Sourdough Manual

"Raiders of the Lost Patrol Box"

Klondike Derby 2023

March 10-12, 2023

Hosted by Talako Lodge

Camp Marin Sierra

Marin Council, B.S.A.

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Information about Klondike 2023

Competition Equipment

Each patrol competing should have the following equipment. This list is not final; Talako Lodge may change or add to this list at any time. Refer to the event descriptions to determine what else you might need. Items should be marked with your troop number.

Patrol flag and yell

Scout handbook

Rope

6 foot poles or staves

Shovel or trowel

Firewood

Tinder

Matches

Compass

First aid kit

Large tarp

Klondike sled (see design on page 12)

Winter at Marin Sierra

Water Supply

The winter water supply at Marin Sierra is limited, and we're not yet sure if troops will be able to draw water from the lodge, so plan to melt the cold white stuff or bring a supply to last you the weekend. To make a water machine, stuff a clean burlap sack with snow and suspend it over a pot near the fire. As the snow melts, it drips into the pot. Near a warm fire, this arrangement will supply a whole patrol if kept constantly full of snow.

Fires and Fuel

We recommend white gas stoves for cooking. They burn hot in cold weather and don't use large volumes of fuel. Liquid propane bottles may also be used, but they put out less heat in cold weather, so cooking may take forever. Don't forget a few small squares of plywood to set the stoves on.

Fires for cooking and warmth may be built in your campsite. Bring your own wood! The stores of wood at the lodge are to be used only by the units renting the lodge throughout the winter. If you wish to forage for wood around the camp, you may. Only use wood that has already fallen from trees.

Starting Fires

Winter camping offers Scouts a chance to really test their fire-starting skill. When you really need the fire, don't be caught without a few tricks up your sleeve. The camp rules prohibit the use of liquid fire starters, but there are lots of other options that will get you a rip-roaring fire in a short time. Some people call the use of fire-starting aids cheating, but if it gets the job done, call it Yankee ingenuity. For an example of a failed attempt to start a fire, see the Jack London short story "To Build a Fire." Simple paraffin in wax fire starters can be made with string and newspaper, see the Scout handbook. Small pieces of Duraflame logs also work well. Experiment in a safe area at home to make sure your fire aids work. Light them first and build your fire on top. No fire starter works well without plenty of dry kindling. Keep a supply of tinder and kindling in plastic bags. Cedar shingles are great if you have them. If you have no dry wood, split open a log. Water does not usually penetrate wood more than ½ inch.

Warning! Root Fires

Remember, much of the ground around the camp is burnable, even under snow. Open fires will burn through the snow and may light the ground beneath. These fires can burn for weeks and come to the surface hundreds of feet away when the woods are dry. Plan your fire in a safe place and make sure it is out when you leave. Note: This is what caused the Mt. Vision fire in Marin County!

Camp Marin Sierra Rules for Fires: (Remember, stoves and lanterns are also open fires.)

- Cooking fires may be built in any safe campsite area that has no limbs within ten feet overhead and is cleared to mineral earth in a ten-foot radius.
- Fires require separation from the ground. This can be done with a 55 gallon drum or other Camp Ranger approved device.
- At least one bucket of water and one shovel shall be present at each campsite.
- A fire shall never be left unattended.
- All campfires shall be approved by the Camp Director, Camp Ranger, or another staff member.
- No liquid fuel type heaters are allowed in camp. LPG and liquid fuel type stoves are permitted when used in accordance with the clearing instructions at the beginning of this section.
- An adult (at least 18 years of age) or staff member shall be in direct supervision of a stove.
- LPG and liquid fuel lanterns are permitted only when used on top of a sturdy table or hung in accordance with the clearing instructions at the beginning of this section. A lantern shall not be moved when lit or hot. An adult (at least 18 years of age) or a staff member shall be in direct supervision of a lantern.
- All liquid fuel except that contained within a liquid fuel type stove or lantern or within approved backpack type fuel bottles shall be deposited with the camp director or camp ranger for proper storage. No other liquid fuel shall be stored in campsites or vehicles.
- No open flames are allowed in tents. Use only battery-operated lanterns and/or flashlights.
- No fireworks are allowed on B.S.A. property.
- Smoking is only allowed in designated areas which shall conform to the clearing instructions at the beginning of this section when outdoors. Smoking is considered an open fire.
- Campfire permits shall be obtained by the Camp Ranger or Camp Director annually or as required.

- Flares and torches are not normally allowed in camp and shall be used only as part of a ceremony as approved by the Camp Director or Camp Ranger. Use of liquid fuel for starting any type of open fire is prohibited.

Patrol or Troop Equipment (Use this list as a guide. You can add as you please.)

Duty Roster

Food
- Food (normal menu)
- Emergency food
- Menu
- Condiments – sugar, salt, pepper, etc.

Food Preparation Equipment
- 2 stoves, white gas is best, with windscreens
- Liquid fuel in approved bottles (see the attached camp rules for fires and stoves)
- 2-3 pots, 2-4 quart size, with lids (water boils 3 times faster when covered)
- Water container, filled (5 gallon insulated is best)
- Water purification tablets, filter, etc.
- Coffee pot
- Can opener
- 2 large spoons
- 1 pair of pot tongs
- Cloth pot holders

Clean-up
- Scouring pads and other cleanup stuff
- Toilet paper

Fire
- Fire starting kit (matches, paraffin starters, steel wool, etc.)
- Firewood, kindling, and cover
- Fire buckets
- Lantern

Tents and Equipment
- Tents and ground sheets (see Shelter)
- Tarps
- Group first aid kit
- Trash bags (bring lots, they are good for many things besides trash)
- Folding saw (avoid axes, the blades become brittle in cold and campsites can be crowded)
- Shovel (Several if you plan to build snow shelters)
- Rope, cord, etc
- Repair kit (wire, pliers, tape, string, needle, thread, safety pins, file, etc)
- Whisk brooms (for brushing off snow)
- American flag and troop flag and poles

The Well-Dressed Sourdough

Do you want to stay warm in the snow? Just remember **C.O.L.D.**

Keep **clean**. Keep yourself and your clothes clean. Dirt and body oils which build up on clothing damage its insulating properties.

Avoid **overheating**. Clothing is designed to be taken off or added in layers to maintain an even body heat. Increased activity produces more heat and perspiration. Don't let yourself get damp.

Wear clothes **loose** and in **layers**. You can add or remove a layer or two depending on air temperature or your activity.

Keep **dry**. Wet clothing removes body heat much faster than it will dissipate through dry clothing. Wet is trouble!

Staying Warm by Rick Curtis

The essence of staying warm in the winter is having the proper clothing layers and knowing how to use them effectively.

Heat Loss

The body basically acts as a furnace, producing heat through chemical reactions and activity. This heat is last through conduction, convection, evaporation, radiation, and respiration. As physical activity increases so does heat production. Conversely, as activity decreases so does heat production. The key to keeping warm is to add insulation to the body.

Insulation

The thermal insulation of clothing is proportional to the thickness of the dead air space enclosed. Dead air is defined as any enclosed unit of air that is small enough that natural convection currents would not arise in it. Such currents have been detected in units as small as 2 millimeters in diameter. The dead air next to the skin is heated up by the body and provides a layer of warmth around the body. The clothing is not what is keeping you warm; it is the dead air. This is because the denser a material the faster it can transfer heat through conduction. The density of air is obviously miniscule compared to a piece of fabric. The "clo" unit was developed to provide a measurement of insulating effectiveness. One clo is roughly equal to the insulating value of an ordinary wool business suit. Each inch of thickness of conventional insulating materials (wool, pile, down) provides a theoretical value of about 4.7 clo or a practical "in use" value of 4.0 clo.

The Layering Principle

The key to providing this dead air space is through having a number of layers of clothing. Each layer provides a certain clo value of dead air space. This allows you to add or shed layers to increase or decrease your accumulated dead air space as the temperature changes and/or as your activity level changes. Remember, your body is the heat source; the clothing layers only serve to trap the heat and slow down your heat loss to the cold environment. If you have too much clothing on, you will overheat and start to sweat. You need to find the proper heat balance between the number and types of layers and your activity level.

Why not just have lots of layers on and sweat? Heat loss from a wet surface can be up to 25 times greater than a dry surface (due to the higher density of water). If you sweat and get soaked, you will lose heat much more quickly through evaporation of the water. Also, you are losing an incredible amount of water through sweating since the air is so dry. Too much water loss leads to dehydration which significantly increases the risk of hypothermia. So, you want to control your layers to be warm at your activity level but not sweating profusely.

Thus, traveling in the winter is a constant process of adjusting your layers to keep comfortable. This means having several layers you can add or subtract and allowing for versatility within layers. Convection may account for the greatest amount of heat loss under most conditions. In order to properly insulate, you need to have an outer layer that is windproof.

Another convective factor is the "bellows action" of clothing. As you move, a bellows action occurs which tends to pump your accumulated warm air out through openings in your clothing and sucks the cooler air in. In some conditions this action can reduce your body's personal insulation by 50% or more. Thus, it is important that all layers have effective methods of being "sealed" (i.e. buttons, zippers, etc.). Openings in layers allow you to ventilate, to open the "chimney damper" if you are beginning to overheat, without having to remove a layer. Opening and closing zippers on a jacket, or armpit zips will allow you to either ventilate if you are getting too hot or seal up if you are getting chilly, all without having to add or take off a layer. With clothes that are too loose, the bellows action pumps warm air out through the openings. You need to have clothes that fit properly but not tightly. Too tight, and the clothes compress and reduce dead air space in layers below as well as restricting body movement.

Another general rule is that the efficiency of clothing is proportional to the diameter of the body part it covers. Thus, a given thickness of insulation added to your trunk will be more thermally efficient than the same thickness added to your arm or leg. It will also help maintain that body core temperature. Therefore, vests work well to maintain body heat. There is an optimal thickness of insulation for each body part. Beyond that, the added bulk tends to be more of a hindrance in movement than the added insulation is worth.

Have you ever noticed that your hands feel colder after putting on a thin pair of gloves? This is because when insulation is wrapped around a curved surface, the cross-sectional area of the insulation through which the heat may flow is greater as is the surface area from which the heat may be lost. This means that the total insulation efficiency of a given thickness progressively decreases as curvature sharpens over a surface. In addition, small cylinders, such as

fingers, show a paradoxical effect. The addition of a thin layer of insulation actually increases heat loss until a thickness of about ¼ inch is reached. This heat resistance gains as additional thickness is added. However, added thickness beyond ¼ inch increases warmth very little in proportion to its thickness. This is one reason that thin gloves don't keep your hands particularly warm.

Clothing Materials

Some of the different types of materials for winter clothing and insulation are discussed below.

1. **Wool** – Wool derives its insulating quality from the elastic, three-dimensional wavy crimp in the fiber that traps air between fibers. Depending on the texture and thickness of the fabric, as much as 60-80% of wool cloth can be air. Wool can absorb a fair amount of moisture without imparting a damp feeling because the water "disappears" into the fiber spaces. Even with water in the fabric wool still retains dead air space and will still insulate you. The disadvantage to wool is that it can absorb so much water (maximum absorption can be as much as 1/3 the garment weight) making wet wool clothing very heavy. Wool releases moisture slowly, with minimum chilling effect. Wool can be woven in very tight weaves that are quite wind resistant. An advantage to wool is that it is relatively inexpensive (if purchased at surplus stores). However, it can be itchy against the skin and some people are allergic to it.

2. **Pile or fleece fabrics** – Pile or fleece fabrics are synthetic materials often made of a plastic (polyester, polyolefin, polypropylene, etc.). This material has a similar insulative capacity as wool. Its advantages are that it holds less water than wool and dries more quickly. Pile is manufactured in a variety of different weights and thicknesses offering different amounts of loft and insulation. This allows for numerous layering possibilities. The disadvantage of pile is that it has very poor wind resistance and hence a wind shell on top is almost always required. Versions of pile are available that have a middle windproof layer.

3. **Polypropylene and other hydrophobic fabrics** – Polypropylene is a synthetic plastic fiber which offers dead air space and a fiber which cannot absorb water. The fiber is hydrophobic, so it moves water vapor away from the source (your body). Polypropylene layers are extremely effective worn directly against the skin as a way of keeping the skin from being wet and reducing evaporative heat loss. As the water moves away from the body it will evaporate, but each additional millimeter of distance between your skin and the point of evaporation decreases the amount of body heat lost in the evaporative process. Some fabrics rely on the chemical nature of the fiber to be hydrophobic. Other fabrics use a molecular coating to achieve the same end.

4. **Vapor barrier systems** – Another way to stay warm in the winter is through vapor barriers. The body is always losing water through the skin even when we are not active. This loss is known is insensible perspiration and occurs unless the air humidity is 70% or higher. This insensible perspiration goes on at the rate of nearly half a quart every 24 hours. Since it takes 580 calories per gram to turn liquid water into water vapor, heat is continually lost through insensible perspiration as well as through sweat from any activity. A vapor barrier is a clothing item which is impervious to water thereby serving as a barrier to the transportation of water vapor. When worn near the skin it keeps water vapor near the skin. Eventually the humidity level rises to the point where the body senses a high humidity level and shuts off insensible perspiration. This prevents evaporative heat loss and slows dehydration.

   Vapor barriers should not be used directly against the skin because any evaporation of moisture directly at the skin surface leads to heat loss. Wearing polypropylene or some other hydrophobic layer between the skin and the vapor barrier allows the moisture to be transported away from direct skin contact. There is no doubt that vapor barrier systems are effective for some people in some conditions. The issues you must consider before using a vapor barrier are activity level, amount you naturally sweat, and "moisture comfort". If you are not active, such as when using a vapor barrier liner at night in a sleeping bag, the system will work well. A vapor barrier sleeping bag liner will typically permit you to sleep comfortably in temperatures 10-15 degrees colder than in the bag alone. However, some people find that they are not comfortable with the level of moisture in the bag and feel clammy. If this interferes with sleeping, it may be a problem. In this case, it is better to have a regular insulated sleeping bag. Vapor barrier liners for sleeping bags also help in another way. In cold conditions, when the moisture from your body escapes upward through the bag, it condenses into liquid or frost. Over several days, this moisture level in your bag increases. If you can't dry out the bag it will slowly get heavier as it holds more water. With a down bag, this moisture can soak the feathers and cause the bag to lose significant amounts of loft (dead air space), thereby reducing its effectiveness.

   When you are active, like snowshoeing, and you are wearing a vapor barrier such as a vapor barrier sock, you must carefully monitor how you sweat. If you are someone who sweats a lot with activity, your foot and polypropylene liner sock may be totally soaked before the body shuts down sweating. Having this liquid water next to the skin is going to lead to discomfort and increased heat loss. If you don't sweat much, your body may

shut down perspiration at the foot before it gets wet. This is when the vapor barrier system is working. The important point is that heat loss comes from water changing state from a liquid to a gas. Liquid water next to the skin leads to significant heat loss. Water vapor next to the skin does not. You must experiment to determine if vapor barrier systems will work for you.

5. Polarguard, Hollofil, Quallofil, and others – These are synthetic fibers which are primarily used in sleeping bags and heavy outer garments like parkas. The fibers are fairly efficient at providing dead air space (though not nearly as efficient as down). Their advantages are that they do not absorb water and dry fairly quickly. Polarguard is made in large sheets. Hollofil is a fiber similar to Polarguard but hollow. This increases the dead air space and makes the fiber more thermally efficient. Quallofil took Hollofil one step further by creating four "holes" running through the fiber.

6. "Superthin" fibers – Primaloft, Microloft, Thinsulate, and others – The principle behind these synthetic fibers is that by making the fiber thinner you can increase the amount of dead air space. Under laboratory conditions, a given thickness of Thinsulate is almost twice as warm as the same thickness of down. However, the Thinsulate is 40% heavier. Thinsulate is made in sheets and therefore tends to be used primarily for outer layers, parkas, and pants. New materials such as Primaloft and Microloft are superthin fibers that are close to the weight of down for an equivalent fiber volume. They are now being used in parkas and sleeping bags as an alternative to down. They stuff down to a small size and have similar warmth to weight ratios as down without the worries of getting wet.

7. Down – Feathers are a very efficient insulator. They provide excellent dead air space for very little weight. The major problem with down in the winter is that down absorbs water. Once the feathers get wet, they tend to clump and lose dead air space. Using down items in the winter takes special care to prevent them from getting wet. For example, a vapor barrier liner in a down bag will help the bag stay dry. Down is useful in sleeping bags since it tends to conform to the shape of the occupant and prevents convection areas. Down is very compressible, which is an advantage when putting it into your pack. Conversely, your body weight compresses the feathers beneath you, and you need good insulation (such as a foam pad) underneath you, more so than with a synthetic bag. Some people are allergic to down. The effectiveness of a down bag is directly related to the quality of the feathers used. Since down is made of individual feathers, sleeping bags and garments must have baffles sewn in to prevent the down from shifting in the bag which would create cold spots.

8. Radiant barriers - Some portion of body heat is lost through radiation. One method of retaining this heat is by using a reflective barrier such as aluminum. This is the principle used in "space blankets" and is also used in some bivy sacks and sleeping bags.

Note: Cotton is useless in winter time. It wicks water, but unlike polypropylene, cotton absorbs this moisture and the water occupies the space previously occupied by dead air. This means a loss in dead air space, high evaporative cooling, and a garment that is almost impossible to dry out.

The Body and Clothing

1. Head – Because the head has a very high surface to volume ratio and the head is heavily vascularized, you can lose a great deal of heat from your head. Therefore, hats are essential in winter camping. The adage "If your toes are cold, put on a hat" is true. A balaclava is particularly effective and versatile. A facemask may be required if there are high wind conditions due to the susceptibility of the face to frostbite.

2. Hands – Mittens are warmer than gloves because you don't contend with the curvature problem described above. Also, the fingers tend to keep each other warm, rather than being isolated as in gloves. It is useful to have an inner mitten with an outer shell to give you layering capabilities. However, gloves are always essential as well in winter because of the need for dexterity in various operations.

3. Feet – Finding the right footgear depends a great deal on the activity you are involved in as well as temperature and environment. The two general modes of travel are skiing or snowshoeing (in areas with only a few inches of snow, you can hike in just boots).

    a. Insulated Boots – These boots, usually made of rubber or both rubber and leather, use a layer of wool felt to provide dead air space. These boots can be Army surplus or modern copies (Be wary of copies since they are often poorly made). True Army insulated boots are rated from -20 degrees to -40 degrees. Depending on the make, the wool felt liner may be exposed. Breaking through a frozen stream may soak the liner which will be difficult to dry. They can be used with snowshoes, crampons, and skis (with special bindings).

    b. Plastic Mountaineering Boots – Plastic shell mountaineering boots use inner boots made with wool felt or a closed cell foam insulation. These can be very warm and easily used with ski bindings, crampons, and

snowshoes. Depending on the inner boot, you may need insulated overboots to add enough insulation to keep your feet warm.

c. **Mukluks** – Mukluks are one-piece moccasins which reach to the knee. They are used with felt liners and wool socks. The Mukluk itself serves as a high gaiter. They are flexible and breathable. They work with snowshoe bindings and can be used on cross-country skis with special bindings and with hinged crampons. They are extremely comfortable, but since they are not waterproof, they are best used in dry cold winter settings where water and rain are not a problem.

d. **Heavy Leather Mountaineering Boots** – These boots have an insulated overboot. They can be effective, but the system is still not very thermally efficient and may lead to frostbite.

e. **Socks** – One of the best systems for keeping feet warm is using multiple layers. Start with a thin polypropylene liner sock next to the skin to wick moisture away followed by 1-2 layers of wool or wool/nylon blend socks. Make sure the outer socks are big enough that they can fit comfortably over the inner layers. If they are too tight, they will constrict circulation and increase the chances of frostbite. Keeping your feet dry is essential to keeping your feet warm. You may need to change your socks during the day.

f. **High Gaiters** – High gaiters are essential for winter activity. They keep snow from getting into your boots and keep your socks and pant legs free from snow.

g. **Insulated Booties** – These are booties insulated with a synthetic fill that typically have a foam sole to insulate you from the ground. They are very nice to have to wear in your sleeping bag at night.

h. **Overboots** – Overboots are shells with an insulated bottom. These can be worn over insulated booties for traipsing around in camp. They are also ideal for those middle of the night visits to the woods.

4. **Outer Layer** – It is essential to have an outer layer that is windproof and water resistant or waterproof. It also needs to be ventilated. There is a big tradeoff between water resistance and ability to ventilate. A completely waterproof item will keep the water that is moving through your other layers trapped, adding weight and causing heat loss. However, in wet snow conditions, if the garment is not waterproof it can get wet and freeze. Gore-tex and other similar fabrics provide one solution. These fabrics have a thin polymer coating which has pores that are large enough to allow water vapor to pass through but too small to allow water droplets through. Nothing is perfect, however, and although Gore-tex does breathe, it doesn't breathe as well as straight cotton/nylon blends. If you opt for a straight wind garment, 65/35 blends of cotton and nylon work well. The other approach is to have a waterproof garment with enough ventilation openings to allow water vapor to escape. This provides the ability to work in wet snow without worrying about getting the garment soaked. Part of the basis for making the decision is the area where you are traveling. If you are in dry snow, you don't need to worry as much about waterproofness. If you are in an area where freezing rain and wet snow are possible, you need to be prepared to be wet.

5. **Zippers** – Zippers are wonderful accessories for winter clothing. Having underarm zippers on jackets can greatly increase your ability to ventilate. Having side zippers on pants allows you to ventilate and to add or subtract a layer without taking off skis or snowshoes.

6. **Miscellaneous** – Knickers with knicker socks can make a good combination. You have the option of ventilating by opening up the bottom of the knickers and/or rolling down your socks. Also, bibs are helpful (both pile and outer waterproof layer) because they prevent cold spots at the junction between tops and bottoms. Snap-on jackets, etc. can be a problem because they fill with snow and ice and fail to work. Velcro works much better as a closure.

Clothing Techniques

1. When you first get up in the morning (and at the end of the day in camp), your activity level will be as low as the temperature. You will need to have many, if not all, of your layers on at this point until breakfast is over and you have started to become active.

2. When you get ready to be active, you will need to take off layers since you will begin generating heat. A good rule of thumb is to strip down until you feel just cool, not chilled just before activity. Failure to do this will mean overheating, sweating, and losing heat. You will have to stop in 10 minutes down the trail anyway to take layers off. Opening or closing zippers, rolling sleeves up or down, taking a hat off or putting one on will all help with temperature regulation.

3. If you stop for more than a few minutes, you will need to put on another layer to keep from getting chilled. Keep a layer close at hand.

4. Whenever you get covered with snow, either from a fall or from dislodged snow from a tree, it is essential to brush yourself off to keep your clothing free of snow. Failure to do this often results in the snow melting into your clothing and refreezing as ice.
5. At the end of the day, as activity decreases and temperature drops, you will need to add layers. Once you start to cool down, it takes a lot of the body's resources (calories) to heat up again. It may be good to put on more than you think you need. If you are too warm, you can open layers and ventilate to reach the proper temperature.

Sleeping Bags

Sleeping bags for winter camping should be rated to temperatures below what you will likely experience if you want to be comfortable. If the nighttime temperature can drop to -15° F, then your bag should be rated to -30° F. There are a variety of different fills for sleeping bags: down, Primaloft, Microloft, Quallofill, Polarguard, etc. The bag itself should be a mummy style bag with a hood. It should also have a draft tube along the zipper and a draft collar at the neck. In sleeping bags, you want the bag to snugly conform to your body. If the bag is too big, you will have large spaces for convection currents, and you will be cold. In a bag that has too much space, you may need to wear clothing layers to help fill up the space. If you have a sleeping bag rated to 0° F, you may want to augment it with a vapor barrier liner (5-10° F), a bivy sack (5-10° F), or an overbag to fit over your mummy bag (15-20° F). Keep in mind that each of these options has advantages and disadvantages in terms of price, weight, and volume.

Foam Pads

You also need to insulate yourself from the underlying snow. Foam pads or inflatable pads work well. Your insulation should be at least ½" thick. It is best to use full length pads so that your whole body is insulated.

Ground Cloths

Ground cloths keep ground moisture out and help protect your tent and sleeping bag and keep them clean. Proper ground cloths must be large enough to cover your sleeping area and must be thick enough to prevent punctures and rips.

Cold Weather Safety

Avoid Dehydration – You Need Water in Winter

Your body requires water in winter just as it does in summer. Under normal winter conditions the average adult loses 2 to 3 quarts of water per day through sweating, respiration, and elimination. Cold, dry winter air can cause you to dehydrate quickly, especially with windy and/or sunny conditions. Dehydration upsets your body's metabolism making you less hungry and increasing your susceptibility to hypothermia.

Unfortunately, cold temperatures tend to suppress thirst. You can become dehydrated without being thirsty. To get adequate quantities of water in winter you may need to force yourself to drink liquids.

The need to remove clothing to eliminate body wastes, the lack of readily available water, and suppressed thirst are factors that tend to inhibit your intake of water. Many people have a pronounced tendency to put off consuming water unless they are thirsty. In normal living situations we depend on thirst to maintain an adequate intake of water, but this is not reliable in cold weather.

An alternative water machine can be contrived using a large sheet of black plastic on a sunny day. Position it on a slope, sprinkle powder snow on top, and direct the flow of water to your pot or can. On a cloudy or severely cold day this method will not work, so avoid relying on it exclusively.

Cold Weather First Aid – Condition, Cause, Symptoms, Treatment

Hypothermia

Cause: Cooling of the inner body core to below normal temperature, inadequate clothing, inadequate shelter, prolonged exposure to high winds, dampness, cool temperatures, or overexerting oneself. Slim athletic people are more susceptible because their bodies lack resources of fat to produce energy.

Symptoms: Uncontrollable shivering, difficulty speaking, loss of muscle coordination, exhaustion, impaired ability to reason, slow pulse and respiration, impaired ability to stand or walk, eventually loss of consciousness and death.

Treatment: Prevent further heat loss. Replace wet clothing with dry clothing. Shelter from wind and weather. Give warm, sugary drinks, or warm food if victim is conscious. Keep victim awake until his body has been warmed. For severe hypothermia, apply warm objects to the victim's ribs, head, neck, and groin areas. Handle with extreme care – do not rub or massage extremities. Get victim to a doctor as soon as possible.

Frostbite

Cause: Freezing of a portion of the body. Usually an exposed part of the face or limbs. Most often occurs in cold, windy conditions. Can also occur from grabbing metal items with bare hands, spilling of gasoline or fuel on the body, or restriction of blood circulation.

Symptoms: Grayish or yellow-white spots on the skin, numbness in affected part, sometimes painful. Frostnip, the first sign of frostbite, will cause a tingling sensation as the body part is warmed.

Treatment: Do not rub the affected part. Do not forcibly remove clothing adhering to affected part, thaw it loose. Warm frozen body part on the bare flesh under armpits or stomach of a person not having problems or rewarm the body part in 108-110° F water. Walk out on frozen feet; once they've been warmed, further travel is impossible. Do not allow any body part to refreeze after being treated for frostbite.

Trench Foot

Cause: Prolonged exposure (usually 48 hours or longer) of feet or flesh to moisture at temperatures just above freezing, causing death to the affected tissue.

Symptoms: Feet, toes, or other affected flesh are pale and feel cold, numb, and stuff.

Treatment: Remove constricted clothing and warm affected part to 70-80° F. If water is used, it should feel slightly cool to forearm. Protect injured part with dry dressings. Litter patient if necessary.

Dehydration

Cause: Loss of bodily fluids from sweating and/or insufficient intake of water.

Symptoms: Body temperature rises, subject feels less need to drink. Greater water loss from sweating and dark urine.

Treatment: Regular intake of water at frequent intervals. Pace work. Replace body salt loss by eating salty foods.

Sunburn

Cause: Excessive exposure to sun's ultraviolet radiation.

Symptoms: Reddish skin, burns, blisters, swelling, or puffiness of extremities, insufficient sweating.

Treatment: Cool the skin, cover exposed areas, treat for burns and shock. Prevent further exposure to the sun.

Windburn

Cause: Excessive exposure of skin to wind.

Symptoms: Burning irritation and reddening of affected skin.

Treatment: Apply ointment designed to treat windburn or sunburn. Prevent further exposure to wind.

Snow Blindness

Cause: Excessive exposure of unprotected eyes to extreme light, usually reflected on snow, sand, or water.

Symptoms: Burning and reddening of eyes, eyes may water and swell shut, throbbing pain around eyeballs, forehead, flashes of light cause pain. Halo seen when looking at lights.

Treatment: Apply cold compress over eyelids. Give aspirin to victim. Place light-proof bandage over eyes or put subject in dark room. Do not use eyedroppers or ointment. Use caution to prevent reoccurrence.

Carbon Monoxide Poisoning

Cause: Fire burning in an unventilated shelter or incomplete combustion in a ventilated shelter. Carbon monoxide is freely generated by a yellow flame stove; flame should be blue. Do not use flames inside shelters.

Symptoms: There may be none. Unconsciousness and death may occur without warning. Sometimes there may be pressure at temples, burning of eyes, headache, pounding pulse, drowsiness, dizziness, or nausea.

Treatment: Get subject into fresh air at once. Keep warm and at rest. If necessary, apply artificial respiration. Give oxygen if available.

Snowshoes

While the exact origin of snowshoes is unknown, foot extension devices originated in Central Asia as early as 4000 B.C. Much later, the North American Indians became great innovators in designing snowshoes. In the 1600's, the French who moved into the St. Lawrence River area intermingled with Algonquin Indians and quickly learned how to use snowshoes in winter.

Today, this winter activity still has plenty of practical application as well as being fun. Even if you prefer cross-country skiing, you need to know how to snowshoe when the snow is too powdery, where a slope is too steep, or in heavy timber where skis are not sufficiently maneuverable. It may also be more practical to don snowshoes to go outside for an arm load of wood to burn in your fireplace or wood-burning stove. There are times when a bit of snowshoeing can save a lot of backbreaking snow shoveling.

The purpose of snowshoes is to permit the wearer to travel atop snow instead of plunging through powder or crust with virtually every step and quickly becoming overheated and/or exhausted. Stepping out of a hole requires great effort since it requires lifting the foot and leg upward against gravity and forward against the snow.

Snowshoes spread your weight over a greater surface of the snow providing various degrees of flotation – the ability to stay on or near the surface of the snow. The amount of flotation provided depends upon three factors: (1) the snow conditions (powdery, crusted, slushy, etc.), (2) the weight on the snowshoes including the user and his pack, and (3) the amount of surface over which that weight is distributed. The area covered by the bottoms of the snowshoes determines the distribution of weight. You have no control over snow conditions, limited control over your weight, but considerable control of the amount of area over which your weight is distributed.

A large pair of boots cover about 50 square inches of surface on the bottom. If you weigh 150lb. including your pack, you will exert a pressure of 3 lb. per square inch. This concentrated pressure on a relatively small area usually will cause your boot to plunge into the depths of the snow. Snowshoes, on the other hand, vary from about 300 to as much as 600 square inches of surface area. Thus, with small snowshoes such as bearpaws, you will exert a pressure of only ½ lb. per square inch, and with large snowshoes you will exert as little as ¼ lb. per square inch of surface. Most snow conditions will support you rather well in large snowshoes because your weight will be widely distributed over the surface of your snowshoes. In fresh, powdery snow, you may sink several inches even with large snowshoes, but it will be far easier to walk with snowshoes than without them.

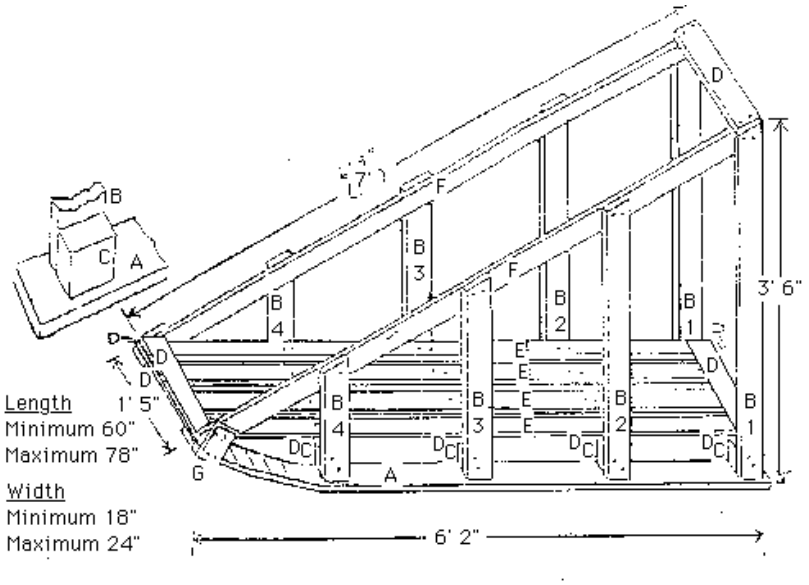
Klondike Derby Sled Plans

The following plan is for a sled that has minimum and maximum dimensions as shown. There is no absolute requirement for these dimensions, but these are typical of those used in most areas.

The sled below is shown as a guide. Your own design may be used if it conforms to the minimum and maximum dimensions. Make sure the sled is strong enough to bear the weight of your equipment and will hold together for a long trip. It is best to use screws rather than nails. Drill first to avoid splitting wood. Varnish bottom of runners and wax before using. Wire netting or a canvas snow curtain may be added to prevent items from falling off the sled.

Secure a towing rope at the front and secure a brake rope at the rear.

Item	Label	Quantity	Dimensions
Runners	A	2	1" x 4" x 6'2"
Uprights	B1 B2 B3 B4	2 2 2 2	1" x 4" x 3'6" 1" x 4" x 2'8" 1" x 4" x 1'9" 1" x 4" x 10"
Upright Supports	C	8	2" x 4" x 4"
Cross Supports	D	6	1" x 4" x 1'5"
Floor Strips	E	4	1" x 4" x 6'
Hand Rails	F	2	1" x 2" x 7'
Front Supports	G	2	1" x 4" x 6"



Shelters

During winter, shelter is very important. At night, temperatures can drop far below freezing. If you have the right kind of shelter you won't even notice the change. You must be prepared for rain, snow, and wind. Think of what happens when a foot of snow falls on top of your tent or snow cave. Does it collapse? If it's wet out, will you be dry? Can you move around enough to change clothes? Also pay close attention to the pad you sleep on. It's the only thing between you and the ground. Plan carefully!

When choosing a tent to use you should think of space, warmth, and stability. Try to get a tent that is rated for more people than will be in it. When the label says "four-man tent" it usually means four stunted nine-year-olds. You need room for packs and for changing. Big dome tents are good for this, as are tents with a "boot" at the rear for storage.

When the air is cold outside the tent, it makes water vapor on the inside condense on the walls. In the morning, you'll be swimming in your own breath if your tent is sealed tight. To avoid this, use a tent with a net top and a rain fly, or leave the door open a bit. Be sure the tent is waterproofed top and bottom, and always use a ground cloth. If you have one, spread a blanket on the floor to keep off the chill of cold nylon.

Some tents are not made to be snowed on. A-frame tents often sag towards the center when loaded, but they can be used if you are careful to occasionally take the snow off. Dome tents and arch tents may fare a bit better, but you should never leave more than a few inches on the roof. Snow on the tent can be helpful since it traps air and acts as an insulator, so you stay warmer.

After you pick your tent site, prepare the snow to sleep on. Pack it down flat with skis, snowshoes, or boots. As soon as your tent is up, crawl inside and smooth the floor. By nighttime, the snow will be hard as a rock.

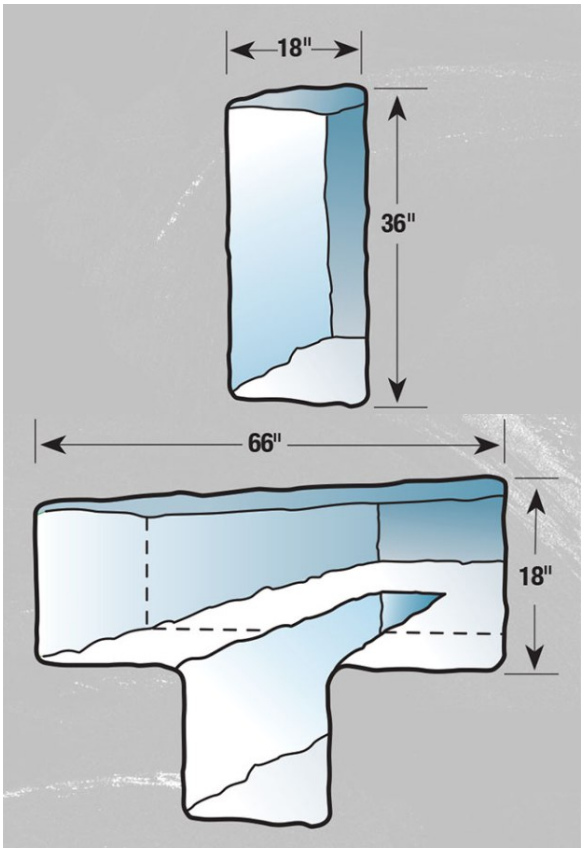
Tent stakes won't hold in snow, and even dome tents should be anchored for wind. To make a "deadman" anchor, tie a short cord around a few foot-long sticks. Dig a hole about a foot deep where you want the anchor. Fan out the sticks at the bottom and bury them. Then just tie your tent rope to the cord. Always use a separate anchor cord. The knots may freeze, and you may have to cut the cord.

Snow Cave by Boy's Life

A T-shaped snow cave is a quick and efficient way to protect yourself from even the worst winter storm. Locate a large snow drift or steep, stable snow slope, and start digging with the instructions below.

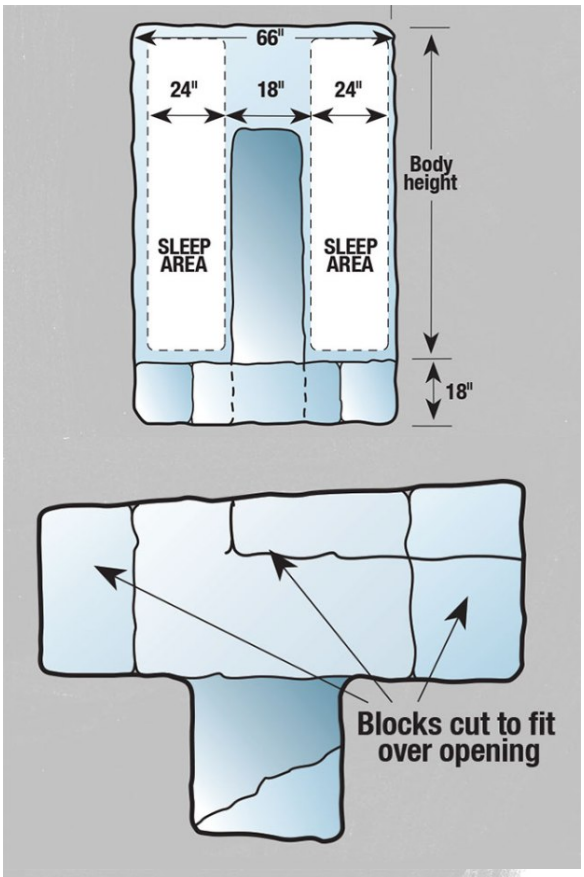
Step 1: Dig the entrance
Dig an entrance about 18 inches wide and as high as your chest.

Step 2: Widen into a T-shape
To make it easier to dig, widen the top of the entrance to form a T shape.



Step 3: Excavate the interior

Dig several feet farther into the drift and excavate the interior of the cave. The floor of the cave will be at about waist level, so much of your digging will be upward and to the sides.

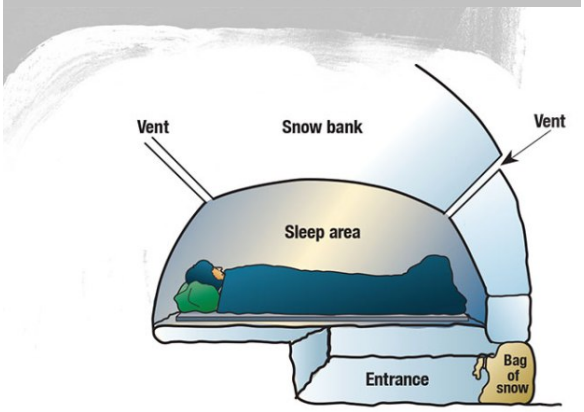


Step 4: Seal the top of the entrance

When the interior space is fully formed, use blocks of snow, bags of snow or snowballs packed together to seal the top of the T.

Step 5: Poke ventilation holes

Use a ski pole or shovel handle to poke several ventilation holes in the ceiling at a 45-degree angle to the floor. Use a bag of snow to seal the tunnel entrance.



Quinzee Hut by Boy's Life

A quinzee is a simple shelter made by hollowing out a big pile of snow. They can take several hours to build but are an effective way to stay warm when camping in the winter. Here's how to build one.

Step 1: Shovel a pile of snow into a mound 7 to 8 feet high and big enough around to hold two people once it is hollowed out. Mix snow of different temperatures to cause it to harden, or "sinter." Flip the snow over so it mixes when you pile it into a mound.

Step 2: Shape the mound into a dome and allow it to sinter for about 90 minutes. Then begin to hollow out the mound.

Dig a small entrance on the downhill side. Smooth out the walls and ceiling. The walls should be 1 to 2 feet thick. Poke measuring sticks through from the outside of the mound, so you will know to stop hollowing out the inside when you see the ends of the sticks. Hollow the shelter out from the top down.

Step 3: Use the last foot of snow to make elevated snowbeds. Dig a narrow trench between the beds all the way to the ground. This allows cold air to flow down and out of the quinzee. Poke a small ventilation hole near the top of the dome.

Building a quinzee will make you sweat. Prevent hypothermia by changing into warm dry clothes after you finish building your shelter.

Step 4: Make sure you mark your entrance in case it gets covered with snow while you are away having fun. Keep a small shovel inside in case you need to dig your way out.