 until you make room for the axe to continue your chopping.

When the first kerf is finished begin another one on the opposite side of the tree a little higher than the first one.

When the wood between the two notches becomes too small to support the weight of the tree, the top of the tree will begin to tremble and waiver and give you ample time to step to one side before it falls.

(It is good to yell Timber specially if there are people around so as to warn them of the falling tree.)

If the tree fig 117 p274 is inclined in the opposite direction from which you wish it to fall.

It is sometimes possible to fig 117 to block the #kerf# on the inclined side and by driving the wedge over the block force the tree to fall in the direction desired but it is **DANGEROUS**, and if the tree inclines too far this can not be done.

There was a chestnut tree standing too close to my log house and leaning toward the building. Under normal circumstances felling this tree would cause it to strike the house with all the weight of its trunk and branches.

So I asked a old woodman who looked at it for several days doing zip until one day he brought out his old trusty axe and made the chips fly by. Soon the chestnut was lying prone on the ground pointing away from the house.

What this old backwoodsman did was to wait until a strong wind had sprung up blowing in the direction that he wanted the tree to fall and his skilful chopping with the aid of the wind placed the tree exactly where he wished it.

Fig 118 p274 shows how to make the cuts on a standing tree in order to remove the bark which is done in the same manner described for removing the birch bark.

TO REMOVE BRANCHES:

Cut off branches from the outside of the fork (A) not the inside (B).

Very high branches can be removed by attaching strings to the saw toggle to give extra reach. **This is DANGEROUS.**

Keep your eye on the branch and be prepared to jump out of the way. **Go RAMBO GO!**

SPLITTING LOGS: 156

Stand behind a large log with feet well apart. Swing down to cut the side away from you (A).

DO NOT CHOP DOWNWARD (B):

To split a smaller log, angle against another log (C)

DO NOT PUT YOUR FOOT ON IT:

Alternatively, hold smaller log against cutting edge of axe and bring both down together (D) on to a larger log. (Not to be tried holding too short a log for safety!) If in doubt split larger logs with a wedge and rock (E).

DO NOT EVER HOLD WOOD UPRIGHT IN YOUR HAND AND ATTEMPT TO SPLIT WITH AXE.

USING A FLEXIBLE SAW:

ALWAYS use a flexible saw so that the cut opens up (A) rather than closes tight (B) on the saw, causing it to jam.

At all times keep the wire taut (C) pulling it in a straight line, at an angles. (D) **With two people the rhythm MUST BE CAREFULLY maintained.**

If a kink is produced in the saw (E) it may break. It is usually easier for a single person to cut a log by pulling upwards.(F).

Support the log to keep it off the ground and give it an angle to keep the cut open. Alternatively, to remove a branch pull down from above the head G. **THIS COULD BE DANGEROUS.**

HOW TO SPLIT LOGS? MAKE SHAKES SPLITS OR CLAPBOARDS?:

HOW TO CHOP A LOG IN HALF?:

HOW TO FLATTEN A LOG AND SOME DO NOT !:

Logs are usually split by the use of wedges.

But it is possible to split them by the use of 2 axes. fig 119P 274b shows both methods.

To split with the axe strike it smartly into the wood at the small end and so as to start a crack, then sink the axe in the crack A.

Next take the second axe and strike it in line with the first one at B. If this is done properly it should open the crack wide enough to release the first axe without trouble which may then be struck in the log.

In this manner it is possible to split a straight grained piece of timber without the use of wedges. The first axe should be struck at the smaller or top end of the log.

To split a log with wedges take your axe in your left hand and club in your right hand and by hammering the head of your axe with the club drive the blade into the small end of the log far enough to make a crack deep enough to hold the thin edge of your wedges. Make this crack all the way across the end of the log as in fig 119P274b.

Put two wedges in the end of the log as in the diagram and drive them until the wood begins to split and crack along the sides of the log, then follow up this crack with other wedges as shown D and E until the log is split in half.

While ordinarily wood splits easily enough with the grain it is very difficult to drive an axe through the wood at right angle to the grain as shown in diagram to the left. fig 120P274b.

Hence, if the amateur be chopping wood if he will strike a slanting blow, like the one to the right in fig 120 p274b.

He will discover that the blade of his axe will enter the wood, whereas in the first position where he strikes the grain at right angles it will only make a dent in the wood and bounce the axe back.

But striking a diagonal blow he **MUST** take care not to slant his axe too far or the blade of the axe may only scoop out a shallow chip and swing around **DANGEROUSLY** & seriously injuring the axe man or some one else.

If it is desired to cut off the limb of a tree don't disfigure the tree by tearing the bark down, trees are becoming scarce.

If you cut part way through the limb on the underside see right hand diagram fig 121 and then cut partly through from the top side, the limb will fall off without tearing the bark down the trunk, but if you cut only from the top see left-hand diagram fig 121.

Sooner or later the weight of the limb will tear it off and make an ugly wound down the front of the tree which in time decays makes a hollow and ultimately destroys the tree.

A neatly cut branch on the other hand when the stub has been sheered off close to the bark will heal up leaving only an eye-mark on the bark to tell where the limb once grew.

If it is desired to chop a log into shorter pieces, **REMEMBER** to stand on the log to do your chopping as in fig 122p 274b.

This will do away with the necessity of rolling the log over when you want to chop on the other side.

Don't forget to make the notch C D the same as A B; in other words the distance across the notch should equal the diameter of the log.

If you start with too narrow a kerf or notch before you finish you will be compelled to widen it.

To flatten a log you **MUST** score and hew it. Scoring consist in making a number of notches C D E F G H J etc. to the depth of the line A B fig 123. 124.

Hewing it is the act of chopping off or splitting off the pieces A C & C D & D E etc leaving the surface flat as shown by fig 125 p274b which was known among the pioneers as puncheon and with which they floored their cabins before the advent of the saw mill & milled lumber.

Perhaps it would be advisable to the amateur to take a chalk line and snap it from A to B fig 123 so that he may be certain to have the flat surface level. The expert axe man will do this by what he calls "sensation". (FEELLING!)

It might be well to say here that if you select for puncheons wood with a straight grain and wood that will split easily you will simplify your task but even mean stubborn wood may be flattened by scoring and hewing.

If the ridges and furrows of the bark run straight up and down the wood will have a corresponding straight grain but if they are spiral the wood will split waney or not at all.

So when you try to quarter a log with which to chink your cabin don't select a waney log. To quarter a log split it as shown in fig 119 P274b and split it along the dotted line shown in the end view of fig 126.

In the Main the woodsmen are adept in making shakes, splits clapboards or shingles by the use of only an axe and splitting them out of the billets of wood from 4 to 6 feet long.

The core of the log fig 130 is first cut out and then the pieces are split out having wedge-shaped edges as shown by the lines marked on fig 127. They also split out boards after the manner shown by fig 128

In making either the boards or the shakes, if it is found that the wood splinters down into the body of the log too far or into the board or shake too far.

You **MUST** start at the other end of the billet or log and split it up to meet the first split or take hold of the split or board with your hands and deftly tear it from the log ,an art which only experience can teach.

We caution the reader against chopping firewood by resting one end of the stick to be cut on a log and the other end on the ground as shown in fig 131 and then striking this stick a sharp blow with the axe in the middle.

The effect of this often is to send the broken piece gyrating into the air as shown by the dotted line and many a wood chopper lost an eye from a blow inflicted by one of these flying pieces. Many men have been blinded this way so **BEWARE**.

ADDED NOTES ON AXE CHOICE:

IF ONE WAS LEFT TO CHOOSE WHICH OBJECT WOULD HELP HIM MOST IN SURVIVAL, DON'T HESITATE TO CHOOSE THE AXE.

ONE MUST AVOID TO BUY AXE WHICH HEAD IS LESS THAN 2 LBS. These are toys which have **NO VALUE IN SURVIVAL** or for sporting needs.

The ideal weight is 2 1/2 lbs not counting the handle. A 3 lbs is better in frozen wood but heavier to handle for the average user.

One **MUST** also consider the biting edge and **MAKE SURE that the edge is no smaller than 4 inches wide** and neither be too thin nor too thick.

In the first case it would break easy and in the second the sharpening would be difficult to maintain. The **IDEAL** axe one may find is what is called the **Hudson Bay** type.

HANDLE CHOICE: (Dear Jane!)

Now as for the handle, in principle one should not buy a painted one which could or would hide defects such as knots which would weaken the handle. The best one are from # Noyer# or Oak.

Second is too choose the handle the right length, even if the short handle may be easier to carry around the long one is much preferable to have the most efficiency.

The length vary according to your height so **a simple method to discover the proper length is:**

Let your hand drop on your side and measure from the centre of your hand down to the ground, this is the length that the handle should have for you.

If it is longer you will have tendency to overreach which is very hard on the handle and can break it, if too short then under reach which is **DANGEROUS** for your feet or legs.

The handle **MUST BE** straight and not curve to right or left. To discover this default, let your axe rest flat on its head, with the biting edge facing upward and align it with the handle.

If the handle shows a curve to right or left then choose another handle. The handle **MUST** also not be either too big or too small.

It **MUST** fit well into the hand, this is not a pick. Too big a handle would not have the # souplesse# and too small would be too #fragile.#

Once your axe all set then you can paint the head all the way to edge using a bright phosphorescent colour which makes it easier to locate at night or simply prevent rust as well.

Also the handle should be painted from the head down a few inches which would prevent the water or snow to penetrate in the handle near the head and to make it rot.

Beside if the handle has a tendency to come off the head one quick look would show the non painted area.

MAINTENANCE OF THE HANDLE:

Even with a good handle fit it comes after a time that the iron starts to come off a bit as we use it.

You **MUST** then #shake the iron by hitting the butt against a wood log#. The handle has a certain sharpness at the butt thus you **MUST BE CAREFUL** when hitting the wood log which could split the handle.

Thus it is preferable to saw a small amount of this butt so that the hit will have a straight impact. One keeps all the flexibility of the handle by oiling it with Linseed oil, the iron is greased when rain to **AVOID** rust.

HOW TO BEST USE YOUR AXE:

WINTER USE:

THE IRON SPLITS IN COLD WEATHER: ckprt

YOU MUST WARM UP THE IRON ON A SMALL FIRE FOR A LITTLE WHILE BEFORE USING IT.

THIS IS A SERIOUS WARNING if it is real cold the axe till split like glass, so warm it up over a fire, or in hot water or even between your legs before using it.

- 1) Don't attack a piece of wood in a perpendicular fashion but use an angle of about 60 degrees.
- 2) Hit alternatively left and right of the cut.
- 3) Lean the wood to cut on a log fig 20 the hit **MUST BE** on D point & opposed to point C.

Fig 21 shows the inconvenient to carry the blow outside the leaning point, since the wood moves and the iron does not bite as easily.

4) Without a leaning log one can strike in the air.

5) If you split lengthwise, work against a hard wood block.

A) **NEVER** work on soft earth directly. It would also risk to have the iron hit the ground & loose its sharpness.

B) **NEVER** use a rock or piece of steel as leaning post for cutting.

6) **NEVER** hold the wood with the hand or the foot on the side where the axe can slip **giving very serious injury.**

7) One old woodsman method to cut or split a log is to hit the log on its head then twisting around the axe and the piece of wood you then hit the striking leaning post with the axe head, this will split the log in no time photo needed here.

FALLING TREE ADDED NOTE:

Make a cut in a form of a coin as low as possible and on the side that you want your tree to fall.

This cut MUST attain and overpass the hearth of the wood. The depth of the cut will serve as a rotation point for the fall of the tree.

Thus its orientation has a VERY GREAT IMPORTANCE specially for big trees.

Now do a second cut on the opposite face of the trunk and a little over the first one.

When this cut will be sufficient the tree should fall by itself. Timber. This second cut can be advantageously done or replace by a saw cut.

NEVER STAND BEFORE OR BEHIND A FALLING TREE, IT WOULD BE YOUR LAST.

NEVER lend your axe, it is too personal like your tooth brush.

KNIFE:

If the axe is essential to survival, so is the knife. Here again there is no bargaining, you have to pay for quality, one of the best knife all around on the market is the old Swiss knife but do take the one with a magnifying glass type its more **USEFUL**.

There is also the new type of Rambo knife with compass inside the top but it is your survival friend with its saw blade.

SHARPNESS IS THE KEY TO THE USE: FOR ALL TOOLS, AXE OR KNIFE !:

AVOID however to give too much a sharpness to the edge for it would dull out faster. **NEVER** let rust start on any tool it is the end of it all!

Oil your saw after use and rap it with paper to hang. For rust kills the sharpness eating away as acid would.

PICK-SHOVEL ARMY STYLE:

Lately they have come up with the best one pliable, with saw blade, hammer, but they are hard to find, so check old army store. Its purpose as weapon of survival are too numerous to list.

DAMPNESS OF WOOD SCALE:

Wood burns well and can be worked well when it is dry. As you cut it down it can have more than 50% in humidity. So in average;

After 6 months cut it still has 30-40% Humidity!

12 months ..20-30%...

18 months ..15-25% ...

After such a time the natural drying process ends.

BURNING POWER SCALE:

When dry a # hêtre# has a power of 4,000 #calories so with 10% humidity it has only 3,580

20% 3,200

30% 2,900

Green 50% 2,450

HERE IS A SCALE PER KILOGRAM OF DRY WOOD HEATING POWER:

PINE 4,700 TO 4,500

#EPICEA# 4,500 TO 4,200

#HETRE# 4,500 TO 4,000

#BOULEAU# 4,300 TO 4,200

#SAPIN# 4,300 AVERAGE

#MELEZE CHENE# 4,100

#FRENE AULNE# 4,000

#MAPLE# 3,800

HOW TO EASILY DESTROY A STUMP:

Once install in the forest or near the water for a certain time, some stump badly placed can be a nuisance to your set up. So without using dynamite, or bazooka; Rambo they gotta go.

A good way to do so it to pierce several holes in the stump fairly deep using a wooden drill and to fill those holes with nitrate de potassium in powder form, grind it if you have to.

Next you cover those holes with a little amount of clay to stop the rain washing out the saltpetre and you wait a few days so that it is sucked in by the sap in all the parts of the stump.

Once you think that it is time you then light a fire on the stump using some branches, the fire will go deep even to the deepest part of the stump with the help of the oxygen brought by the nitrate, then it is a child play to remove the charred parts.

#POINTES# AND NAILS:

Planting a #pointe# without precaution nearly **ALWAYS** will split the wood at its end.

So to **AVOID** this just tap the #pointe# with a hammer before hammering it in. This way the #pointe# will smash the wooden fibre rather than spreading them apart and your wood will not split at the end.

If the wood is very delicate then you should drill a hole into it before using the #pointe# or nail. If you **MUST** nail a long point in hard wood grease it first.

Just like you should do the same with screws using soap before screwing them in the wood, they go in like a charm when soapy.

BENDING NAILS:

Better use a longer nail than too short, however if you don't do it correctly the nail will be a constant **DANGER** to rip hands or pants.

So in order to **AVOID** those scratches, place a big nail as you see in fig C near the nail to bend then hammer it down as the result shows in D fig 51 **this way no scratches and lot stronger.**

NAIL IT RIGHT:

In fig 52 the nails are put side by side neatly, but a strong push or strength on F will make it come apart. Rats! **To AVOID this**; nail them oblique against one another, this will hold fine.

PULLING NAIL OFF:

Using your hammer is fine but if the nail is too strong then put a piece of wood underneath the hammer will do the trick. If this does not work then use a crow bar to do the job best.

#CALFATER DES JOINTS#:

This means to fill in the gap so that the water does not come in.

An easy way to do this is by melting down with the use of a sand bath a mixture of resin and tar, this product is then put while hot using a wooden or steel spatula then let it harden.

The sand bath is any container made of steel filled with sand in which is tucked the mastic pot. The whole thing is put over a good fire with a lid. See photo

TOOLS:

Before humans discovered metals and learned to work them, tools were made from stone-especially flint, obsidian, quartz, chert and other glassy rocks, bone and other natural objects.

Stones can make efficient hammers, alone or lashed on to a handle if a shape that can be easily secured.

The glassy stones can be knapped (chipped and flaked) to make a sharp edge; some other kinds of stone, such as slate, can also produce a knife edge, though they may not have the strength to be used for percussive blows.

The best start for a stone implement is a split cobble, perhaps from a stream bed, or split by a blow from another smooth, hard pebble, so that a flat face is produced.

The blow should be at an angle of less than 90 degrees or the shock will be absorbed within the pebble.

Once the split is made, other layers can be broken off. Flakes can be removed around the edge of the flat face by hitting edge-on with another stone.

Delicate work can be produced by hitting and pressing with a softer tool such as deer's antler. If a flat face is produced end-on blows can make thin blades.

Making stone implements is not a skill that can be quickly acquired and you may have to be very persistent.

Bones can be used as tools-antlers and horns make **USEFUL** digging implements gougers and hammers. They can also be cut with stone tools or ground with coarse stones.

You may have the advantage over the prehistoric tool-makers, whose skills you are copying, of having a knife or other metal implement to help you to carve bone.

Some woods, such as the Mulga tree of Australia, used by the Aborigines for spears, are hard enough to make effective blades for hunting and cutting.

STONE TOOLS:

One technique for producing an axe-head: First the stone is split and the edges partly shaped (A).

Then a platform is created on one side (B) from which a series of flakes can be struck vertically down (C) The final shaping can then be done.

Hit with a softer stones, and hit and press small flakes away with a piece of antler or hard wood. It may take a lot of patience to acquire tool making skills but even practice flakes may be **USEFUL** as scrapers, for cutting edges & as arrowheads.

BONE TOOLS:

A shoulder blade provides a good shape for an effective saw (A) First it should be split in half, then teeth can be cut along it with a knife.

A small bone (B) scraper could also be made, the edge ground sharp. Ribs are good bones for shaping into points (C).

BONE NEEDLE:

Choose a suitably bone or flake of bone and sharpen to a point. Burn an eye with a piece of hot wire, or lacking that, scrape with a knife point or piece of flint. **DON'T** heat the knife in the fire.

AXES:

A fire axe is part of the equipment of any boat or plane, but an axe-head, to be fitted to an improvised handle, is a **USEFUL** additional piece of equipment for anyone to carry.

One of about 500-750gr (1-1 1/2 lb) is ideal. Use your knife to fashion a handle when it is needed.

AXE HANDLE:

Any straight, knot-free hardwood is suitable-ash and hickory are ideal. In the Tropics the flukes of Buttress tree (A) are excellent: slightly curved, straight-grained and easy to work.

Cut two notches into the fluke of a buttress, spaced to the desired length (b to c) Hit along the side of fluke close to the cuts. It will split away at their depth.

FITTING THE HEAD:

Whittle the handle into shape with one end cut to fit the hole in the axe-head, cutting a notch in that end.

Make a wedge to fit the notch. With the head in place drive in the notch then soak the axe the axe in the water overnight to tighten the head on the shaft.

ALWAYS CHECK AXE-HEADS FOR TIGHTNESS BEFORE USING THEM!

I know I forgot it once OOPSSS! It still is a flying in the sea!

FITTING A STONE AXE-HEAD:

(Not fighting a stone head!) (Ask your local purple punk head to explain U that one!)

Select a hardwood handle. Tie a band of cord around it about 23cm (9in) from one end.

Split the end down as far as this band (use your knife and a wedge or the piece of flint you have made for the axe-head).

Insert the flint and tie the end to secure. This mounting will split wood but will not be very effective for chopping it.

SHARPENING AN AXE:

An axe with a blunt edge becomes **NO MORE THAN** an inefficient hammer so keep it sharp, it will save energy. A file is best for getting rid of burrs, and a whetstone for imparting the sharp edge.

A file is a one way tool-it works when pushed not pulled. Prop axe-head between a log and a peg (a).

ALWAYS try to sharpen inwards from cutting edge to **AVOID** producing burrs. Use a file or rougher stone first to remove rocks and burrs (B).

Then finish with a smoother stone, using a circular motion. Don't drag the stone off the cutting edge. Push ON the blade. Turn the axe over. Repeat the process circling in the opposite direction.

NOTHING ON P 35 SKIP TO PAGE 36

#RECOLTE ET PREPARATION DES MATERIAUX POUR LA VANNERIE# 346b

PLANTS: HARVEST TIME SOAKING TIME

1) #ronce des haies# end of fall 20 min. warm water

#framboisier sauvage vert# = shoots from 1 to 2 years old

#framboisier sauvage sec# = stems over 2 years old.

2) #ronce des haies# all year long, 20 min. warm water,

3) #roseau massette feuille# start of fall

5-10 min warm water = Leaves full grown/end growth

4) #roseau massette# stems start of fall

5-10 min warm water = stems at end of growth

5) Corn cob when corn reap 1-5 min warm water = # spathes internal, pale green

6) green grass spring or summer 30 min cold water = green blades end of growth

7) dry grass end summer/fall 30 min cold water = blade yellow and dry

8) #chevrefeuille# start spring/fall 20 min. warm ... =#lianes# of 1 to 2 years

9) #iris, crocus# end spring/summer sprinkle lightly

#Jonquille vert#= green leaves, end of growth

10) Same but dry after first /frosts sprinkle lightly = brown and dry leaves

11) #maple, cornouiller# spring or fall / Most shoots no need

other hard wood = small 1 year shoots to be soaked

12) pine, green needle all year long Warm water till flex = long green needle

13) pine long dry needle dry days Warm water till flex = long brown needle

14) Hay end summer, start fall 10-20 min warm water/stems = nearly end of growth

15) #saule vert# spring 1/2 hour to 1 hour in hot water = green shoots 1 year old

16) #saule sec# spring 1/2 hour to 1 hour in hot water ? #= shoots over 1 year old

17) #glycine, lierre# fall/ start spring All night in warm water #vigne vierge# ?= long # flexible #liane#

PREPARATION FOR THE ABOVE:

- 1) Remove the thorns with gloves and use **IMMEDIATELY**.
- 2) Remove the thorns as young shoots but boil it 3-4 hours.
- 3) Clean mud from foot, hang out to dry up or lay down.
- 4) Remove head, clean foot, split in 2 then 4 before drying.
- 5) Hang or lay down to dry slowly which takes about 1 week.
- 6) Dry in a dark and fresh place hung or laid in full sun.
- 7) Use right away or keep in dry and fresh place.
- 8) Boil during 3-4 hours. Rub strongly with towel to remove bark.
- 9) Dry to the sun to discolour or in shade to keep colour.
- 10) Use right away or to dry laid down in the shade.
- 11) Use right now the shoots with or without bark even split them.
- 12) To dry with head down the branches with needles or laid down.
- 13) No preparation needed unless a cleaning has to be done.
- 14) Dry slowly by spreading leaves on ground or hung head down.
- 15) Use right now or to dry head hung down or laid on ground.
- 16) Boil from 2-6 hours or soak them for 3-4 days,skin off.
- 17) Dry by hanging in dark and fresh place, remove skin when it starts to peel off.

METRIC CONVERSION DISTANCE

IMPERIAL METRIC METRIC IMPERIAL

1 INCH 2.540 CM 1 CM 0.3927 IN.

1 FOOT 0.3048 M. 1 METRE 3.281 FEET

1 YARD 0.9144 M. 1 METRE 1.094 YARD

1 ROD 5.029 M. 1 METRE 0.20 ROD

1 MILE 1.609 KM. 1 KM. 0.6214 MILE

CAPACITY

1 PINT = 0.568 LITRE 1 PINT (US) 0.473 LITRE

1 GALLON = 4.546 LITRES 1 QUART (US) 0.946 LITRE

1 BUSHEL = 6.369 LITRES 1 GALLON (US) 3.785 LITRES

1 FLUID OZ. = 28.41 ML. 1 BARREL OIL 158.99 LITRES

1 QUART = 1.137 LITRE 1 CUP-8FL.OZ 277 ML.

1 LITRE = 1.76 PINT 1 TABLESPOON 14.21 ML.

1 LITRE = 0.220 GAL. 1 TEASPOON 14.21 ML.

1 LITRE = .88 QUART

WEIGHT

1 OZ. (TROY) = 31.103 GM. 1 GRAM 0.032 OZ. (TROY)

1 OZ.(AVIOR) = 28.350 GM. 1 GRAM 0.035 OZ. (AVIOR)

1 LB.(TROY) = 373.242GM. 1 KILOGRAM 2.679 LB. (TROY)

1 LB.(AVIOR) = 453.592GM. 1 KILOGRAM 2.205 LB.(AVIOR)

1 TON (SHORT) = 0.907 TONNE 1 TONNE = 1.102 TONNE (2000LB.) (SHORT)

IMPERIAL AREA METRIC

1 SQUARE INCH 6.452 SQUARE CM.

1 SQUARE FOOT 0.093 SQUARE METRE

1 SQUARE YARD 0.836 SQUARE METRE

1 ACRE 0.405 HECTARE

1 SQUARE MILE 259.0 HECTARE

1 SQUARE MILE 2.590 SQUARE KM.

1 SQUARE CENTIMETRE 0.155 SQUARE INCH

1 SQUARE METRE 10.76 SQUARE FEET

1 HECTARE 1.196 SQUARE YARDS

1 SQUARE KILOMETRE 0.386 SQUARE MILE

"1 HECTARE 1 SQUARE HECTOMETRE (1HM.)"

VOLUME

1 CUBIC INCH 16.387 CUBIC CENTIMETRES

1 CUBIC FOOT 28.317 CUBIC DECIMETER (LITRES)

1 CUBIC YARD 0.765 CUBIC METRE

1 CUBIC CENTIMETRE 0.061 CUBIC INCH

1 CUBIC DECIMETER 0.035 CUBIC FOOT

1 CUBIC METRE 1.308 CUBIC YARD

TEMPERATURE CONVERSION TABLE

Conversion F to C = Subtract 32 Then Divide by 1.8 Ex: 80F.

IS $80-32=48 \div 1.8=26.66$

Conversion C to F = Multiply by 1.8 Then Add 32 but for daily use just do this:

Convert F to C by Subtracting 32 and divide by 2. It is not as precise but it does the trick.

Ex: $82F-32=50$ Divided by 2 = 25C Ex; $10C+32=42$ Multiply by 2 = 84F! It's hot!

Boiling point 212F or 100C Freezing point: 32F/ 0C