



The Wonderful World of Winter Camping

Legal Disclaimer: All information in this handout is provided as a free service. Under no conditions does it constitute professional advice. No representations are made as to the completeness, accuracy, comprehensiveness or otherwise of the information provided. Information may have errors or be outdated. Some information is from historical sources or represents opinions of the author. It is for research purposes only. The information is "AS IS", "WITH ALL FAULTS". User assumes all risk of use, damage, or injury. You agree that we have no liability for any damages. We are not liable for any consequential, incidental, indirect, or special damages. You indemnify us for claims caused by you. Information contained herein is not meant to replace or supercede official BSA documentation.

Clothing – The Old and the New

Layer Upon Layer⁶

By now, everybody's heard that the key to dressing for the cold is to dress in layers—layering. But it's been my experience that, though everybody knows the word, most people still haven't quite figured it out. The benefits of layering are threefold. First, specific layers help wick moisture away from your body, provide insulation, and block the wind and rain. Second, you can easily add or remove clothing layer by layer, to compensate for your activity level and thus regulate the amount of heat retained. And finally, warm air is trapped between layers, further increasing the total insulation value.

Layer One - No Sweat For Starters

The Old Style (left):

A - Cotton underwear; B - Wool liner socks;

The New Style (right):

C - Polyester underwear; D - Polypropylene liner socks

We're talking underwear here, and to me, this layer is the most important of all. If your base layer is faulty, it doesn't matter how good your other layers are, you're going to get cold. So seek out a store that sells high-tech outdoor gear and be prepared to spend a few bucks. It's critical that this layer transport moisture away from the skin to the next layers so the body does not lose excessive heat through evaporation. It's also critical that this layer dries quickly. Having wet underwear is the surest way to get hypothermia. Moisture is the ultimate heat conductor, and having wet fabric next to the skin draws heat away from the body 25 times faster than dry clothing. Most quality inner-layer garments are made from polyester or polypropylene, with polypropylene being the hands-down favorite. These synthetic fabrics are extremely durable, absorb very little moisture, transfer perspiration extremely well and dry rapidly. Synthetic underwear typically comes in a variety of weights and should be selected according to your activity level. More is not always better here, and a light weight is usually the best choice when doing a lot of walking. If you will be sitting all day, then a medium or heavy weight will suit your needs better. The idea is to stay warm but not to overheat. Even the best quality underwear can only transfer sweat so fast, so avoid selecting too heavy a weight of underwear that will cause you to sweat excessively.



Layer Two - Pile On Whatever It Takes

The Old Style (left):

A - Heavy flannel (cotton) shirt; B - Cotton/polyester blend turtleneck;

C - Mackinaw (wool) pants; D- Heavyweight wool socks;

The New Style (right):

E - Lightweight synthetic fleece shirt; F- Fleece jacket;

G - High bib pants with suspenders; H- Heavyweight wool blend socks

In my opinion, the middle layer is the least critical of all, but with that said, it still pays to wear the right clothes. The middle layer is usually the one that provides the insulation, and it can consist of one or several pieces of clothing. I prefer to wear several lighter weight layers, rather than a single heavy one, so I can add or remove layers depending on the temperature and/or my activity level. Currently, synthetic fleece dominates the market for mid-layer clothing. It is lightweight, extremely durable, absorbs very little moisture and has good insulation value. Polartec, the leading manufacturer of fleece, has more than 150 different types of fleece available, and it can be a little overwhelming to choose. Polartec 100 Microfleece and Polartec 200 are both great options. In extremely cold



conditions, Polartec 300 Shearling works well. Unlike other fleece, it's made in such a way that air is trapped in tiny pockets for the ultimate in warmth. However, even in extreme cold, if I plan on being active, I always opt for a couple layers of the lighter fleece versus one heavy layer. Wool is another popular mid-layer garment and I must admit to being a fan of it, especially when hunting. It may be oldfashioned but it works. I find that I can wear wool through a wider range of temperatures, and remain comfortable without adding or removing layers. On the downside, if it gets wet, wool absorbs up to 30 per cent of its weight in water, compared to about one per cent for synthetic fleece. However, wool's ability to hold moisture is not always a negative. When you perspire while wearing wool, the moisture is held for a period of time in the fibres, and this latent heat helps insulate the wearer. If money is a consideration, go for the fleece. It's far less expensive than wool and will do the job very well. If you were good this year and Santa has you at the top of his list, take a look at the high-end wool lines from companies such as C.C. Filson, King of the Mountain, Woolrich and Sleeping Indian Designs. But be prepared, these duds are not cheap.

Layer Three - Out, Out, Damned Cold

The Old Style (left):

A - Wool/sheepskin cap; B - Wool gloves;
C - Mackinaw (wool) jacket; D- Mackinaw (wool) pants;

The New Style (right):

E - Polypropylene head gaiter; F- Gore-Tex mitts with polypro liners;
G - Waterproof/breathable parka with hood; H- Bib pants



The outer layer has several functions. It must keep the rain and wind out, while keeping the heat in and allowing moisture to escape. While there is no perfect fabric here, Gore-Tex still comes as close as there is. Gore-Tex is excellent at repelling rain and wind, is incredibly durable and does let some moisture out. Other waterproof/breathable fabrics that do the trick include Omni-Tech (used by Columbia Sportswear) and Tegraltex (by Integral Design). Typically the outer layer has no insulation, but for extremely cold situations or when you're relatively inactive—at a stand, ice-fishing or riding a snowmobile—you may need an insulated jacket or parka and pants. But though a one-piece insulated suit may have a higher warmth-to-weight ratio than layering, it is far more restrictive. It's an all-or-nothing type of garment. If you do go for insulation, what's the best kind? It depends on whom you talk to. The folks at Integral Design in Calgary, suppliers to many an Everest expedition, say that Primaloft is the most "thermally efficient" insulation available. While most types of insulation lose up to 60 per cent of their insulating properties when wet, Primaloft loses absolutely none. Traditionalists say that high-quality goose down provides the best warmth for weight of any insulation, but concede that down loses much of its insulating properties when wet. For the average outdoorsman, synthetic insulation such as Thinsulate, Thermoloft and Micro-loft will do the job.

The Digital Age

Though I've been discussing body layering, the same rules apply for hands and feet. Many manufacturers are now offering layering systems for gloves, mitts and socks. Rely on a synthetic like polypropylene next to the skin as it will wick away moisture, keeping your extremities drier and warmer. The mid-layer is typically wool, especially for socks, but there are a number of synthetics available. Fleece mitts and gloves are becoming extremely popular. Insulated boots provide the outer layer for the feet, but for your hands, Gore-Tex is still the most popular choice.

Heads Up

Experts say that up to 50 per cent of the total heat lost through radiation is lost through the head, yet hats are often the most overlooked piece of clothing. When your head cools, your body reduces the blood supply to other distant areas to make sure your brain is not affected. By keeping the head warm, you help ensure an adequate blood flow to your hands and feet.

Clothing: The C.O.L.D. Principle

Scouting is a year-round program and your Scouts can camp in the harshest of weather with a few items and some experienced advice. Here are some hints and tips for sleeping warm, keeping warm, and having safe fun during cold weather campouts. If a Scout feels that at this time winter camping is not for him, then he should not go. There is always next year and the year after and so on. If a Scout comes to camp and you don't feel that he is prepared, ask him to stay behind. Make sure you are ready, and SAFE.

At some time, you will have a scout show up for a winter campout with tennis shoes and scout socks, leave his boots out in the snow to freeze, forget his long underwear or coat, refuse to change into dry clothes before bed, forget his gloves or not wear a knit hat to bed and want to go home the next morning. Nothing you say will absolutely prevent this. Just remind him of the basic principles of staying warm.

Keeping warm is the most important part of cold weather camping. Use the **C-O-L-D** method.

C - Clean - Since insulation is only effective when heat is trapped by dead air spaces, keep your insulating layers clean and fluffy. Dirt, grime, and perspiration can mat down those air spaces and reduce the warmth of a garment.

O - Overheating - Avoid overheating by adjusting the layers of your clothing to meet the outside temperature and the exertions of your activities. Excessive sweating can dampen your garments and cause chilling later on.

L - Loose Layers - A steady flow of warm blood is essential to keep all parts of your body heated. Wear several loosely fitting layers of clothing and footgear that will allow maximum insulation without impeding your circulation.

D - Dry - Damp clothing and skin can cause your body to cool quickly, possibly leading to frostbite and hypothermia. Keep dry by avoiding cotton clothes that absorb moisture. Always brush away snow that is on your clothes before you enter a heated area. Keep the clothing around your neck loosened so that body heat and moisture can escape instead of soaking several layers of clothing.

CONSERVING BODY HEAT - THE PRIME OBJECTIVE

Heat Loss

The body basically acts as a furnace, producing heat through chemical reactions and activity. This heat is lost through conduction, convection, evaporation, radiation, and respiration. As physical activity increases so does heat production and conversely as activity decreases so does heat production. The key to keeping warm is to add insulation to the body. There are three ways to lose body heat: **RADIATION** - The Loss of body heat, especially from the skin areas exposed to the elements. **CONDUCTION** - The absorption of cold by the body when sitting or laying on cold ground, or handling cold objects such as metal cooking utensils. (*Try not to sit on the ground.*) **CONVECTION** - The loss of body heat from wind blowing across unprotected body parts. Keep bare skin covered with hats, scarves, and gloves and keep exposure to a minimum, Convection heat loss can reduce body heat the fastest. Wet clothing will accelerate this process.

REDUCING HEAT LOSS (TECHNICALLY SPEAKING)

Insulation: The thermal insulation of clothing is proportional to the thickness of the dead air space enclosed. The dead air next to the skin is heated up by the body and provides a layer of warmth around the body.

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 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.

You want to control your layers so as to be warm at the activity level you are in but not sweating profusely. Thus, traveling in the winter is a constant process of adjusting your layers to keep comfortable. This means having a number of 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.

Openings in layers allow you to ventilate, to open the “chimney damper” if you are beginning to overheat, without having to actually remove a layer. So 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 actually reduce dead air space in layers below as well as restricting body movement.

Diameter of the body part vs. insulating ability. 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. 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 1/4 inch is reached. This heat resistance gains as additional thickness is added. However, added thickness beyond 1/4 inch increases warmth very little in proportion to its thickness. This is one reason that thin gloves don't keep your hands particularly warm.

PROPER CLOTHING CHOICES:

1. Socks and Boots.

Do I really need to repeat “no cotton” here? I didn't think so. As with other clothing, the layer system works for the feet also. Start with a pair of sock liners. These are usually made of polypropylene, silk, nylon, or thin wool. Then layer on heavier wool socks. When and if your feet become damp, change into another pair of dry socks at the first opportunity.

Many hikers now wear SmartWool™ socks (www.smartwool.com) which are a high-tech wool blend engineered to wick moisture away from the moment it appears (\$17/pair but worth every penny). SmartWool™ socks will leave your feet dry and your socks dry even without sock liners. Beware of inexpensive wool blends. They boast about their wicking ability, but while your feet stay dry, the outer layer of the sock builds up moisture and gets very wet and smelly. This is because the poly-blend needs the moisture to condense before it begins to wick. SmartWool™ socks begin wicking immediately and help prevent a buildup in your boot.

As for boots, It is best to buy a pair of winter hikers with (generally) no more than 200gm of insulation (depending on the temperature conditions). Your basic dept. store snow boot should also do fine, as long as they are bought at least one size too big, in order to fit the heavier socks. Fit is very important. Anything too tight will cut off circulation to the toes and be a potential frostbite.

TIPS ON HOW TO BUY BOOTS:

1. Wear socks that you wear on the campout.
2. Size the boot so that when you slide your foot to the front there remains a thumb's thickness at the

heel. Shop for boots later in the day when your feet are a bit larger from standing.

3. Walk around the store for at least 15 minutes.
4. Try on another pair and do the same.
5. Choose the one that fits best after the trial period.

Gaiters on top of pant legs and boots work well in snow. Gaiters are basically a cordura or nylon sleeve which bridges the gap between boots and pants. They do a great job keeping snow out of the boots and your pants legs dry.

2. Mittens and Gloves.

Mittens will keep your hands warmer than regular gloves that cover each finger. Long cuffs will keep wind and snow from getting in. Socks work great in an emergency or when packing light. "Glomitts" are fantastic. These are a pair of finger-less wool gloves with the finger part of a mitten attached to the back of the knuckles. Normally the mitten is over the fingers, but when it comes time to fiddle with the stove, or even light a match, the mitten part flips up and Velcro's to the back of the glove. Under these (yes, layer here as well), wear some thin acrylic knit gloves. You can either buy glove liners at some outdoor store or go to the women's section of a discount dept. store like Walmart. They have one-size fits all mini- gloves for around a buck and work fine for a fraction of the cost of an "official" glove liner.

3. Headgear.

Starting with the top, a wool or polypropylene hat. Much of the body's heat is lost through the head, and the body will start shutting down blood flow, and therefore heat, to the extremities in order to keep the core warm. A common saying is, "Cold feet - put a hat on". This hat will also help at night in the sleeping bag. Some sort of face shield is needed. The stocking hat is the warmest thing you can cover your head with in cold weather. Get one that is large enough to pull down over your ears. Ski masks are great in the winter and can help in keeping your neck and face warm as well. Noses and ears can be very easily frostbitten, so a scarf helps. A wool or acrylic scarf, or even a spare wool sock for those boys who forget the scarf, keeps frostbite away.

4. Torso.

Layering. Avoid a heavy winter coat. A good "system" consists of a medium-weight polypropylene long-sleeved undershirt, a wool sweater, an insulated flannel shirt (Wal-Mart deal which luckily is made of all man-made fibers - no cotton!), all topped with a wind-breaking, water resistant, shell. Total cost is about \$50.

"Cotton kills". Cotton has this annoying habit of holding onto moisture, keeping it close to the skin, and thereby losing all insulation value. Those waffle-weave, "thermal" undershirts found at dept. stores are almost always 100% or 50% cotton. Go to the sports dept. and look for the poly. Most man-made fibers and wool will wick moisture away from the skin. Even when wet, they will still keep a pretty good amount of insulation. You can wear cotton briefs or boxers, but synthetic underwear is best.

A wool sweater, Polartech™ or similar fleece top. Fleece has the added advantage of being lighter weight, something to consider when backpacking. The outer shirt or jacket should be of a material that will stop wind and shed snow. Some slick synthetics work well. Coveralls on the outer layer are warm and work well except for hiking or heavy activity.

5. Legs.

The layering and no cotton rule works here as well. Start with poly long johns, put on some wool pants over that and then thin, wind-breaking, snow-pants over that. Please keep the kids from bringing sweatpants. These are almost always cotton. Wool pants are hard to find cheaply in kid's sizes. Check army surplus. Many boys substitute poly's topped with the heavier snow pants. Just make sure they're not cotton-filled. The outer pair of pants should shed snow and block wind. Some types of ski-pants do both well. Problem with wind-resistant synthetic outer layers (except those such as Gore-Tex) is that if they keep moisture out, then they'll keep it in, too.

6. Parka and/or Overcoat.

Your coat or parka is the most important piece of your winter clothing. It needs to be large enough to fit over extra clothing without cutting off blood flow, and allowing ventilation to keep moisture away from your body. A large permanently attached hood will prevent heat loss around your head and neck. A parka or overcoat is ok for very cold conditions or low activity conditions.

Rain gear should include a jacket-pants set made of woven nylon or other breathable fabric. Vinyl or plastic ponchos and raingear traps moisture and tears easily. (\$30-\$200).

7. **Sleepwear.**

Never sleep in the same clothes that you have worn all day. They are damp and will cause you to chill. This could cause frostbite and hypothermia. Bring a thick pair of sweats and thermal underwear to sleep in. Keep the thermals and sweats in a zip-lock bag for sleeping in only. Do not wear them during the day, this will keep them dry. Also be sure to have a couple pair of dry wool socks as well. Always sleep with a stocking hat on your head. Your sleeping bag needs to be a winter rated bag. Typically rated down to -10 degrees.

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 low as will be 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, losing heat and you will have to stop in 10 minutes down the trail anyway to take layers off. Open 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 so layer up ASAP before you get chilled. It may be good to put on more than you think you need; it will only get colder. If you are too warm, you can open up layers and ventilate to reach the proper temperature.

EXAMPLES OF EFFECTIVE CLOTHING MANAGEMENT

Example 1: You are backpacking up a steep incline with a 50 lb. pack. The air temperature is 10° Fahrenheit and you are dressed in wool pants and a lightweight polypropylene shirt. As soon as you stop for a rest, your heat production slows. If you stop for more than a couple of minutes, you will begin to chill. So you need to have an outer layer handy to put on.

Example 2: You are hiking. The air temp is 25° Fahrenheit and you are dressing in light polypropylene tops and bottoms, a down vest, and a windshell. You come to a long steep hill and have to push hard to get up and over. You start to sweat as your heat production increases with the increased muscle activity. To prevent overheating, you pull off the vest and stick it in your pack.

Example 3: You are standing around a campsite at 15° drinking coffee and chatting. You begin to wonder what the heck you are doing there, but then you realize you are prepared with multiple layers to regulate your body temperature and humidity. It's just hard as heck to go to the bathroom.

⁵CLOTHING MATERIALS

Clothing Materials Some of the different types of materials for winter clothing and insulation:

1. 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 third 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.

2. Pile or Fleece fabrics - is a synthetic material 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 (thicknesses) offering different amounts of loft and insulation. This allows for numerous layering possibilities. It has very poor wind resistance and a wind shell on top is required.

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 the water vapor away from the source (the 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. Others fabrics use a molecular coating to achieve the same end.

4. Vapor Barrier Systems - When sleeping in cold conditions, the moisture from your body escapes upward through your sleeping bag, when reaching the cold outside of the bag it condenses into liquid or even frost. Over a number of days this moisture level in your bag increases. If you can't dry out the bag it will slowly get heavier and heavier as it holds more water and reduces its effectiveness. When you are wearing a vapor barrier, you must carefully monitor how you sweat. If you don't sweat much, your body may shut down perspiration at the foot before it gets actually wet. This is when the vapor barrier system is working.

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. Quallofil™ also created four “holes” running through the fiber.

6. “Superthin” fibers - Primaloft™, Microloft™, Thinsulate™ and others - the principal 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 lightweight fibers and are now being used in parkas and sleeping bags as an alternative to down. They stuff down to a small size without the worries about 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 (and it can be a major problem) in the winter is that down absorbs water. Once the feathers get wet they tend to clump, and lose dead air space. A vapor barrier sleeping bag liner in a down bag will help the bag stay dry. The effectiveness of a down bag is directly related to the quality of the feathers used.

8. Radiant Barriers - some portion of body heat is lost through radiation. One method of retaining this heat is through use of a reflective barrier such as an aluminum "Space Blanket".

RULES AND INSTRUCTIONS FOR KEEPING WARM AT NIGHT

THE SLEEPING BAG DOESN'T HEAT YOU; YOU HEAT IT. So use this rule: "Thickness is warmth." If you're cold, add some more insulation (blankets, clothes, more newspaper).

GROUND CLOTHS AND PADS **Insulate underneath you.** Stay on a foam pad or closed-cell self-inflating pad. Self-inflating closed-cell pads are best and now available in all camping departments and outdoor stores. You can also use blankets, piles of newspaper, or a piece of carpet to help insulate underneath you. Do not use a blow-up air mattress. Air mattresses only increase the amount of air that you need to heat up. Standing all day long is uncomfortable, but sitting on snow just makes you cold in a hurry. Rock may be dry, but it sucks heat even faster. For \$6 you can buy a cheap closed-cell foam pad, and cut it into 2 by 2 foot squares so you can flop down anywhere and sit dry and insulated during breaks on the trail. A foam-backed placemat works well too. It also provides a dry place to put on shoes or stand while dressing.

DO NOT SLEEP WITH YOUR HEAD IN THE SLEEPING BAG! Your breath contains water. If you close your bag, with your head inside, the bag will get wet and you will be cold.

CHANGE CLOTHES. Never sleep in wet clothes or clothes that you have worn during the day. Even perspiration will chill you at night. Wear a layer of dry polypropylene underwear, loose socks, wool or wooly dry socks, and a fleece or hooded sweatshirt. No Cotton!

WEAR A SKI HAT TO BED. Remember 70% of body heat is lost through the top of your head. Wear a knit hat or a full ski mask. Wool, fleece, or acrylic (cheap knit watch caps from Wal-Mart) caps are best.

VENTILATE YOUR TENT: Leave the back or top flaps of your tent open about 4 inches. This will allow the moisture from your breath to escape out of the tent and not collect on the sides. Closing the tent up will not keep it warmer.

EAT A CANDY BAR or other high calorie food (nuts, etc.) before you go to bed: This increases your metabolism (moves your blood faster) and it helps keep you warm. Your stomach is your furnace and will generate heat while you sleep. Before going into the tent, drink some warm cider or hot instant cocoa to hydrate you and give you some carbohydrates for your inner furnace. Make sure you don't try to sleep dehydrated: you'll sleep colder. No food in the tent, though. Critters are still prowling for food in the winter.

GO TO THE BATHROOM BEFORE BED: This saves you a trip in the middle of the night, keeping the heat in your bag and tent.

DO NOT DRY "WET" CLOTHES IN OR UNDER YOUR BAG: Moisture will travel from wet clothes to your sleeping bag.

PUT TOMORROW'S DRY CLOTHES UNDER YOUR BAG: This heats up clothes for tomorrow's cold morning and also provides more insulation.

FLUFF UP YOUR BAG: Always fluff up your sleeping bag before using to create the thickness important in keeping warm.

KEEP IT DRY: Keep all your sleeping gear dry. Unzip your bag during the day and let it air-out. This reduces the moisture in your bag. Keep your sleeping clothes separate and do not wear them during the day. By night they should be dry and you should change into them from the clothes that you wore during the day. Pack all clothes in ziplock bags. Put your sleeping clothes together in a zip lock and store it in your sleeping bag until used, then lay them out to dry.

³SOME ADVICE ON KEEPING THE TENT DRY: Some tips for the novice. Veterans of camping will have learned these and probably have a few ideas of their own.

Tent Placement.

Whenever possible, place your tent in a location that will catch the sunrise in the morning. This will aid in melting off any ice and evaporating any frost or dew that may have formed during the night. This will also warm your tent as you awaken in the morning. Cold air sinks. Try to place your campsite on slightly higher ground than the rest of your surroundings. Try to choose a site protected from snow or wind.

1. Examine your camp site carefully before setting up the tent. That nice flat spot, is it a low point? If you camp in a hollow, you may end up camping in a puddle if it starts raining.
2. Put that rain fly on NOW even if the sky is blue. You can take it off, now that you know how to put it on. With the fly off, the tent will breath better. But make sure you remember where it is.
3. Are you camping under trees? The trees will help break the rainfall, but they will continue to drip after the rain has stopped. You win some, you lose some.
4. A canvas under the tent is a good idea, but watch out. If your canvas extends out further than your rain fly, rain will run off the rain fly and onto the canvas. Depending on the slope, the rainwater may then run *under* your tent.
5. You can improve your tent's rain resistance by applying seam sealer to your tent. Spending a couple dollars and a few minutes ahead of time will help. But don't expect miracles.
6. Condensation will form on the tent's interior walls, unless you keep the tent ventilated.
7. Placing the sleeping bag on a pad or an air mattress is a good idea. It will not only improve your sleep by keeping you warmer and and bed softer, it will keep you up off the tent floor should you get water in the tent.

Cooking In Cold Weather.

Cooking in cold weather will take about twice as long as normal. Always use a lid on any pots that you are cooking in. This will help to hold in the heat and decrease the overall heating time. Make sure you start hot cleaning water before you start cooking. The pots and utensils must still be cleaned. Try to keep your menu to good one-pot meals. Things like stews, chili, and hot beans stick to your ribs, lessen the cleaning time, and provide good sources of energy and fuel for your internal furnace. A good high-calorie snack before bedtime will also keep you warm all night. Stay away from an overabundance of sugar, cheese is a good high-calorie bedtime snack.

SLEEPING BAG CONSTRUCTION:

7Principles of sleeping bag design

1. The smaller the bag, the less area it will have to insulate. **Translation:** *Confining mummy bags are much warmer for their weight than roomy rectangular ones.*
2. Most heat loss from a sleeping bag occurs through the open head end. It's nearly impossible to seal the open end of a rectangular style sleeping bag so that warm air won't escape. (One solution is to install a collar - *see diagram above for details.*) For this reason integral hoods are mandatory on sleeping bags that will be used for cold weather camping.
3. A full length zipper which runs from foot to chin is a must. Bags with half-length zippers become impossibly hot in warm weather.

Bag Anatomy

Hood. Most bags have a hood that can be drawn tight around your head in cold weather. Get in the bag and pull the drawstring. Can you still breathe with the hood in place? Can you turn, or roll, without suffocating? A hood should have slightly more fill material than the rest of the bag, and when in place, still have room to accommodate a cap.

Draft collar. Scrutinize the draft collar, which is at the base of the hood. This insulated tube is designed to prevent heat loss from around your neck and shoulders. Draft collars are an instrumental part of winter bags. The collar should be fluffy enough to fill the excess space between your neck and shoulders, but not so bulky you feel like you are wearing an inner tube around your neck.

Foot box. Since your feet take up room in the bottom of the bag, many sacks are designed with a flared, boxed, or barrel-shaped foot box to accommodate these protrusions better.

Zipper and stitching. Look at the zipper and stitching. The zipper should have teeth big enough to run smoothly, without catching on fabric.

Zipper flap. Most bags have an insulated tube or flap that runs parallel to the zipper in order to block heat loss. The tube should be sewn only to the lining material, since sewing through the bag creates holes that allow air leaks. Cold weather bags may have two thickly filled draft tubes. If there is a single flap or tube, it should be sewn to the top zipper so it hangs down when you sleep.

Pockets. Some bags come equipped with accessory pockets, but they can be more of a problem.

Warranty. Ask about the bag's warranty. What is covered and for how long? Some companies offer a warranty on materials and workmanship for the owner's lifetime, others limit warranty to "faulty" materials and construction. If you buy a bag, note the name and customer service number of the manufacturer. Most companies will repair damaged equipment for a nominal cost.

Type of Sleeping Bag: Sleeping bags come in either a rectangle, mummy or tapered shape, narrower at the bottom.

Rectangular Style Sleeping Bag: The most common sleeping bag is the rectangular style. It is roomy and comfortable inside, and can be opened and used as a comforter on warm nights. If you like to sleep with your legs and arms all sprawled out, then a rectangular bag may be best for you, but they are also the bulkiest and heaviest. Because of the extra space they are not as efficient in keeping you warm. Roll over in the middle of the night while sleeping and icy cold air can rush into the bag. Further, you can move around at night and find yourself laying on a freezing cold part of the bag that hasn't had the benefit of your body warmth to keep that area comfortable. Also if



you're on a budget, bargains can be found looking at rectangular bags.

Mummy Style Sleeping Bag: The mummy style sleeping bag is meant to wrap tightly around the sleeper, so it will provide maximum warmth while using less material. *Mummy bags tend to be warmer because there is less space to heat.* If you will be camping in cold weather, like 40 degrees and below, you might want to consider the mummy. This efficiency will also keep the bag's weight to a minimum, they take up less room in a stuff bag making this style the choice if you will be backpacking. Not everyone likes the confines of the mummy, so you might want to try one before buying.



Weights less Smaller size requires less energy to keep warm at night Has a hood to pull tight around your head. The more serious explorer, who needs protection in more extreme conditions, often prefers the efficiency and technical features of the mummy design. Mummy bags are more expensive because they're more complex to make, but are worth it! Tapered bags fall between the two. They can be zipped to others with matching zippers, take less body heat to warm them than rectangular ones, and allow some room for foot movement. Variations on these include the "barrel" shape, which is a mummy with extra space in the middle. This is a good compromise if you want a mummy's warmth but need a little space for comfort.

Hybrid: Hybrid bags, also called tapers and semi-rectangular combine mummy bags with rectangular bags. Resembling a rectangular bag, they may taper down slightly as they go toward the feet and will have a rounded end. Like the mummy bag the removed space means lighter weight and less wasted area to keep warm at night. Like a rectangular bag it offers more room for a person with a larger frame. Usually weighing just a little more than a mummy bag, this style offers a good compromise between price, weight and warmth.

Overbags & Bivy Sacks: Overbags and Bivy Sacks are used with a sleeping bag. Overbags are used when additional warmth is needed, like during extreme winter camping. Overbags may also be used to supplement the waterproof abilities of a sleeping bag. Bivy sacks are waterproof and made of a breathable material, a bivy sack is used when sleeping under the stars, in extreme wet conditions, or winter camping. Both overbags and bivy sacks increase the range of use of your bag, but cut down on how well the materials breathe.



Fleece or Liner Bags: Fleece bags are inexpensive and lightweight. They work well alone in the summer or add about 10° of warmth to a typical sleeping bag in the winter. They can make most bags more comfortable in cold temperatures when inserted into a mummy or other bag. The fleece material also handles moisture like a champ. See Below.

Determine the Size: **Junior size bags**, up to 4'11" (59") tall. **Full size bags (Standard)** are most common and at a length of 6' 3" (75") fit most average-sized adults; **Tall size bags** are the same width as a full but are longer 6' 5" (77") to accommodate taller individuals; and **King size bags** are a little wider than the full bags and a little longer than tall bags, fitting most adults up to 6' 2" (74") tall. A well-fitting bag will allow room to turn over and move around a little bit, but will not have so much air space that body heat won't warm it sufficiently. A short person or a child might be able to get by with a normal sized sleeping bag by tying off the lower portion with twine or camping straps.

Another dimension to consider is the girth. Girth is the inside space, as measured around the sleeper's waist area. Mummy bags have the smallest girth, and rectangular the largest.

Determine Temperature Rating: Depends on the conditions you plan to camp in. A bag temperature rating indicates the lowest temperature in which a person would be comfortable. **"Comfortable" is a very subjective term everyone is different.** Use of a ground pad is assumed, necessary and very important - this provides extra insulation and comfort. A foam and air core pad is the best. Most bags are rated according to the lowest temperatures in which they provide comfort, but there is no set standard in the industry. The rating is determined by the manufacturer. A "three season" bag means that it will be comfortable for sleeping for an average person in temperatures ranging from about 15° plus.

When selecting a temperature rating for a sleeping bag, be sure to consider the following: The lower the rating, the warmer the bag. If you plan to camp in warm conditions and also want your bag to be comfortable on cool spring and fall nights, look for a three-season bag rated to 20°. Traditional camp bags are comfortable to about 40°. In general, consider the coldest night you will likely experience, and then drop down 10 or 20°. Keep in mind that temperature ratings always assume that the bag will be used with a ground pad. The loft of a sleeping bag refers to how much the insulation "fluffs up". More loft means more warmth. For maximum loft, look for a bag with a differential cut, one in which the inner lining is smaller than the outer shell. This allows the insulation to loft up to its maximum.

Basic ratings: Traditional sleeping bags are rated at 40° F Three season bags are rated at 20° F Cold weather bags are rated at 0° F. Winter bags are rated from -10°F to -30° F. Consider these as guidelines only. You may sleep warmer or cooler than someone else. These guidelines seem to assume that you will be wearing warm clothing too. You can probably use any bag rated for summer temperatures as you start out, since you will most likely be camping during the warmer months.

There are several ways to make a bag warmer. One common way is to use a "liner" bag. These bags are placed inside your regular sleeping bag, like adding an extra blanket to your bed. You can buy these bags ready made, or make one. You can also just throw a blanket over the top of your bag, rather than put it inside. When it is really cold, two summer bags can be used, one inside the other. Tent temperatures commonly run about 10° warmer than the outside environment, but in temperatures below 40° it is best to switch to a -10° bag for comfort. In really cold weather, you can mate your bag with an outer or inner liner, or a blanket or even put your mummy bag inside your summer bag. **SHELL**

Nylon, Polyester, Taffeta: This is the most basic of materials and is used from bargain basement bags to custom made sacks. The least durable of synthetic materials used on sleeping bags, these are best used for car camping or general walk-in camping. Low cost and very breathable, nylon, polyester and taffeta are best used for late-spring, summer and early fall camping when conditions will be tepid to dry. Although they breathe very well, without waterproof treating offer very little protection in damp conditions.

Ripstop: Ripstop is nylon or polyester that has had heavier threads woven into the material. These heavier threads reinforce the shell making it stronger and a hair more moisture resistant than nylon while still being very breathable. Ripstop is an excellent choice for three season camping when things won't be too damp.

Microfiber, Gossamer Micro, DryClime: Also nylon or polyester, microfiber and its cousin's gossamer micro and DryClime are very tightly woven, very strong and moisture resistant. Microfiber is an excellent choice for three or even four season camping if your winter camping is in ideal conditions.

DryLoft: DryLoft is a close relative to Gore-Tex, but it is Gore-Tex with an attitude. Sharing all of the water resistant abilities of Gore-Tex, DryLoft is very breathable. DryLoft is the premium choice for four season camping, canoe camping, or extended stays in the backcountry.

Gore-Tex: Sleeping bags with a Gore-Tex shell should be avoided. Although Gore-Tex is durable and water resistant, it doesn't breathe well which can make for damp conditions inside a bag. Gore-Tex is an excellent choice for an overbag or bivy sack. Few, if any new bags have Gore-Tex shells.

Canvas & Cotton: If you go down to your Army Navy store you may find sleeping bags with canvas shells. Canvas is very durable and breathable. Canvas is made of cotton, and when it gets wet, it stays wet.

LINING: Nylon Taffeta *Used to line parts of the garment that are exposed to more abrasion than mesh can handle, or in areas where hydrophilic mesh would attract moisture from the outside such as the hem or cuff areas. This smooth, durable taffeta slips easily over mid-layers.* Polyester Cotton Fleece. Some outer shells are moisture resistant; this keeps out dampness, but can also keep moisture in, resulting in a cold and clammy sleeping experience. If you perspire heavily, you may prefer a cotton exterior, or at least an absorbent interior fabric. Some of the new materials will wick moisture to the outside without allowing it to penetrate in; they can add \$100 to the price of a sleeping bag, but great for wet weather. Dark colors, both inside and outside, draw more heat from the sun. They dry out more quickly.

Determine Insulation: Once upon a time the good bags used prime goose down for insulation. This is still used, mainly in specialized bags where extreme dry cold, and light weight are primary considerations. Down's cost and difficulty in washing make it impractical for most camping. Actually, modern synthetics have been developed which have all but replaced down. Synthetics cost less, are washable, and can be nearly as warm as down, especially when it is damp outside. For most family camping situations, most any of the synthetics will be sufficient.

The type of fill (insulation) determines the amount of warmth that stays inside the bag; the warmth itself comes from the body heat of the person sleeping in it.

Goose down is a natural fiber that has long been held as the standard as lightweight, comfortable, and warm. They compact easily into small stuff bags, mold easily around a camper's body to retain heat, and are extremely durable. The down side is that they can be miserably uncomfortable if they get wet, take longer to dry, are more expensive than most synthetics, and are most safely cleaned professionally.

Synthetic Fill: Cost less than down bags. Insulates even when wet. Dries quickly *ideal for camping in wet conditions*. Higher end synthetic fills come close to down's efficiency. They also weigh more than down. Look for Duofill and Hollofil.

Any sleeping bag can be made warmer by using a purchased or home-sewn flannel liner, and some bags come with their own.

CARE & STORAGE: Always open the bag after a night of sleeping in it to air it out. If it's not raining or damp out, spread it across the top of your tent or car for freshening. Don't toss the manufacturer's care instructions. Always read and follow them. Since fabrics and insulation differ, they might require different care. Most bags can be washed with a mild detergent (*you can buy down-specific cleaning agents*) in your bathtub or an industrial washing machine. **Don't get your bag dry-cleaned.** Goose down bags must be dry cleaned, then aired thoroughly before using again. Synthetic fill usually air dries quickly on a clothesline or spread out on a flat surface. If it's safe for machine drying (*check the tags!*) toss a tennis shoe in with it to fluff it up. Your sleeping bag will last longer if it's hung up, secured by clamps at the bottom end, when it's not in use. If you don't have adequate hanging space, leave it folded loosely, perhaps under a bed or on a shelf, between camping trips.



Do's and don'ts for sleeping bags

Don't roll sleeping bags; stuff them!

Don't yank sleeping bags out of stuff sacks; pull gently.

Don't leave sleeping bags stuffed for long periods of time.

Don't machine wash down sleeping bags.

Don't dryclean polyester filled sleeping bags.

Don't wash down bags with harsh detergents.

Don't pick up a wet down product without adequately supporting it.

Do air and fluff sleeping bags after each use.

Do store sleeping bags flat, on hangers, or in large porous sacks.

Do sponge clean the shell of your sleeping bag occasionally.

Do wash your sleeping bag when it gets dirty.

Do air and fluff sleeping bags after each use.

Basic Seasonal Tent Construction

Basic Differences: Tents are also designed for various conditions and purposes. Backpacking tents are designed for lightweight backpacking adventures, are small and work well to contain heat in the winter. Most troops buy 2-3 man tents that hold 2 boys plus their packs comfortably. Some use slightly larger versions for adults. These tents are still lighter weight but usually too heavy for backpacking. Family tents are large, cumbersome and do not retain heat well. They also require more ground space to set up.



From a seasonal design aspect, tents come in 2,3 and 4 season types. The main difference is the design of the rain fly. The colder the design factor the farther the fly comes to the ground.

A 2-season tent (left) offers good ventilation with a rain fly that protects from rain, and offers easy access to the cabin. There is no vestibule and the fly comes about half-way down the side of the tent. The door and rear window are exposed.

A 3-season tent (right) still offers excellent ventilation for warmer weather, and a rain fly that usually comes close to the ground on three sides with a vestibule. It may have an exposed rear window with the fly sheltering it from rain or snow. A 3-season tent is usually adequate for year-round camping.



A 4-season tent (left) affords the optimum combination of venting plus seasonal protection from wind and snow with a full fly with a small vestibule for messy boots storage or gear and entry into the cabin.



Always check out tents completely before purchasing. Set it up and inspect the construction for double sealed seams and quality materials, especially zippers. Look for the self-repairing type. Poles are usually aluminum or type of glass

fiber sectional. Keep replacement sections handy. Broken poles can be salvaged for spare parts. Our troop requires each person to have a plastic tarp or ground cloth. Since 2 people share a tent, one goes on the inside to protect the floor and the other under the tent as a vapor barrier. We keep extra stakes and duct tape on hand as well as extra plastic clips for the fly. Make sure the boys know how to set up and pack up the tent properly, in the dark, before you leave.

Always put tents away clean and completely dry.

Some basic Cold Weather conditions are outlined below. This is only a general guide. See BSA First Aid literature for more details and always contact qualified medical assistance immediately. Before you camp or hike, know the emergency contact numbers in the area and when applicable, notify someone of your plans and expected time of return or contact.

DEHYDRATION

Excessive loss of body water

Symptoms:

1. Headache
2. Dizziness
3. Fatigue
4. Thirst (maybe)

Treatment: Drink Liquids, Keep Warm

Prevention: Drink Water, Avoid Caffeine

HYPOTHERMIA

Cooling of the body's inner core temperature

Symptoms:

1. Feeling Cold, Shivering
2. Slurred Speech
3. Stumbling
4. Poor Judgement
5. Fatigue, Numbness

Treatment: Remove from cold, change into dry clothing, re-warm, give warm liquids

Prevention: Plenty of food, water, rest, proper clothing, prevent windchill, buddy system

FROSTBITE

The freezing of skin and underlying tissue

Symptoms:

1. Pain, Prickly Feeling (at first)
2. Numbness
3. White/Gray Color Skin
4. Cold to Touch

Treatment: Exercise, re-warm area, cover with dry clothing

Prevention: Cover exposed skin, prevent windchill and wetness, maintain good circulation, buddy system

¹<http://www.coleman.com>

²http://www.usscouts.org/safety/safe_hyp.html#tent

³<http://www.macscouter.com/KeepWarm/keepwarm.html>

⁴<http://www.macscouter.com/KeepWarm/wintcamp.html>

⁵<http://www.princeton.edu/~oa/winter/wintcamp.pdf>

⁶http://www.outdoorcanada.ca/gear/warming_intro.shtml

⁷<http://www.angelfire.com/ia3/camping/sleepingbags.htm>

Information in this handout was derived from many sources including those listed above. It is intended only as a general reference for winter camping. Additional resources are available from BSA, the internet and your local library.

COLD WEATHER BACKPACKING CHECKLIST

Remember, If you bring it, you carry it. Ounces turn to pounds after a few hours.

CLOTHING- You must pack all clothes in ziplock bags.

- Socks - Min. 1pr. Smartwool socks (\$17.95 avg.) (No sock liners required), 3 Pair suggested for winter camping. Smartwool wicks moisture best and prevents odor. Warmer than Polyester/wool blend.
- Additional Socks: If you have only 1pr. of Smartwool socks, you must have at least 3 additional pair of Wool/synthetic blend socks and sock liners for winter hiking.
NOTE: Smartwool socks are very good quality and will last a long time.
- 2 Tee shirts (I would even consider just one short sleeve, one long sleeve)
- 2pr Boxers
- 1pr (min) polypropylene/wool or other hi-tech polyester wicking long underwear (top & bottom)
- 2pr long pants (quick dry cargo type, non-cotton preferred, no jeans) (rain pants are backup)
- Sleeping clothes-packed in plastic bag separately.

OUTER CLOTHING

- Fleece Jacket (preferred) or sweatshirt. Cotton sweats hold moisture. Polar Fleece is best.
- Knit hat (non-cotton)
- Waterproof/Weatherproof gloves or liners (Light pair & Insulated Pair)
- 1pr Hiking boots (no steel toes)
- 1pr shoes (Backup in pack) (Light tennis shoes no sandals)- Prefer boots in colder weather.
- Rain Gear - Jacket/Pants Combo. Good quality nylon is preferred over vinyl to last longer.

GEAR

- Backpack
- Pack Cover and/or Big Trash Bags (2) – Packs wont go in tents
- 1 flashlight, mini mag/headlamp optional (nothing larger than 2C cells)

SLEEPING

- 10° sleeping bag
- Foam mat/no self-inflating or air mattress

PERSONAL CARE.....

- Personal care items (toothbrush, meds, deodorant, eyeglass repair kit, etc.)
- Plastic bowl, plastic cup and spoon (no mess kit)
- 1/2 Roll toilet paper, flattened in ziplock bag (remove paper core for weight reduction)
- Personal first aid kit (Pocket style)
- Individually packaged moist towlettes
- Small towel/hand or pack towel/Chamois (Probably not going to be washing when its cold so I would say this is optional)

HYDRATION/SNACKS.....

- 2 liters of water (Nalgene bottles or 1 Nalgene and platypus)
- Trail mix (Provided by Eike) Bring your own if you like.

MISC.

- Small roll (25ft) of light rope/heavy cord.
- Foam backed placemat/plastic bag to sit/stand on (You could always sit on your pack)
- Plastic type grocery bags (2) for shoe inserts if shoes get wet or storing wet/dirty clothes
- Pocket knife/Totin' chip
- Pencil/Paper
- Camera/Compass
- Caribeaner Clips (3) to hang gear, Safety Pins (to repair pack) (6)
- Bungee Cords (2) (I would say optional, If your packs are packed well this is not necessary)

ADDITIONAL......

- Change of clothes & shoes for ride home (leave in car)

TROOP GEAR

- Backpacking Tent, Bring one if you got one!
- Small tarps for backpacking tents (Shared between tent partners) 2 per tent.
- Food
- Water purifier & tablets (Don't really need tablets on all treks)
- Rope
- Backpacking stoves
- Cookware
- Cooking Water (2 liters)
- Fuel
- WP Matches
- 4qt pots (Pot handle)
- Soap
- Paper Towels
- Compass/GPS unit
- Map
- Spoon (Ladle)
- Dining Fly
- Shovel/Trowel
- 1 & 2 Gal. Zip Lock Bags (Generic are fine) for packing clothes.
- Other _____
- Other _____

YOU WILL BE RESPONSIBLE FOR CARRYING SOME TROOP GEAR.

Special thanks to the Eagle Scouts of Troop 299 for their input on this list.