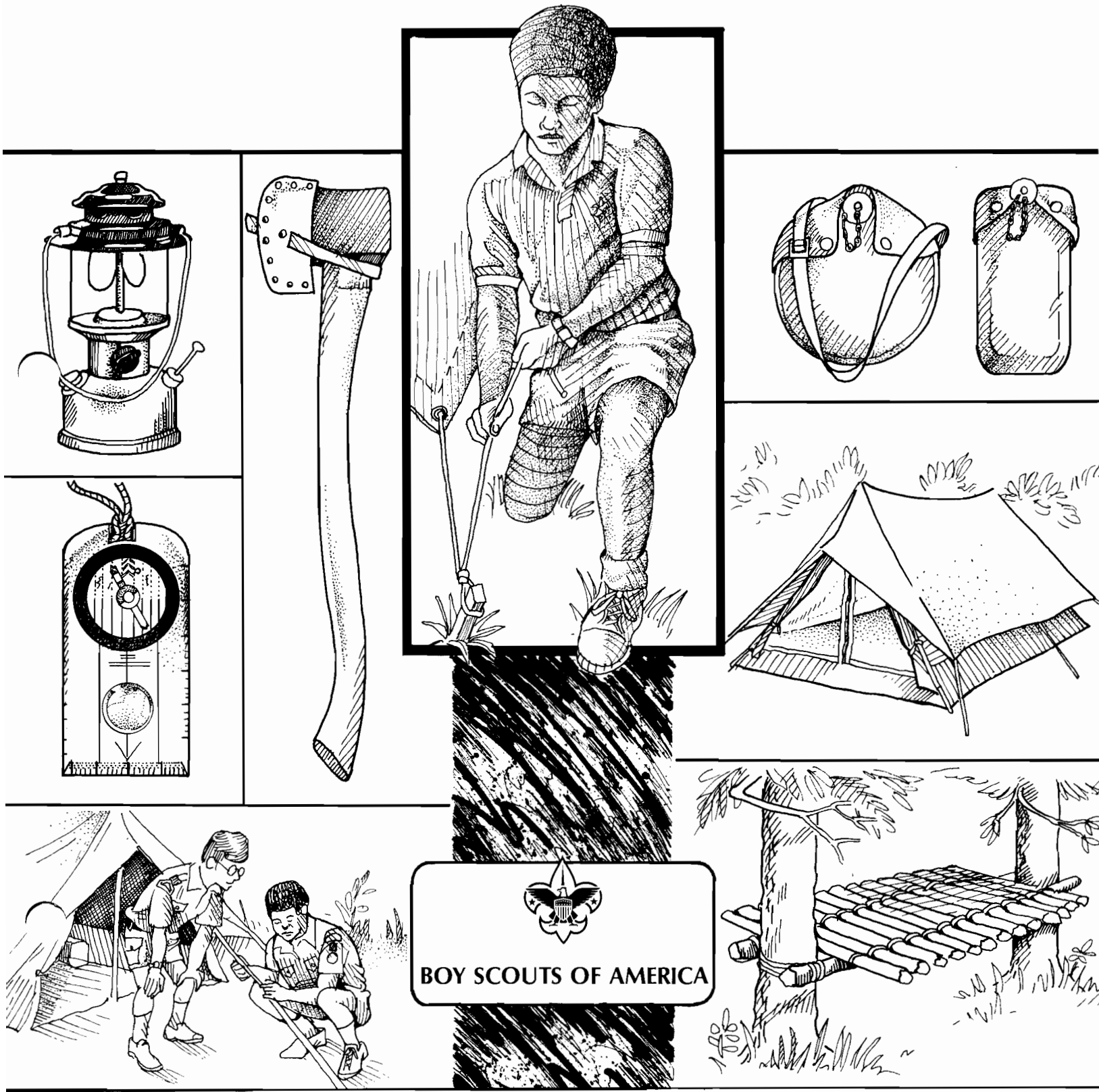
OUTDOOR SKILLS INSTRUCTION

CAMPING



BOY SCOUTS OF AMERICA

OUTDOOR SKILLS INSTRUCTION
CAMPING

Introduction

This manual is designed to expand the skills of leaders and/or older Scouts. The objective of these sessions is to provide "hands-on" experience for the participants.

Note to the user of this manual:

This manual is one in a series of skills manuals. Each manual may be used separately, or sessions may be mixed. Each manual covers a broad spectrum of topics. You will note that there are no time schedules listed. The training should be conducted according to the ability of the participants to complete the topics. These sessions may be conducted by any qualified Scouter. You are encouraged to recruit experts to assist in instructing. Use the outlines as guides to create a hands-on learning experience.

Outdoor Skills Instruction Manuals

Aquatics, No. 33026
Backpacking, No. 33035
Camping, No. 33003
Cooking, No. 33567
Rappelling/Rock Climbing, No. 33027
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LOW-IMPACT CAMPING

Learning Objectives

At the end of this session, each participant should be able to:

- List and demonstrate low-impact camping techniques and practices related to pre-trip plans, travel, campsites, fires, sanitation, horses, and courtesy.
- Develop troop or post programs and activities that can be carried out within the limitations of low-impact camping in wilderness or primitive areas.
- Train a group of older Scouts or Explorers in the techniques and practices of low-impact camping.

Materials

- *Low-Impact Camping* audiovisual, AV-668 (slides), and AV-668C (cassette)
- Slide projector, cassette player, screen, extension cord, spare lamp
- "Low-Impact Camping Quiz," one per participant (see Appendix)
- *Fieldbook,* No. 3200
- Wilderness Use Policy of the BSA, one per participant (see Appendix)
- Samples of equipment suitable for low-impact camping (tents, clothing, packs, stoves, etc.)
- Easel with pad and felt pens
- One Coleman Peak I stove for each team of four participants
- Coleman stove and lantern fuel as needed (one gallon will fuel eight to ten stoves)
- Filter funnel and pouring spout, one per team
- Sample selection of dehydrated and freeze-dried foods (available in the supermarket)
- *Backpacking* merit badge pamphlet, No. 3323
- *Camping* merit badge pamphlet, No. 3256
- Lightweight garden trowel
- Selection of trail food supper packs to serve four
- One nesting pot set or collection of one- and two-pound number ten coffee cans for each team
- Sturdy plastic plate, Sierra Club-type cup, Vitt'l kit, and pocket knife (provided by participants)
- Pocket notebook and pencil (provided by participants)
- Wilderness Commitment (outdoor code), one per participant (see Appendix)

Conducting the Session

Preparation

An area with comfortable seating will be needed for the general presentations. A demonstration low-impact campsite set up in advance of the session is an important feature. Outdoor areas will be needed for preparation of the noon meal.

Preopening

As the participants gather, ask them to get acquainted with each other and form into teams of four persons. Ask the participants to see that no members of the team are from the same Scouting unit—teams of formerly unacquainted individuals are desirable. If youth are involved, however, be sure they are teamed with their own leadership.

Session Introduction

Introduce the session by asking each participant to give a definition of a "wilderness" or a "primitive" area. Accept each definition and note it on the easel pad without comment.

Explain that many people feel a wilderness area is some place where they can't drive the family camper. On the other hand, some feel that wilderness areas should be reserved for mystic enlightenment and contemplation. Both are correct, but neither view includes the full scope of wilderness experiences.

Definitions

Explain that wilderness and primitive areas are public lands designated as such by the federal or state governments. They are managed to ". . . promote, perpetuate and, where necessary, restore the wilderness character of the land and its specific values of solitude, physical and mental challenge, scientific study, inspiration, and primitive recreation." Thus, designated wilderness and primitive areas have specific limitations on their use defined by federal or state law. Some areas, while not designated as wilderness, deserve the same protection. For our purposes, we shall refer to these as backcountry areas.

Many traditional Scout camping activities are not appropriate for wilderness, primitive, or backcountry areas. Through lack of information and training, some Scouts and leaders have been guilty of violating the law—or the spirit of the law—regarding wilderness or backcountry areas.

Choices, Decisions, and Values

There are no hard-and-fast rules for low-impact camping. The best way to camp differs from region to region. Camping practices that are best for the land in the Rocky Mountains may not be best for the land in the Sonoran Desert. Appropriate practices for the White Mountains of New Hampshire differ from those for the dunes of Michigan, the Smoky Mountains of Tennessee and North Carolina, the plains of North Dakota, and the Badlands of South Dakota. Each area is unique, and using knowledge and your desire to do the right thing, the more you practice low-impact camping, the more you'll perfect your skills. The more you know about the plants, animals, soil, and water of an area, the better a camper you'll become.

Low-impact camping is a way of life, a philosophy of caring. Certainly concerned citizens understand the need to accept responsibility for their actions. The important thing is that you care and try to learn more and more as you progress. You should develop a "land ethic." In simple terms, a land ethic is caring for the land in just the way that you try to care for other people, treating others as you want to be treated. Treat the natural environment with care, for from it comes all our water, food, and building materials. So even if you aren't going to spend the rest of your life camping, you, too, have the responsibility of caring for the land.

What should your actions be? Low-impact camping is easy if you always start with that question. Consider the following ideas, which will make your effect on natural resources as minimal as possible.

Low-Impact Camping Quiz

Explain that each participant will now have a chance to find out how much he or she knows about low-impact camping as applied in wilderness or backcountry areas.

Distribute a copy of the "Low-Impact Camping Quiz" in the appendix to each participant. Point out that the quiz will *not* be collected, and that each person will check his own results later in the session.

Allow about ten minutes for the quiz.

Recap of *Low-Impact Camping* Audiovisual

Invite the participants to recall the key elements in each portion of the *Low-Impact Camping* audiovisual. When appropriate, demonstrate the types of equipment mentioned. Note the key points for each segment on a separate easel pad sheet, removing and posting it. Aim for the following:

1. Pre-trip Plans
   - Take gear that blends into the environment.
   - Package food in burnable or pack-out containers.
   - Take trash bags and use them.
   - Plan for a party of twelve or fewer people.
   - Select an area that few people visit.
2. Travel
   - Stay on the trail.
   - Avoid cutting across switchbacks.
   - Let muddy trails dry out.
   - Select hard ground for cross-country travel.
3. Campsites
   - You can minimize a large group's effect on the environment in either of two ways. One is to spread the campers into smaller groups approximately 100 yards apart so that they'll have minimal impact on each portion of the site; the other is to concentrate the group so that the group affects a smaller area. Your decision as to which practice is best depends on the environment and on the activities you've planned for the group. You may want to check with the agency that manages the area where you are camping to find out how many people it recommends you have in one group.

- Set up camp at least 200 feet away from any stream, pond, or lake. At a popular site, it's best to camp where other campers have camped rather than to camp on the edge of that area. Camping on a new site creates a larger, wider area of trampling and causes general environmental change. If you're camping in an area that very few people have used before, you may want to spread the campers out so that they'll have minimal effect on this rarely-used site.
- Before the days of plastic and floored tents, campers commonly dug trenches to keep rain from running under the tent walls and the sleeping bags. If it didn't rain, the trenches served only to ruin the land around the tents. If it did rain, the trenches became muddy gullies that contributed to erosion.

  Now campers can use tents with waterproof floors or put tarps underneath conventional tents, so digging a trench serves no purpose today. Digging is not only a lot of work, it also causes irreversible damage to the soil and to plants.
- Before you leave a campsite, go over the area carefully to remove all traces of your visit. Leave the campsite in the same condition in which you found it, if not better. (Of course, because you were practicing low-impact camping, you don't have many cleanup corrections to make.)

4. Fires
   - Use a lightweight backpacking stove.
   - Use an old fire circle in heavily-used areas.
   - Burn small wood gathered from the ground.
   - Make sure your fire is out.
   - In seldom-used areas, cover fire scars with twigs.
5. Sanitation
   - Wash away from streams and lakes.
   - Pour washwater and dishwater in a hole.
   - Dig latrines 6 to 8 inches deep, 200 feet or more from camp and water.
   - Cover washwater holes and latrines.
   - Pack out nonburnable trash.
6. Courtesy
   - Hikers should step off the lower side of the trail when horses pass.
   - Control pets.
   - Leave wildflowers.
   - Avoid making loud noises.

Correct the Quiz

Distribute a copy of the answers to the "Low-Impact Camping Quiz" to each participant. Ask each person to check his or her answers. Some of the answers may cause questions or discussion. Deal with these as appropriate.

Wilderness and Historic Sites

Point out that restrictions placed on the use of designated wilderness or primitive areas are a matter of law. Federal wilderness falls under an Act of Congress known as "The Wilderness Act," Public Law 88-577. Read the following definition from the act:

"A wilderness, in contrast with those areas where man and his own works dominate the landscape, is hereby recognized as an area where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain."

Point out that federal wilderness areas are managed either by the U.S. Forest Service, National Park Service, or Bureau of Land Management. Many states have designated wilderness or natural areas, and these are managed by the appropriate state conservation agency. It's important to note that specific standards and rules apply for the use of wilderness and primitive areas, and these have the force of law with stiff penalties for violators. Park and forest rangers are naturally reluctant to issue citations to Scouting groups, but have done so in the past. Much will depend on the attitudes shown by the Scouts and their leaders.

Explain that wilderness and backcountry areas often contain historic and archaeological sites. These must be preserved for proper study by qualified persons. "Pot hunting" and disturbing these areas is not only unethical, but often is against federal or state laws.

Respect for Wilderness and Backcountry

As one of the nation's leading outdoor organizations, the Boy Scouts of America must take a leadership position in the protection and preservation of America's wilderness resources. Scouting units must carefully observe the standards and limitations in wilderness and backcountry camping, not only because it's the law, but also because these are wise environmental practices.

Distribute a copy of the Wilderness Use Policy of the Boy Scouts of America to each participant. Briefly review the key points, noting that these closely parallel those made in the audiovisual presentation. These are the standards to be followed by all BSA units engaging in wilderness or backcountry camping. Explain that using low-impact camping skills should not be confined only to wilderness or backcountry areas. They are valid in all camping situations, even the most heavily used long-term camp.

CAMPING EQUIPMENT

Lead the group to the demonstration low-impact campsite for this presentation. Point out that the location has been chosen to cause the least damage to the environment and is located well away from trails, lake shore, or streams.

What Gear to Take

Tents

Point out that a wide variety of backpacking tents are available. All present some sort of compromise with regard to roominess, weight, and ease of packing. Note that the tents are a color that blends into the environment. In snow, white may be best.

The tents are located with a consideration for prevailing winds and are *not* ditched. If builder's plastic is used as a ground cloth, it will be carefully packed out.

Bedding

Point out that sleeping bags have been selected for the type of weather to be encountered. Foam pads are warmer, lighter, and more practical than air mattresses. Stuff sacks are a more practical way to carry a sleeping bag than rolling it, although the bag must be fluffed up well before retiring. Again, if plastic is used as a ground cloth, it must be packed out.

Backpacking Stoves

Many wilderness areas prohibit open fires. Where fires are permitted, wood may be scarce or unavailable in popular campsites and above timberline. A backpacking stove is suggested for true low-impact camping.

If you ask the question, "Which is the best backpacking stove?" you'll get a different opinion from everyone within earshot. Stoves fueled with alcohol, liquified petroleum gas, kerosene, and gasoline all have their advocates. A "best" backpacking stove is largely the opinion of its owner. It also depends on how and where the stove will be used and who will operate it. Like all outdoor equipment, the stove presents a compromise regarding weight, size, availability of fuel, ease of operation, and the relationship between the amount of usable heat produced and the size and weight of the stove and its fuel. Some stoves are more efficient than others at high elevations and in cold temperatures.

Explain that most professional outfitters, including the BSA, have concluded that the Coleman Peak I stove represents a good compromise of factors to consider in a backpacking stove. Explain that we will not debate the relative merits of stoves, but will demonstrate the Peak I.

The Coleman stove uses a gasoline-type fuel. We recommend a fuel designed specifically for stoves and lanterns—unleaded automotive fuel can cause problems. The most practical fuel bottles are those made of spun aluminum; the one-quart bottle is most popular. A filter funnel and pouring spout will avoid spillage and help assure clean fuel.

Demonstrate how the Peak I stove is filled, with the fuel bottle capped and placed at arm's length, and the steps to lighting the stove and bringing it to full heat. Point out that instructions for lighting and operating the stove are printed on the fuel tank and should be followed exactly. A similar procedure is used for filling and lighting the Coleman Peak I backpacker's lantern.

Stove and Lantern Safety

The BSA has a firm policy regarding the use of chemical-fueled stoves and lanterns. Like most pieces of equipment, the stove or lantern itself is not dangerous—fires, explosions, and burns are almost always the result of a careless user. Most stove and lantern accidents involve the following:

- **Spilled fuel.** Allow any spilled fuel to evaporate, and move the stove to a new location before lighting.
- **Opening the filler cap while the stove or lantern still contains flame.** Open the filler cap *only* when the top of the stove or lantern is cool enough to be touched.
- **Stove fuel that may cause the safety device to blow.**
- **Loose fittings.** Stoves are sold with a special wrench, and instructions for keeping the fittings tight should be followed carefully.
- **Gasoline used to start fires.** Never under any circumstances use any type of liquid fuel as a fire starter while involved in a Scouting activity. Scouts simply don't know the difference between commercial charcoal lighting fluid and highly-explosive gasoline.
- **Stoves and lanterns not filled and lighted out-of-doors.** Neither should be used inside a tent.
- **Open fuel container too near the stove.**

Review the twelve points for stove and lantern safety found in the *Backpacking* and *Camping* merit badge pamphlets.

Cooking Gear

Point out that there are a variety of nesting pot sets on the market and all have their advantages and disadvantages. A set of various sized tin "billy cans" can do the job just as well and can be packed out and thrown away when the trip is over. Besides, they are free!

Most trail foods require a minimum of cooking utensils, and one or two large spoons will be all that's needed. The Scout Vitt'l Kit, a Sierra Club-type cup, Scout measuring cup, and a sturdy plastic plate are all that an individual camper will need. A pair of inexpensive pliers and pot lifters is a must. The bandanna handkerchief has an all-purpose use in camp. A red one is used in the kitchen, while a blue one is used to blow your nose. Woe to the camper who uses a blue bandanna in the camp kitchen!

Packs

A discussion of the "best" backpack may produce an even livelier discussion than one about stoves. Again, the pack is a compromise between cost, size, weight, and how it will be used. A pack basket is at home in the bottom of a canoe, but would hardly be practical on a steep mountain trail. So the pack must be matched to the job it is to do.

The BSA Supply Division packs are a good compromise between cost and practicality. They may not have the glamour of a noted brand name, nor all of the attractive (but little-used) fittings, but they are designed for rugged use. Individual packs are a matter of preference.

Point out that the weight distribution of the pack depends on the type of terrain to be covered. On a smooth trail, heavy items are kept high so that the weight comes straight down and is balanced over the hips. If the trail is rough or the hiker will be stepping over logs or moving up steep inclines, heavier gear is lowered to the center of the pack.

A high load would tend to pull the body sideways when leaning or making sudden movements. When you are jumping from boulder to boulder, crossing steep snow slopes, or on skis, weight should be lower in the pack to lower the center of gravity and make balancing and maneuvering easier. No matter where the weight is placed, heavier items should be close to the back. This conserves energy and aids balance.

It is equally important to have the pack balanced from side to side. If a water bottle is in one side pocket, it must be balanced with an equal weight on the other side.

Demonstrate how a heavy-duty garbage bag can be used to rainproof or drownproof a pack or sleeping bag. The garbage bag goes into the pack and the gear goes into the garbage bag. Air is pressed out, the bag is twisted shut, and the end is secured with a rubber band for protection against a rainstorm, a fall when crossing a creek, or a swamped canoe.

A "bear bag" is a *must* in many parts of the country. Every "smellable" and edible item is placed in a pack that is hung at least fifteen feet in the air *between* two trees. If the bear bag is hung near a limb, a smart and hungry bear may simply climb the tree and haul up the goodies.

Shoes and Boots

Point out that novice backpackers often assume that if shoes are good, heavier shoes are better. Not true! One additional pound of shoes uses as much energy as *five* more pounds in the pack. So hiking shoes should be as lightweight as possible and still properly protect the feet.

Most Scout hikers are "overshod." A good brand-name work shoe with eight-inch uppers and composition sole will do a fine job in any but the most extreme conditions. Most Scouts outgrow their boots long before they show significant wear.

Boots are best worn with wool or wool blend socks. Be sure to wear the socks when buying the boots. Boots *must* be well broken in before hitting the trail. Feet are the *only* means of transport, and blisters can cripple a hiker.

Ask the participants to feel the insole of a comfortable pair of shoes. They'll find that the insole has formed a little nest for each toe. To speed breaking in a pair of boots, fill the boots with warm water, pour out the water, and wear the boots until they are dry—all day if possible. Then lightly oil the leather.

"Waffle Stompers"

Shoes with heavy lug soles are a genuine threat to fragile environments and are needed only in the most rugged and rocky terrain. They can do real damage to fragile ecosystems. Some call them "waffle stompers" for the pattern of the lugs pressed into the soil. Their use in alpine tundra, around campsites, and near lake shores is strongly discouraged by skilled and concerned outdoorsmen.

Whether wearing simple work shoes or "waffle stompers," it's a good idea to carry a pair of sneakers to wear around camp. They're a relief to the feet, as well as to the environment. Avoid sandals, and *never* go barefooted. Rocks and small stumps seem to seek out bare toes!

Toilets

As cultured people, we have been taught that the discussion of human waste and its disposal is neither pleasant nor even acceptable in polite groups. Yet we must recognize that one of the biggest challenges of using the outdoors for recreation is disposing of human waste. Certainly, if any toilet facilities are available, you must use them, no matter how unpleasant they may appear to be. Not using existing toilets or latrines is extremely insensitive to other people and to the environment.

Your base camp may offer some sort of latrine or outhouse, but you must make other arrangements in remote areas. Can you construct your own toilet? How can you be sure that your toilet won't contaminate the soil or water, spread disease, or leave unpleasant residue for other people to find after you've gone?

Human waste carries many forms of bacteria that are harmful to the environment and to humans, and it's just plain disagreeable to people who encounter it by accident. Urine, however, doesn't cause bacterial problems; it's a sterile waste product that usually carries no parasites. It does, however, contain uric acid, which, when crystallized, has a taste that bears, skunks, and, particularly, porcupines enjoy. Many old-fashioned outhouses have been ravaged by porcupines who gnawed the wood to taste the uric salts. Urine also has a disagreeable odor, particularly when it gets on clothing or accumulates in one place.

When you urinate, do so at least 200 feet from water and preferably on rocks or dry areas. This practice will help the urine evaporate, keep animals away, and disperse any damage to plants.

As for fecal material, no single way to dispose of it can be recommended for every situation. You'll need to consider the size of the group, the type of soil, the location of the trip, and the time of year. You have the challenge of deciding which method will not contaminate the water supply, will not be discovered by later campers, and will still result in rapid and maximum decomposition. Regardless of the disposal method you use, remember that the pathogenic, or disease-producing, material may survive in the ground for more than a year after you leave the area.

Because you'll be traveling in a group, you must figure out how to disperse the waste, not concentrate it. The best way may be to have each person locate an area 200 feet or more from the water supply and, with a trowel, dig a cathole several inches deep to receive the fecal material.

When you finish using a cathole, mix the feces and the soil with a stick, and cover the area with an inch or two of topsoil, the way a cat does. Then camouflage the cathole so that it's not obvious, but identify it somehow so that the next camper won't make the mistake of digging another cathole in the same place. Many campers mark a cathole with two crossed sticks. This looks fairly natural and signals to other campers that this area has been used.

You might consider making a group latrine if you're in an area where digging is fairly easy. Dig a long trench twelve inches deep, and ask campers to start at one end and cover their waste as they use the facility. When the trench is full to within four inches of the surface, cover it and start another one.

A latrine may be the best option when the campers are inexperienced and having difficulty finding suitable individual catholes. It may also be the best option when you have a large group and don't want to surround the camping area with catholes.

A person traveling alone or with one or two others in a dry, rocky area might best leave feces scattered on the rocks to dry if there is little possibility that someone else will be coming along soon. Fecal material deteriorates rapidly, and the bacteria die quickly in this type of environment. But this type of situation is extremely rare.

Keep in mind the idea of carrying things out of the woods with you. When you camp in a snowy area, or when the air temperature is below freezing, you should use plastic bags to carry fecal material back to the area from which you came. You can dispose of the waste in the toilet facilities provided there.

As a matter of fact, when large groups camp under these conditions, one common practice is to designate a common area for the latrine. Deposit all frozen feces, toilet paper, and other material in a double plastic bag and transport the material to the trailhead for disposal in a landfill. The material remains frozen and odorless as long as the temperature stays below thirty-two degrees.

Cold acts like a preservative, much like a refrigerator, and keeps many things from decomposing. Human waste is one such thing. Disease-producing material may not survive, but the physical waste will remain, creating a terrible mess when the snow melts. In all cases, regardless of temperature and climate, carry tampons and sanitary pads out in plastic bags; they won't decompose in the woods or the desert.

In desert areas, it's very important to keep a cathole or latrine shallow. Few organisms will help decompose the fecal material, but the heat of the sun on sandy, light soil creates a sterilization oven of about 105 degrees if the hole is not too deep.

Low-impact camping on river trips begins with the planning stage. Each river has a different management plan. Check with the U.S. Forest Service, the National Park Service, or the Bureau of Land Management (if the river you plan to travel is managed by one of these federal agencies) to find out how you should dispose of human waste. Where there are no established rules and regulations, take the following steps:

1. Urinate and defecate above the high-water mark and at least 100 feet away from the river. Keep away from natural drainage systems.
2. Dig a cathole.
3. Carry out all toilet paper in plastic bags.

You can make a rocket-box porta-potty large enough for twelve people to use for five days by using a surplus ammunition can or box, available from Army-Navy stores. You'll also need a toilet seat, large heavy-duty plastic bags, a chemical deodorant (such as the kind used in motor homes) or chlorine bleach to prevent methane gas production, toilet paper, and a handwashing bucket.

To build and use a rocket-box porta-potty, follow these steps:

1. Line the box with two plastic bags, folding the excess plastic over the edges of the box.
2. Pour in the deodorant.
3. Use the toilet for fecal material, not for urine. Urine will increase the amount of liquid that you must transport from your campsite.
4. Place used toilet paper, tampons, and sanitary napkins in the toilet.
5. Keep the handwashing bucket nearby (covered with plastic, if flies are a problem).
6. To dismantle the toilet for the next day's trip, remove the plastic bags from the box, squeeze out excess air, and tie the tops of the bags shut.
7. Place the used bags inside other bags, and store them in the ammo box for transportation in one of the canoes or rafts. As other bags are used, add them to the carrying bags.
8. At the next stop, remove the bag containing the used bags from the ammo box and line the box with two new plastic bags.
9. When the trip is over, dispose of the plastic bags in a landfill.

As you would for any outdoor activity, always ask the question, "Am I disturbing the environment unnecessarily?" Practicing low-impact camping may also make a difference in your own health and safety.

Summary

Summarize this session by pointing out that there is a wide difference of opinion on the "best" equipment for low-impact camping. Whatever equipment is used, it should blend with the landscape, produce minimal impact on the environment, and do the job for which it's intended.

Low-Impact Cooking Skills

The purpose of this session is to demonstrate the types of trail foods for use in low-impact camping. It will also demonstrate how to prepare these foods with a backpacking stove and minimum cooking equipment.

Fuels for Outdoor Cooking

Fuels used for cooking outdoors include wood; charcoal; solid alcohol; and liquid or gaseous substances such as kerosene, white gas, butane, and propane. There are pros and cons for using each fuel for different types of cooking and in different situations.

Before deciding what to cook, consider the type of fuel that is available and the situation in which you'll use it. Let's analyze some possible outdoor-cooking situations.

At your base camp, you can set up a well-stocked kitchen and use any cooking method you want to try. You may have access to several kinds of fireplaces, stoves, and fuels, as well as to equipment for making more stoves, ovens, and rotisseries.

Away from base camp, however, you'll have less equipment, so you'll want to keep your load light. Stick to simple recipes and cooking processes—one-pot meals are the easiest.

Practice all trip cooking at base camp before trying it out on the trail. You may find that you want to change the menu or the ingredients, learn to cook some dishes better, or not take some equipment along on the trip.

The following sections describe the uses of various fuels. Before you actually use any of them, be sure to understand the section of this chapter that relates to the specific fuel you have in mind.

Butane and Propane Stoves

Today, many campers use small stoves that burn some type of petroleum product. There are many types, and some are safer than others. Generally, the safest and easiest to use are the butane and propane stoves. The fuel comes in a gaseous form, in a pressurized container. These stoves light much like a kitchen stove that uses natural gas; once a canister of butane or propane is loaded onto the stove, you need only light a match and turn on the gas.

Butane and propane stoves are easy to regulate, and therefore are excellent for cooking many types of foods. Because these stoves are so easy to operate, they are sometimes used for heating lunches. They may even be used on day hikes, where a stove is not normally carried. In addition, propane and butane stoves are easy to pack, don't require messy priming like some liquid-gas stoves, and are not as volatile as liquid-gas stoves.

There are, however, some drawbacks to these stoves: They do not work well at high elevations or at temperatures below fifty degrees; they sometimes suffer malfunctions (for example, the knob that turns the stove on and off can get stuck); and many butane stoves are awkwardly tall and prone to tipping if not placed solidly on even ground. Additionally, the fuel canister

must be replaced frequently—always carry used canisters out to be disposed of properly. On the whole, however, these stoves are an excellent way to teach beginners about camping stoves because they are easy to operate.

Tips and Warnings

- Always read the manufacturers' directions before using any type of stove.
- There should be little activity around any stove; that activity should be directly related to operating or supervising the operation of the stove.
- Always place these stoves on a level surface to avoid tipping. This will also help to avoid boiling food over the side of a pot.
- Always make sure the fuel canister is seated correctly so that there is no fuel leakage.
- Never put your face over a stove while lighting or operating it. Never allow campers to put their faces over a stove while lighting or operating it.
- Never remove a fuel canister while the stove is on.
- As long as nothing is spilled on the burner plate of this type of stove, they require little cleaning.
- The fuel for propane and butane stoves comes in canisters. Take enough canisters with you. Always carry empty canisters out with you.
- Some types of fuel canisters can be removed and then replaced. Others will allow any remaining fuel to leak if they are removed before they're empty. Know your stove.
- Propane and butane stoves should not be used inside a tent where they may tip over and ignite the tent fabric.

Liquid-gas Stoves

In America, the stove most commonly used at parks and established campgrounds is the two-burner white-gas stove, although recently it has been replaced with the two-burner propane stove. Many types of smaller one-burner stoves are also available and are much more popular with backpackers. These stoves come in all shapes and sizes—some are compact and easy to pack, while others are not. Some even come with a small cooking pot that fits over or around the stove.

Almost all liquid-gas stoves work relatively well in cold temperatures and at high elevations, which makes them popular with mountain and winter campers. But these stoves can be very dangerous. White gas, one of the liquid gases, doesn't actually burn; the fuel is in a liquid state in the fuel reservoir of the stove and must be pressurized into a gas before burning. As tiny droplets of the liquid are pressurized and become gaseous, incorrectly, liquid-gas stoves are prone to flare-ups and may even explode, setting tents, forests, and people on fire. If handled correctly, cleaned properly and regularly, and treated with care, these stoves can be as safe as any other.

Some liquid-gas stoves burn white gas, generally the most dangerous of these fuels because it's very volatile. Kerosene stoves are generally safer because the fuel burns at a lower temperature than does white gas. Other stoves use automotive gasoline, which falls between white gas and kerosene in terms of heat and safety. Still other stoves accept multiple kinds of fuel. Always read the stove directions before using any fuel.

Kerosene and automobile fuel, which are more oily than white gas, must be handled carefully. Because of their "oiliness," if kerosene or automobile fuel is spilled on fabric, such as clothing or a tent, it won't evaporate as quickly as white gas. Should a match or a burning coal come into contact with this saturated cloth, the fabric will catch fire easily.

For risk-management purposes, only group leaders age 18 or older who have been trained in the use of liquid-gas stoves should supervise the use of these stoves. Younger people should be permitted to use them only under the *direct supervision* of a leader trained in the use of such stoves. Direct supervision, in this case, means the leader should have his/her full attention on the stove and those persons operating it. There is no recommended minimum age for the use of liquid-gas stoves. However, there is enough risk involved in the use of such stoves that a group must be able to exhibit mature behavior while using them. If you believe that a group cannot exhibit mature behavior, do not allow them to use liquid-gas stoves.

Tips and Warnings

- Always read the manufacturer's directions before using any stove.
- There should be very little activity around any stove; that activity should be directly related to operating or supervising the operation of the stove.
- Always place these stoves on a level surface to avoid tipping. This will also help to avoid boiling food over the side of a pot.
- Always fill a liquid-gas stove away from the actual cooking area, and away from other activity.
- Use an eye-dropper to place liquid fuel around the priming area of the stove. This will allow you to place only as much fuel as needed, without any spillage.
- After filling a liquid-gas stove, allow it to sit for at least five minutes before lighting, to allow any spilled fuel to evaporate.
- Never fill the fuel reservoir of a liquid-gas stove completely full—leave room for the cap to fit back on and for the gas to pressurize.
- Never put your face over any stove while lighting or using it. Never allow any camper to put his/her face over a stove while lighting or using it.
- Liquid-gas stoves are prone to flare-ups if they are not treated properly and cleaned regularly. These stoves will need to be cleaned less frequently if you avoid boiling food over onto the stove.
- Never turn off a liquid-gas stove during a flare-up. Let the excess fuel burn off.
- Never take the cap off the fuel reservoir during a flare-up, while the stove is burning, or while the stove is still hot after it has been shut down.
- Clean white-gas stoves regularly so they will burn evenly.
- Keep fuel for liquid-gas stoves in a container made specifically for it. Never put anything else in that container.
- Liquid-gas stoves should not be used inside a tent where they may tip over and ignite the tent fabric.

Alcohol Stoves

You may have seen someone using a chafing dish to cook fancy meals at the table at home or at a restaurant. Alcohol chafing dishes use a semi-solid type of wood or denatured alcohol that is sold in grocery stores, often under the name Sterno. Chafing dishes and liquid-alcohol stoves can both be used for outdoor cooking.

These stoves have some advantages: they're relatively inexpensive; they're compact; they're very quiet; and if they're unopened, they are not likely to leak except in extreme heat. The popularity of some kinds of alcohol stoves is growing because they burn so quietly.

However, they also have four drawbacks that limit their popularity and usefulness:

- Alcohol stoves that are nonpressurized generate a relatively low heat. Limit their use to cooking simple meals.
- The fuel burns quickly.
- The alcohol is extremely poisonous. (In some states, it is impossible to buy wood alcohol without a permit because of its poisonous properties.)
- Where there is leftover fuel in a container, it can be hard to light a second time, thus wasting the remaining fuel.

Charcoal

Charcoal is wood that has been partially burned so that only the hard fuel remains. It is made from wood that was grown and cut specifically for this purpose. Hardwood charcoal, which burns slowly and generates a lot of heat, is the preferred type.

Some charcoal is manufactured with an easily ignited material so that it can be lighted with only a match. This type of charcoal may be the easiest to use; however, you'll get a better bed of coals if you use the ordinary kind which contains no ignition fluid. Ordinary charcoal is more difficult to light and requires some sort of starter.

Before you build a charcoal fire, decide what you want to cook. Many Asian families can cook an entire meal for four using four or five charcoal briquettes. North Americans tend to use too many briquettes, and the coals keep burning long after the cooking is over, the meal has been eaten, and the area has been cleaned up. Four briquettes are enough to cook hamburgers for two people. Twenty briquettes will cook an entire meal for eight, and you can use the leftover fuel to heat the dishwater.

Starting a Charcoal Fire

There are several ways to start a charcoal fire. The easiest way is to use treated charcoal. Place the briquettes in a neat pile, and light one or more with a match so that others will ignite from those. After all briquettes are ignited and before you cook, use a pair of tongs to space the briquettes evenly. A well-controlled bed of coals generates heat at the correct temperature for cooking most foods. After spacing the briquettes, place a metal grate over the coals, then set your pot on the grate. Or, place the pot directly on the coals if they have burned down enough. Whenever you place a pot over coals

or a flame, be sure to soap the pan. Rubbing liquid soap over the outside of the pot will make it easier for you to clean the black soot off when you've finished cooking.

Nontreated charcoal requires some type of starter and appropriate risk-management strategies. Starter fluids are liquid petroleum products that are sprayed onto the charcoal, allowed to sink in for a minute or so, and then ignited with a match. If you use starter fluid, make sure it has absorbed before you try to light the briquettes; otherwise, you may burn the fluid off the charcoal as you try to light it and will have to add more fluid.

The danger of adding starter fluid to charcoal that you've already tried to light is that a few briquettes may already be burning. As you release pressure on the starter-fluid can, the fluid is drawn back into the can, along with air and possibly flames from the coals. The result can be an explosion that burns the person who is lighting the fire.

As the leader, you should be the only person in the group to add starter fluid to a charcoal fire. Pour the fluid into a paper cup before putting it on the charcoal, so that when you pour the fluid on the coals, only that fluid will burn, not the remainder in the cup. Even this practice is dangerous, because the flame could move up the stream of fluid that you're pouring and ignite the cup.

Here is a simpler, safer method of lighting a charcoal fire that is also a true camping skill: Make a tiny campfire out of tinder, paper, and wood chips, and light that with a match. If you put a small pile of charcoal on top, this little fire will light the briquettes.

Tin-can Fire Starter

You can also make a tin-can fire starter. Open a tin can (any size from a number two to a number ten is appropriate), use the contents, and wash the can carefully. Then turn it upside down and punch triangular holes in the sides and the closed end with a juice-can opener. Punch similar holes in the sides near the open end. Partially fill the can with charcoal, using four to ten briquettes, and finish filling the can with crumpled paper. Place the can on the ground upside down, so that the closed end is at the top, and light the newspaper through the holes you punched at the bottom. The heat from the burning newspaper will be concentrated enough to light the charcoal. When the briquettes are glowing, use a pot-lifter to remove the can. You can now spread out the charcoal for cooking or add more briquettes to make a larger, hotter fire.

Other Fire Starters

Other ways to light charcoal include using heat tabs, which are cubes of solid alcohol, or fire ribbon, which is a gelatinous alcohol product that can be squeezed out like toothpaste. People on backpacking trips, and those who use liquid-gas stoves but don't want to prime them with liquid fuel, usually take fire ribbon along as emergency fire starter and stove primer.

In the past, you may have seen charcoal being lighted with paper milk cartons. This was an excellent practice when the cartons were covered with paraffin, which burned like candle wax. Today, however, milk cartons are covered with a polyplastic and do not burn well.

You can make your own heat tabs by taking a cardboard egg carton (not a plastic or foam one), filling each egg compartment with small pieces of charcoal, then pouring melted paraffin over the charcoal pieces. Be sure to handle the paraffin carefully—if you let it get too hot, it will burst into flames. As soon as the paraffin melts, pour it over the briquettes, and then allow it to dry thoroughly. Later, when you need a heat tab, simply tear off one of the egg compartments, put it under some briquettes, and light the cardboard, which serves as a wick for the charcoal "candles."

Paraffin

To melt paraffin, observe the following steps.

1. Place the paraffin blocks in a tin can.
2. Place the tin can in a pan of water.
3. Place the pan of water on a stove or fire, and heat the water to a simmer. The hot water will slowly melt the paraffin. Never place a container of paraffin directly over a flame.

You can also make fire starters from strips of newspaper, rolled tightly into cylinders about one-inch thick. Tie the cylinders together with string and dip them into melted paraffin. The end of the string will serve as a little wick for your homemade candle. (Or you may want to carry stubs of purchased candles in your pack for use as emergency fire starters.)

To extinguish a charcoal fire, either let it burn out or sprinkle water on it, a little at a time, until the coals are cold. Save the unused portion in a sack for use the next day. If the leftover charcoal doesn't dry out completely, you'll know to use less charcoal next time. It's much easier to add one piece to a dying fire than to lug wet leftover charcoal around until it dries.

Wood

For the veteran camper, wood is the ultimate cooking fuel. It can be regulated. It is relatively safe and can be used for virtually any type of cooking, and it can be collected at the campsite. Collecting wood, however, is a trickier matter than it may seem, and this may be the greatest drawback to using wood for fuel. *When you take wood that you find on the forest floor, you may be destroying future forests.*

When there were very few campers and outdoor cooks, plenty of wood was available for cooking. Native Americans used wood most of the time; some prairie Indians also used buffalo chips. (Buffalo chips are dried buffalo droppings made up of partly digested grass; these chips generate great heat when they're burned.) Some people living in the African deserts got the same result by using camel dung. These materials, sanitized by drying in the hot sun, are essentially compact pieces of processed grass.

Today, wood fuel is no longer as plentiful. In the central United States, where there are many farms, forests have been replaced by fields. Even in the North and West, where large forests still stand, fuel is in short supply. Too many people camping in the same spots year after year have depleted the supply of downed wood, particularly small sticks, which are useful for cooking. And because of campers' fascination with blazing campfires, the supply of logs has been depleted, also.

If you camp in a state or national park, you may see signs warning that campfires are prohibited. There are two reasons for this: the danger of forest fires set by careless campers and the depletion of forest nutrients.

Trees derive much of their nourishment from decaying plant materials. If the fallen timber, sticks, and branches are burned, no material will be there to decay to feed new small trees and replenish the soil's nutrients for existing trees. In some parts or the country, it takes up to 100 years for downed trees and limbs to decay and nourish growing trees. If campers take all the dead materials for use in their campfires, the growing trees will soon die of starvation. Therefore, where there are many campers, there are usually restrictions against using wood from the forest floor for campfires and cooking.

An Ethical Issue

Whether to gather fallen wood for a campfire is not only a legal question, it is also an ethical issue. There are some places where there are no restrictions on fire building. The land is vast and, in theory, the number of campers visiting the area wouldn't greatly affect the land if they spread themselves throughout the natural area. In practice, however, many campers seek the same popular sites. Often, these sites are places that have a naturally stressed existence—they may be mountain lakes at tree line, or beach sites on barrier islands. The areas around these sites are then damaged by a continuous stream of campers, while other areas of the same managed forest go virtually untouched. So, even though fires are permitted, there is still a question of whether or not to be part of the wear and tear on that popular site by building a fire. People have damaged the earth in countless ways—by depleting forests of downed wood; by discharging industrial pollutants; by using chemical fertilizers; and so on. Challenge yourself and your group. Do you want to damage the environment or help protect it?

Before you answer this question, consider the possibility of forest fires and the depletion of forest nutrients. Plan to bring your own wood to a site if you are at a base camp. This wood has been cut from a managed forest where new growth is replacing cut trees. Plan, also, to use a stove for cooking meals whenever possible. Fires should be considered a luxury.

There is more information provided in this session for building wood fires than for any other single fuel source, because of the nature of the fuel. There are no manufacturers' instructions on this package. Should you be in a situation where the above criteria can be met and you decide to build a wood fire, you should know as much as possible about them in order to make the least possible impact on the environment.

It is recommended that wood fires be used only when the following conditions can be met:

1. Any removal of fallen wood for a fire still leaves a more than adequate supply of downed wood for continued decay into the soil to replenish forest nutrients. (If you have to search for wood, this condition is not being met.)
2. The fire can be built in an existing fire pit and/or will leave no visual scarring.
3. The fire can be built and used without any danger to participants or the surrounding natural environment.

Gathering Wood

Despite the fact that cooking over wood in a forest has a certain amount of glamour, at times it is neither easy nor pleasant to do so. Gathering wood and cutting it into short pieces takes time and effort. It may also be difficult to find wood that burns easily. On a rainy day, you may not be able to find any dry wood. If there is snow on the ground, the only wood in sight may be the tops of living, nonburnable green trees. A lush, humid forest may offer no dead wood, or that wood may already be rotten and soggy. A hardwood forest may offer no small tinder with which to start a fire. You may be in an area where you have no idea what kind of wood burns easily and well, or in an area where the wood contains some natural chemical that causes your food to taste strange (for example, certain cedars make food taste like mothballs). Or the available wood may be too hard to cut.

To gather wood, take a buddy and a compass, and travel about 100 yards from your campsite in one direction. Gather wood, *being sure not to take all you find,* then return to your campsite, traveling in the opposite direction. Gather just enough wood for your own use. The days of leaving firewood for the next camper are over. Step lightly while you are gathering wood, so that you disturb the forest as little as possible.

If you are camping in an area where wood fires are permitted and environmentally ethical, your cooking fire should be small. It's almost impossible to prepare dinner over a roaring fire. Small sticks (between the size of your finger and your arm) are large enough for all outdoor cooking; anything larger makes too big a fire, burns too hot, and wastes wood. Consider the fact that you really want to be part of the outdoors. A roaring fire may detract from the sounds and sights of the natural world you're visiting for only a short time.

Selecting a Fire Area

The next step in building a wood fire for cooking is selecting a site for the fire itself. If you are in a park, at your base camp, or in a campcraft area, you'll probably find an existing place for a fire, such as a charcoal stove, a fire pit, or a fireplace. Many fireplaces have a layer of heavy metal under them to keep the fire from spreading to plant roots. In any case, if a designated fire pit is available, use it.

When you have to build your own fireplace, the recommended places to do so are on rocks, on sand, or in shallow pits. Make a *shallow pit,* remove the *duff* (organic material on top of the soil), and the topsoil down to mineral soil. Be very gentle, so that you don't destroy the topsoil and duff. You'll scrape them back over the shallow pit when you leave the area.

If the only place you can find to build a fire has a thick layer of duff, is under low branches, or is surrounded by heavy vegetation, try making a *mound fire* instead of a pit. The purpose of the mound is to protect the soil and its inhabitants. Find an area with exposed mineral soil (a stream bank, an uprooted tree, or gravel near rocks), and use this soil to build a mound at least three inches deep on top of a large rock or several rocks piled together. Again, be very gentle and conservative with the amount of soil you take; exposed soil houses many tiny creatures, so help them maintain their homes.

A mound of twenty-four inches in diameter is sufficient for a cooking fire. You can even make a mound fire on top of a plastic or nylon sheet covered with at least three inches of mineral soil. Be sure to use at least three inches; less than that will allow the fire to melt the sheet (cook the lichens on the rocks underneath, and scorch the rock itself). Building a fire directly on a large rock is not recommended because of the visual scar it leaves.

After building the mound of soil and laying the fire, place a small, lightweight grate on top. When you use a grate, your fire will burn more evenly, leave less ash, and pans will be less likely to tip over and put out the fire.

Consider taking along a large frying pan and building your fire in that (still on top of the protective layer of mineral soil). This "portable fireplace" will keep the fire contained and the area around it clean. Many people on canoe or boat trips carry some sort of fire pan, such as a metal garbage-can lid, oil drain pan, or barbecue pan.

Building a Fire

To build a fire, you'll need tinder, kindling, and small fuel. *Tinder* is small, easily lighted material that gets hot enough to light the *kindling* (wood larger than tinder). The kindling, in turn, gets hot enough to light the fuel. The *fuel* is what actually produces enough heat to cook on. Allow the fuel wood to burn down to coals before cooking. The heat from the coals is much more even than that from the fire.

A match doesn't burn with enough concentrated heat or long enough to light anything larger than tinder, so find a variety of tinder materials before you think about lighting that match. Tinder may be birch bark; wild grapevines; small sticks; dried spruce; tamarack; pine branches; or other wood that you find lying on the ground or dead on trees. *Never remove bark from living trees, and never use living branches for tinder.* You may bring tinder from home in the form of wood scraps, paper (although it doesn't burn as well as wood does), or purchased or homemade fire starters (described in the section on charcoal). Don't use rotten wood, which crumbles, or green wood, which bends but does not break. And *always* be gentle with the environment when you gather wood and build fires.

When you finish cooking, let the fire burn out. You can burn wastepaper, but not garbage. Burning garbage requires much more fuel, produces debris and odors, and is not satisfactory low-impact practice. Remember, if you carry something in, carry it out again.

Once the fire is out, sprinkle water on it and stir the ashes with a stick until you're sure that both the ash and soil are cool. Then return the leftover ashes and soil to the environment by scattering it widely.

Sprinkling water on a burning fire is generally safe, but very young participants should never do this without adult supervision. Pouring water on a fire creates steam, which can burn people and scatter the burning wood, possibly creating another fire.

If you're at a base camp, leave the fire pit and leftover materials where they were used. (In a frequently used, primitive site, you may want to leave the fire pit and some ashes so the next person will use the same site, rather than digging another hole.) If you're in a pristine area, be sure to practice

no-trace camping. Remove all evidence of your presence, return the topsoil, and scatter the duff around on top of the fire pit.

When you're camping beside a river, put the fire out with water, drain the coals, and put the coals into a bucket or sack to dry out so you can use them again at your next stop. Again, leave no trace of your visit.

Foods

Supermarket Food Sources

Display a variety of dehydrated or freeze-dried foods (suitable for use on the trail) and available at any well-stocked supermarket. Point out that these are just as good, and a great deal less expensive, than commercially-prepared trail foods. Be sure to read the label, however, as some are "fake foods" with little or no nutritional value. Some instant soups are an example.

Prepackaged Food

Most foods for use on the trail should be repackaged from the store container to plastic bags. Package each complete meal in a large bag so that everything will be together when cooking time arrives. This will reduce the weight and volume, and there will be no empty containers to pack out. Be sure to mark the meal and contents on each package with a waterproof felt-tip pen. More than one fisherman has dipped his trout in what he thought was white corn meal only to discover it was powdered laundry soap!

Commercial Trail Foods

Display a sample of commercial trail foods packaged for a party of four. Explain that each team will have a chance to try one of the dinner menus for its noon meal. Point out that dehydrated and freeze-dried foods have come a long way in the past few years, but one caution still applies: "Only this I vainly plead: when all else fails, the instructions read!" So, following the instructions exactly will produce the best results. Note, however, that cooking times will need to be increased at higher elevations.

Spices and Condiments

Some trail foods are a bit bland, and a selection of spices and condiments can make a meal more tasty. In addition to salt, small packets of pepper, paprika, onion flakes, minced garlic flakes, pepper flakes, and other flavorings can make a world of difference.

Trail Munchies

The experienced hiker takes on fuel and water regularly to keep his energy level up. Some water and a bit of food at each rest stop will do wonders to keep a hiker moving. "Gorp" (good old raisins and peanuts) is a staple on the trail. But most hikers prefer their gorp a little fancier. Banana chips, coconut, dried apples, pineapple crystals, dried dates, chocolate chips, sunflower seeds, pumpkin seeds, and a variety of nuts can give each hiker's gorp its own distinctive character. Whether the seeds are roasted or raw, salted or not, is a matter of personal choice. Pass around samples of "creative gorp" for the participants to try.

Fruit "leather" is preferred by some. This consists of applesauce and masked fruit poured into a shallow, lightly oiled or Teflon baking pan and allowed to congeal in a warm oven. When it has congealed into "leather," it is cut into strips, rolled into a cylinder, and ready to eat. It's a good snack, but hard on braces, fillings, and bridgework.

"Jerky" has its fans. This is a lean meat that has been spiced, salted, and dried. The best jerky is homemade, cut from strips of beef or venison. Soak the strips in saltwater for thirty minutes and dry for six to eight hours in an oven at its lowest possible setting. Commercially-made jerky is quite acceptable, though a bit expensive.

Water

It's important to drink lots of water to prevent dehydration. Unfortunately, the days when a camper could safely drink from a wilderness stream are over. A number of parasites, notably *Giardia* (sometimes known as beaver fever or cattle fever) have been carried by wildlife into even the most remote areas.

Drinking Water

At home, it's easy to find good drinking water; all you have to do is turn on the faucet. It's not quite as simple outdoors. If you're at a youth camp or a state, national, or city park that has faucets, by all means use them. You can expect good drinking water to come from pipes that can be easily turned on and off. Health regulations in the United States mandate that water pumped through pipes from which the general public will drink must contain no disease-bearing organisms.

At one time, streams, lakes, rivers, and springs also offered safe drinking water. Until about the 1970s, most canoeists, backpackers, mountain climbers, and rafters simply drank from rivers and streams, giving little thought to any impurities in the water. Today it's foolhardy not to take precautions against disease-causing organisms in even the most remote streams. Because there are thousands more outdoor enthusiasts today than twenty years ago, disease is much more likely to be spread by water. People and their pets travel farther and to many different places today, transmitting organisms to areas where they never existed before.

A good example of this is a waterborne organism named *Giardia lamblia* that causes a disease called *Giardiasis*. This disease, which has been around for many years, is now found even in the most remote high-mountain areas. The organism seems to thrive in the cold waters of mountain streams.

No one knows how Giardia came to the United States or from where it evolved. The organism is spread to water sources by human and animal fecal material, and anyone who drinks Giardia-contaminated water suffers a very painful complication of the intestinal tract. Giardia acts as a powerful laxative. The illness may take up to two weeks to show up and victims may be ill for many days. They often wish they had never gone into the beautiful natural area where they contracted the disease.

What's the solution to the dilemma of choosing between beautiful country and the possibility of this or other diseases? The answer is water purification. Purifying water takes a little time and a little planning, but you're in the outdoors to enjoy yourself, not to rush through everything as fast as you can.

You'll need to purify all water that you'll be using for drinking, cooking, and washing dishes unless you use melted, newly-fallen, clean snow. Most people, however, participate in outdoor activities long after the months in which snow falls, and old snow can be as contaminated as a stream or pond.

Boiling Water

Boiling dishwater is a simple task. It takes a little while for the water to cool, but you can be doing other chores or appreciating the sunset while you wait. Purifying drinking water is also easy—simply boil stream water for ten minutes. If you don't have time to wait for your drinking water to cool to a refreshing temperature, you can use other simple water purification methods.

Assuming that pollutants are living organisms and not chemicals, boiling will provide you with safe drinking water as long as you boil it at least ten minutes at sea level and up to twenty minutes at 5,000 feet (even longer above that elevation). Be sure to sanitize your water bottle by rinsing it out with some of the boiling water. It's a waste to pour purified water into a bottle that may have had even a small amount of pollutant in it.

Remember that one of the ten essentials is extra drinking water. Common sense should tell you to save some water to drink while you are preparing the next batch. It would be silly to drink all the water, get thirsty, and then try to find a source of new water to purify. By that time, you'd really be thirsty. A good rule is to drink before you're thirsty; another good rule is to replenish your water supply before you're thirsty.

Water Purifiers

If you use commercial water purifiers—halogens, iodine, a bromine or chlorine compound, or even common bleach—you'll be able to kill Giardia cysts if you use the purifiers properly. The directions on the bottles usually assume that you're using these materials in room-temperature water. If you're taking your water from a mountain stream, its temperature may be only thirty degrees, so you must allow the purifier to work longer than the directions suggest—at least thirty minutes.

Water Filtration

The third method of water purification is filtration, a process that is becoming very popular. Your youth camp, outdoor program, or group may need to purchase commercial backpacking water filters. Unfortunately, the best is probably the most expensive. Other good models are available, however, and the secret is not the price as much as it is the size of the filter. It must be small enough to catch the Giardia organisms. Filters are described by size, and the .06-micron size should filter Giardia.

Filters must be replaced or cleaned at intervals in order to keep them efficient. Be sure to follow the directions that come with your group's water filter. Keep these directions in a readily available file at home or at your camp so that you can refer to them each time you prepare for trips.

No matter what method of water purification you use, practice it at your base camp before venturing forth on your trip, to learn how the method works

and how long it takes. Then when you get to a water source on the trip, you'll be able to act with confidence and assurance that you know what to do.

Don't take water from streams that may contain agricultural or chemical wastes. Free-flowing streams may not purify themselves of chemicals, no matter what you may have read. Don't use streams carrying runoff from farms, forestry operations, and factories, because you have no way of knowing what kinds of chemicals the water may contain.

When you're hiking in a snowy area, particularly in the early spring, you may see red or pink snow patches. Although the color may simply be pollen from nearby conifers, it could also be red algae, which contains a chemical like Giardia, a very powerful laxative. Anyone who drinks melted snow that contains even small amounts of this algae will suffer severe diarrhea. Beware of red snow! Find clean, white snow, if you can, and melt that, instead. (You may have to dig to reach a spot where the snow has not been covered by branches or dust.) When you melt snow for drinking water, it's best to pack it tightly before you put it in a pan over the heat source. By doing so, you'll use less fuel and end up with more drinking water.

Water flowing from a glacier probably won't be contaminated by pathogens, or disease-producing materials, but you can be sure that it contains fine particles of worn rock. This material resembles liquid sandpaper as it moves through your system. Although the water may look and taste great, the rock particles will make you ill. You may decide that drinking water from a melting glacier is not such a good idea after all.

Water sources vary in different geographical areas. Talk with forest rangers, expert campers, and experienced outdoor leaders in the area where you'll be traveling. They can give you the best advice.

Gadgets are probably unnecessary. Some outdoor experts believe that a solar-still works well in the desert, where the sun is intense. However, building a still takes more energy and perspiration than the resulting small amount of water it can replenish. It's better to conserve your energy and natural body moisture. Even in a survival situation, a solar-still may not give enough water. If you plan appropriately before you leave base camp, you'll never need one.

Trail Food Practice

Ask each team to select one of the four-person trail food dinner menus to prepare for its noon meal. Use dinner menus rather than lunch menus that require little or no cooking. Issue a stove, fuel, and cooking equipment to each team and let each select its own area in which to prepare the meal.

Objective

Announce that the objective is to experiment with preparing a dinner menu with limited utensils and one backpack stove. Each team is to prepare its meal and clean up afterwards using its best low-impact camping techniques.

Monitor Progress

The instructor monitors the progress of each group, noting who assumed leadership, how conflicts are resolved, how the meal is planned, and the general results of the experience. Instructors may wish to prepare their own meal or subsist on a trail lunch of gorp, cheese, pilot bread, etc., so they will be free to visit each group.

Evaluate

When each team has finished its meal, has cleaned up, and has begun to relax, assemble the group for an evaluation.

- How did the meal go? Was the food acceptable? Too much? Too little?
- How did you manage with only one stove? Did you serve the meal in courses? Was that okay?
- Why did you choose the spot you used to prepare your meal? Was it a good spot? Could you have chosen a better one?
- Who took charge of the meal preparation? How was he selected? Did the leadership change during the meal preparation and cleanup? How did you feel about the leadership? (And we don't want an answer to that one.)
- How did the equipment work? Did you learn anything you didn't previously know about the backpack stove?
- Did you check over your cooking site to be sure that you actually *did* leave no trace of your presence?
- How much noise did your group make—shouting, loud laughter, etc.? A low noise level is a part of low-impact camping.

Check-in Gear

Ask the participants to return their equipment to the workshop quartermaster and assemble for the next session.

Low-impact Outdoor Skills Training

This is intended as a buzz group and discussion period with each team working as a group. The length of the buzz group sessions and discussion periods can vary with the time available.

New Skills Are Needed

Point out that by now the participants have concluded that most older Scouts and Explorers may need some new outdoor skills in order to become successful low-impact campers in wilderness or backcountry areas. Traditional Scout camping techniques and methods are more appropriate to the council long-term or short-term camp and established camping facilities.

Explain that each team will have a chance to work as a buzz group with the following topic: "What new or improved skills must the older Scouts or Explorers in the troops or posts we represent master in order to become skilled low-impact campers?" Announce whatever time limit has been established for this buzz-group session.

Teams Meet

Each team now meets as a buzz group. Instructors may wish to monitor progress. Give teams a one-minute warning before reassembling.

Reports and Discussion

Ask each group to report its findings and discuss the results. Discussion length will depend on the amount of time allowed for this session.

Who Will Train and How

Ask each team to go back into a buzz session with the following question: "Specifically, how can we train our older Scouts and Explorers in the techniques and attitudes of low-impact camping? Who should conduct that training?"

Teams Meet Again

Once again the teams meet with the instructors who are monitoring. Give a one-minute warning before reassembling.

Team Reports

Ask each team to report its findings and discuss as appropriate. Try to get as many resources as possible from the group and list these on the easel pad. The length of the discussion will depend on the amount of time allowed for this session.

Summary

Summarize the discussion with key points made in team reports. Stress that most older Scouts or Explorers will need special preparation – both in skills and attitude – before attempting wilderness or backcountry camping.

WILDERNESS AND BACKCOUNTRY PROGRAMS

Different Programs Needed

A typical Scout views camp as a place to run, jump, shout, and burn off excess energy with raucous abandon. But in a wilderness or backcountry area, this behavior is not only unethical, it may be illegal! Once the day's hike is ended and camp is made, few leaders feel the need for a carefully orchestrated program of activities. As one leader says, "Throw out a couple of Frisbees and Scouts will amuse themselves for hours." But eight Scouts chasing Frisbees in the fragile environment of a wilderness Alpine meadow can cause damage that may take twenty-five years to heal. So creative programming is needed.

The Problem

Pose the following problem to the participants:

You are the leader of a group of eight Scouts on a weeklong hike through a designated wilderness area managed by the U.S. Forest Service. You have obtained a permit from the local ranger and understand the limits placed on activities in this area. It is 3 p.m., and your day's hike is finished. The group has set up a typical low-impact campsite just below timberline in a wooded area adjoining an Alpine meadow through which flows a rushing mountain stream. The terrain is mountainous, and you've noticed a number of small animals and unusual plants. Fishing is permitted, and all members of the party have licenses and fishing gear. The ranger was very insistent that noise be kept to a minimum.

Your problem: What will you and these eight Scouts do from now until 9:30 p.m. bedtime that will be in keeping with the spirit and intent of this designated wilderness?

Teams Meet

Now ask each team to meet, discuss the problem, and suggest activities appropriate to this situation. Announce the time allowed for this project, monitor progress, and give a warning shortly before reassembling.

Teams Report

Ask each team to report on their plan. Discuss and evaluate each plan as appropriate. The length of discussion will depend on the amount of time allowed for this session.

A Further Problem

When the discussion is concluded, remind the participants that we have been struggling with only *one* afternoon and evening in a weeklong wilderness experience. It should be clear that the leader of a wilderness Scouting expedition must give careful thought and planning to programs and activities that will produce a true wilderness experience for his Scouts.

Summary

Point out that when a leader fully realizes the limitations and opportunities involved in a wilderness or backcountry expedition, he will probably make one of two decisions: (1) go somewhere else where the more traditional Scouting activities are acceptable, or (2) undertake some careful planning and training to ensure that his Scouts have a true wilderness experience in ". . . an area where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain."

Wilderness Commitment

To conclude the course, distribute a copy of the folded Wilderness Commitment to each participant. Read with them the Outdoor Code and the Wilderness Pledge. Point out that the seven key points to consider in low-impact camping are listed as a checklist and reminder.

Ask each participant to make a personal commitment to observe the highest standards of environmentally sound hiking and camping in wilderness, primitive, and backcountry areas. When each participant has signed the commitment, congratulate them on completing the training program and offer best wishes for a future of outdoor adventures:

"Scouting is an organization that believes in principles and values. We are charged to share these values with future generations through our work with today's youth.

"We care about people—not only our own members, but the general public with whom we associate. We reach out to others and give of ourselves.

"We care about the land and its resources. Our task is to protect the wild spaces for present and future generations.

"We commit ourselves to positive action. If we believe in our mission to serve youth, it follows that nothing good and worthy is an impossible task."

First Aid

Definition

First aid is *immediate and temporary care* given to the victim of an accident or sudden illness. It is not the purpose of this session to give a complete first aid course. There are many excellent books on first aid and on wilderness first aid. They will not be duplicated here. You should get training from the American Red Cross or some other recognized first aid organization. Every leader must consider it his/her personal responsibility to complete an advanced first aid course *before* taking any group outdoors.

The following section provides basic information on treating some common problems. This information is by no means complete, so get further training in these areas.

Minor Injuries and Illnesses

Bleeding

Place the cut or bleeding area above the heart, if possible, unless the victim has other injuries that require him/her not to be moved. No matter how minor or how severe the bleeding is, put pressure on the wound to stop the bleeding, using a clean cloth if one is available. If the bleeding is severe enough to saturate available clean bandages, use a bandanna, a shirt, or anything to stop the bleeding. It may take anywhere from fifteen minutes to five hours, but keep putting pressure on the area until the bleeding stops.

Blisters

Eliminate any friction that caused the blister, and clean the blistered area. Cover the area with a bandage and tape or molefoam and moleskin to prevent further trauma to the area. Do not remove the skin from the blister; it will help prevent infection. If the blister is large, it may need to be drained. The best treatment for blisters is avoidance—making sure that campers' boots or shoes fit and are broken in, and that they are wearing the appropriate socks. Gloves should be worn when there is any possibility of blistering to the hands.

Minor Burns

Immediately remove all surrounding clothing. If the burn is superficial and localized, and involves less that twenty percent of the body surface, the following steps should be taken. Apply cold immediately. Wash the area thoroughly with nonmedicated soap and water. Apply appropriate ointment. Cover loosely with a sterile dressing to avoid further trauma. Aspirin may be given to relieve pain. Leave dressing secure while on the trail to reduce the risk of infection. When the bandage is removed, check for blistering. If none is visible, cover the area only to protect it from trauma. Keep the area clean.

More serious burn victims should be given fluids to help reduce the chances of shock, then evacuated immediately. There are other considerations in evacuation; please read a more in-depth resource or get further training on burn treatment.

Chapped Hands and Lips

Protect the chapped parts of the body from further exposure to the elements. Apply lotion or a commercial chapped-lip treatment.

Dehydration

Replace body fluids with any nonalcoholic, noncaffeinated drink. Fruit juices and noncaffeinated soft drinks are especially good because they also help replace lost electrolytes. (Potassium, salt, and bicarbonate together make up electrolytes; your diet should include a balance of these things.) Do not treat dehydration with salt tablets, especially if the victim has a kidney disorder. Treating dehydration with salt tablets can create a lethal imbalance in the kidneys.

Common Headaches

Make certain that the camper has not been injured. If no injury is present, a nonaspirin pain reliever may be given in the proper dose, and the person should be kept still and quiet for thirty minutes to an hour. Headaches are common after a rapid ascent to high altitudes.

Minor Insect Bites and Stings

Remove stinger or remaining poisonous insect parts. Cold compresses may decrease absorption of venom. Desensitize injured area with mild antihistamine. Keep area covered with a bandage if victim is likely to scratch it.

Insect bites and stings can cause severe allergic reactions in some people. The treatment for these cases is much different, and you should be properly trained by medical personnel to deal with them. Some campers are already aware of their allergy to bee or wasp stings and will have their own medications. If so, they will know how to medicate themselves, possibly by injection. It may be prudent to get permission to teach that camper's buddy how to give the medication, in case the victim is unable to do it himself.

Muscle Cramps

Stretch the muscle where the spasm is occurring. Do not knead or pound the area—that may cause other soreness. To help prevent cramps, make sure that campers get enough water and salt in their diets.

Nosebleeds

Keep the victim upright—either sitting or standing, but not lying down—and do not let that person tilt his/her head backward. That won't stop the bleeding, and the blood could run backward into the throat. Have the victim tilt the head forward instead, to let the blood drain. Cold application may help stop the bleeding. Have the person pinch his/her nostrils firmly with the thumb and forefinger so that there is pressure on the place where the bleeding is. Usually the bleeding will stop in one to two minutes.

Poison Ivy, Poison Oak, Poison Sumac

Wash thoroughly. Relieve the itching by applying an over-the-counter topical antihistamine.

Sprains

Apply a cold compress to the area immediately to prevent further swelling. The camper should rest the joint for twenty-four to forty-eight hours. Support the ankle, wrist, or other joint by wrapping it with a well-padded compression bandage or tape. If the injury is a sprained ankle, you may need to wrap the boot as well as the ankle, so that the ankle won't have to support the weight of the boot.

Hypothermia

Hypothermia (low heat) and hyperthermia (high heat) must be a primary concern of leaders and participants. In almost all situations, you can prevent these problems by making sure that everyone has proper clothing and equipment.

Hypothermia is the lowering of the temperature of the inner core of the body faster than the body can replace the heat. The average internal temperature of the human body is 98.6 degrees Fahrenheit. When the exterior of the body becomes cold, the heat from the interior moves up to warm the surface. If you put one finger in an icy stream for a few seconds and examine it after you pull it out, you'll see that it has become red. The redness is the result of the body's inner heat rushing to warm the finger in the cold water.

When the external body temperature goes below about seventy-five degrees, the internal temperature drops significantly. This results in a decrease in vital bodily functions such as digestion, circulation, breathing, and even thinking.

As the core temperature continues to decrease, the symptoms of hypothermia change. Although not all cases are the same, the following indicates the usual symptoms of hypothermia at specific body temperatures.

Ninety-six to ninety-nine degrees. Shivering becomes intense and uncontrollable. Ability to perform tasks is impaired. The victim can't walk heel to toe down a thirty-foot line scratched in the ground.

Ninety-one to ninety-five degrees. Shivering continues, along with difficulty in thinking and speaking. Loss of memory is evident.

Eighty-six to ninety degrees. Shivering stops, and muscles become rigid. Motions are jerky and erratic. Skin may be blue and puffy. Thinking is less clear, but the victim may appear to still be in contact with reality.

Eighty-one to eighty-five degrees. Muscles continue to be rigid. Pulse slows. Victim loses contact with the environment and may drift into a stupor.

Seventy-eight to eighty degrees. Victim loses consciousness. Heartbeat becomes erratic.

Below seventy-eight degrees. Cardiac and respiratory control centers fail, resulting in heart and lung problems and possible death.

Hypothermia that occurs over a period of time is called *systemic hypothermia.* If the body is immersed in cold water, hypothermia is almost immediate; that type is called *immersion hypothermia.* The two types are similar, except immersion hypothermia may set in after only five to ten minutes.

The best protection against hypothermia is following good outdoor practices, especially by providing adequate protection from wind, rain, and snow. In addition, make sure that campers get adequate nutrition and liquids.

Other safeguards include physical conditioning, wise use of wool and insulating materials, adequate rest, and enough exercise to keep up the body's production of heat.

There are two treatments for hypothermia:

1. **Reduce the heat loss.** Shelter the victim from the wind, weather, and cold ground. Replace his/her wet clothing with plenty of dry clothing so that they won't lose any more body heat. Increase the victim's exercise level slightly to maintain heat (for mild hypothermia). Get the victim into a tent or other shelter immediately.
2. **Add heat.** Give the victim warm or hot drinks and high-energy foods, such as sugars and breads. Apply heat from a warm rock or canteen full of hot water. (If the heat source is too hot for you, it will burn the victim, so be careful.) Exercise the victim by having them walk with you toward a lower elevation, warmer area, or the trailhead.

If the victim is in a state of confusion and can't respond or get warm, put the victim naked or nearly naked into a sleeping bag with another person who is also naked or nearly naked. The warmth from the other person's body will warm the victim. The experience will be very chilling for the person who is helping, but there's no better way to transfer body heat back to the victim. If you can zip two sleeping bags together, add a third person so that the victim is sandwiched between two warm bodies.

It's extremely important that you not warm the body of a severely hypothermic person too quickly. Warming the extremities too quickly will dilate the blood vessels, sending previously stagnated cold, low-oxygen blood back to the body core, where it will shock the organs. This can be fatal.

Assuming that you caught the hypothermia in time, as the victim becomes warm, he/she will need to urinate frequently. Be sure to have some pan or bottle available in the tent for this purpose, as the victim can't go outdoors yet. The treatment for even mild hypothermia may take several hours.

A victim who seems to be fully recovered should be evacuated to the trailhead and given medical care slowly, but steadily. If the victim does not respond to early treatment, you must immediately send for emergency medical care.

Hyperthermia

Hyperthermia, which is just as serious as hypothermia, may set in more rapidly. Your body contains a built-in cooling system, but if the body core reaches 106 degrees Fahrenheit or more, death may occur.

Your body gains heat in two ways: through *absorption* (external heat from warm air, radiated and/or reflected sunlight, and direct contact with warm

objects) and *internally* (heat produced from working muscles and normal body metabolism).

Hyperthermia may result in either *heat stroke* or *heat exhaustion.* Heat stroke is characterized by high body temperature; hot, red, dry skin; rapid, strong pulse; and possible unconsciousness. To treat it, cool the victim with cool or cold water. Avoid overchilling him.

Heat exhaustion is characterized by approximately normal body temperature; pale, clammy skin; profuse perspiration; weakness; headache; and possible nausea and vomiting. To treat it, give the victim sips of mildly salted water (unless he/she is vomiting) and apply cool wet cloths. The victim should not be exposed to warm temperatures during the rest of the trip. It's probably best to return all victims of any type of hyperthermia to the home base immediately.

Preventing heat-related problems involves drinking water whenever you are thirsty. In hot weather, two or three quarts per day is the minimum amount you need to maintain normal body functions. Have plenty of salt in your normal diet; salt tablets are not a good substitute. Stay out of direct sunlight. Cover your body, wear a hat, and protect your neck. Imagine the covering worn by Arabs who must be protected from hot, dry desert conditions, and follow their example. Eat lightly but well, and slow your activities.

If all goes well, your trips will be uneventful as far as injuries are concerned. As a leader, though, you must be prepared to treat minor problems so that they do not become major ones.

First Aid Kit

A well stocked first aid kit is a good starting point for handling common first aid problems. Your first aid kit should include the following items:

- First aid manual
- Permission forms from parents for providing medical treatment
- Matches
- Flashlight
- Paper and pencil
- Change for making phone calls
- Adhesive bandages of assorted sizes
- Adhesive tape
- Antacid tablets
- Aspirin and/or nonaspirin pain reliever (to relieve pain and reduce fever)
- Butterfly bandages (to protect small, deep cuts)
- Antibiotic ointment (small tube)
- Latex gloves
- Liquid antibacterial soap (for cleaning wounds)
- Elastic bandage, four-inch width (to support sprains or strains)
- Sterile gauze compresses, two inches and four inches wide (to protect open wounds)

- Rolled gauze bandages, one inch and two inches wide (to protect open wounds)
- Telfa pads (nonadhesive)
- Molefoam and moleskin (to protect blisters)
- Needles (to open blisters)
- Oral thermometer
- Safety pins
- Scissors
- Sunblock lotion
- Sunburn lotion
- Triangular bandages
- Tweezers (for removing splinters, bee stingers, etc.)
- Poison-ivy or poison-oak remedy

Snakebite kits are recommended only if an adult who has been trained in their use is present. Snakebite kits can be as dangerous as the snakebite itself if they are used incorrectly.

Before you go on a trip, discuss the possible accidents that could occur. Practice the first aid you would administer. Try role-playing simple first aid situations with campers.

In all cases, remember to get first aid training before you provide any first aid. It is recommended that leaders be certified in American Red Cross Standard First Aid.

Summary

In addition to making and following sound plans for a trip into the outdoors, you can help ensure safety by learning about weather, water, toilets, and first aid. Understanding the weather will help you keep campers from getting too cold and wet, too hot and dry, or ill under cold, damp, windy conditions. Understanding how to get safe drinking water and dispose of human waste can keep your group from contracting painful and sometimes fatal diseases. And knowing how to care for victims of accidents or illness will prevent the problems from becoming major ones. Be safe. Take care of yourself and your environment. By doing both, you and the environment will remain safe and healthy, and you can take another trip with confidence.

TREATING KNOCKED-OUT TEETH

A camper is playing third base in the camp softball game. A line drive hits him in the mouth and knocks out his two front teeth. What should the camp staff on the scene do?

Camp personnel are often confronted with children who have had teeth knocked out in an accident. More than two million teeth are accidentally knocked out in the United States each year and most of them can be saved for life if the proper steps are taken.

In order to ensure the greatest possible chance for successful treatment, the knocked-out tooth must be treated and stored in a protecting, nurturing environment, and the victim must see a dentist immediately.

The Key to Long-term Success

The key to long-term success in replanting knocked-out teeth is keeping the tooth's root alive. After 30 minutes of exposure to the air, these cells will die and the replanted tooth will be rejected by the body. In order to keep these cells alive, the tooth must be stored in a nonabrasive environment compatible to the tooth's cells. In addition, the cells of the tooth must not be crushed, chemically treated, or removed in any way during storage.

Knocked-out teeth can be replanted immediately, or after several hours.

Immediate Replantation

1. If the situation warrants, pick the tooth up by the crown, and wash it with a PH-balanced, glucose- and mineral-enriched fluid. If this is not available, use milk or sterile saline.
2. Do not attempt to sterilize, scrape, or dry the tooth in any way.
3. Place the tooth back into the socket from which it came until no more root can be seen.
4. Have the victim bite on a piece of gauze to hold the tooth in place.
5. Take the victim to a dentist as quickly as possible.

Delayed Replantation

Often it is not possible to replant the tooth immediately. Sometimes the patient has other more serious injuries that require immediate attention. Sometimes the victim may be hysterical or unconscious. If this is the case, implement the following plan :

1. The tooth should be placed in a first aid device specially designed for storing knocked-out teeth, called an emergency tooth-preserving system. This device contains a PH-balanced glucose and mineral solution and will store, preserve, protect and rejuvenate any knocked-out tooth for twelve hours until a dentist can replant the tooth.
2. If such a device is not available, the tooth can be placed in sterile saline. Sterile saline, however, will not rejuvenate tooth cells and will only preserve the tooth for one to two hours.

3. As a last resort, the tooth can be placed under the tongue of the victim; however, there is always a great danger of the tooth being swallowed.
4. Tap water, distilled water, or any other fluid should never be used to wash off or store the tooth. This will kill the tooth's root cells.
5. The tooth should never be wrapped in anything that will dry or crush the tooth, such as tissue or gauze. These substances will also kill the tooth's root cells.

Regardless of the method used to store the tooth, the tooth and the victim must be brought to a dentist as quickly as possible. When using milk, saline, or saliva as a means to preserve the tooth, it is important that a dentist be located within one to two hours following the accident.

Follow-up Care

The dentist will institute immediate replantation of the tooth. This consists of replanting the tooth into its socket and splinting it to the adjacent teeth. It is important that the splint stay on no longer than two weeks. Any time longer than this can cause irreversible damage to the tooth root. In addition, the tooth almost always requires a root canal treatment within one week of the accident. This depends upon the age of the victim. If the victim is between 6 and 8 years of age, the dentist may choose to wait.

Teeth can be knocked out anywhere that people are active. Campers are especially prone to this type of accident. Camp personnel can aid in saving knocked-out teeth by being prepared for it. If they are prepared, they can save the victim thousands of dollars in dental bills required to replace the tooth. The victim will also be saved unnecessary pain and suffering.

In order to prepare for such situations, camp personnel should:

1. Inform all campers and personnel that any knocked-out teeth can and should be saved.
2. Inform them of the steps to take should they see a tooth knocked out.
3. Have emergency tooth-preserving systems available where accidents are likely to occur.
4. If emergency tooth-preserving systems are not available, have containers available in which to place a tooth, along with saline or milk.
5. Speak to a local dentist and discuss an emergency treatment strategy for treating knocked-out teeth.
6. Speak to the local hospital and see if they are prepared for such dental emergencies.

Note: The Emergency Tooth-Preserving System is available from Biological Rescue Products, telephone 1-800-882-0505. The creator, Paul R. Krasner, D.D.S., is a dentist in Pottstown, Pa., and is a diplomat of the American Board of Endodontics.

WEATHER

Read the Weather

People who are planning any outdoor activity learn to read the weather so that they won't be surprised by rain, snow, excessive heat or cold, or high wind. Weather changes can cause discomfort, even danger. Fortunately, most people can get the weather information they need from the local newspaper or from television. If, however, you're on a trip of two or more days, you'll have to rely on your own ability to understand potential weather changes. You'll need to know the prospective high and low temperatures, the wind direction and intensity, the amount of cloud cover, the humidity, and the possibility of precipitation.

Weather means daily changes in temperature, humidity, wind, cloud cover, and precipitation. In the United States, most weather comes from the west and moves east. In mountainous areas, however, you may encounter storms caused by changes in air temperature as the elevation increases. These weather changes may be quite different from those in the valley from which you came.

Although some weather signs are easy to read, they don't always mean the same thing throughout the country. For example, cloud formations that foretell rain in the North may mean nothing in the arid Southwest. Thunderhead clouds, however, usually precede storms no matter where they may appear.

In order to understand the weather—and in particular, rain—you need to understand the water cycle and the way in which clouds form. A good way to begin is to perform a simple experiment with cloud formations.

Bring a tea kettle of water to a boil. If you look carefully, you'll see an area of clear air just above the spout and just below the plume of steam. The air that is warmed by the boiling water rises; this air holds moisture from the evaporating water in the tea kettle. As the warm, moist air rises, it cools. Cool air can't hold as much moisture as warm air; consequently, the moisture condenses and forms steam, creating a miniature cloud.

Clouds are like steam, except they are much cooler. When warm air rises from the ground, laden with moisture from rivers, streams, oceans, and plants, it cools, creating clouds. As these clouds rise higher and higher, the air becomes colder and colder. When clouds are so cold that they can no longer hold moisture, that moisture falls back to earth in the form of rain or snow. The probability of rain, then, depends on how moist and how cold the air is.

Most weather systems in the United States come from the Pacific Ocean and move east in convection currents. When air moves east and meets the Cascades, the Sierras, and the Rocky Mountains, it has to rise in order to get over the mountains. As it rises, the air cools, and clouds form. If the clouds are heavy with moisture and the air cools to the point of condensation, rain or snow falls.

After the air crosses a mountain range, it keeps going east, and because the air has already dropped much of its moisture, the eastern side of the

mountain range is relatively dry compared with the western side. Of course, as the air passes over the prairie states, it picks up new moisture rising from fields, lakes, rivers, and forests. Rain falls again when the air is sufficiently cool and saturated.

On the East Coast, the morning sun warms the air along the beaches and continues to warm it as it passes inland. In the eastern mountain ranges, a band of clouds often rises from about 8 to 10 in the morning, accompanied by gusts of wind. The wind is created as the warm air rises over the eastern sides of the mountains. Late in the afternoon, when the sun goes over the western side of the mountains, the air on the eastern side cools and sinks. As the cooling air falls, warmer air rushes down the mountainside after it, causing afternoon breezes from the west. This *diurnal* (daily) sequence of breezes is the natural weather pattern for this area. Stronger winds from the west bring storms and higher wind.

The following sections describe air currents and the water cycle. Try to imagine what happens in your camping area, and you'll start to understand weather.

Humidity

The amount of water vapor in the air is called *humidity.* Relative humidity means the amount of moisture in the air compared with the maximum amount that the air can hold. "Relative humidity of 65 percent" means that the air contains 65 percent of the moisture that it can hold at the current temperature. While humidity isn't necessarily a weather sign, it indicates how comfortable or uncomfortable the temperature is, given the amount of moisture in the air.

Air is like a sponge. Sometimes, a sponge has no moisture; at other times, it's damp, very wet, or so saturated that it can't hold any more moisture. If a sponge is 80 percent full of moisture, it contains more moisture than a sponge that's 60 percent full and less than one that's 100 percent full. When humidity reaches 100 percent, the clouds can hold no more moisture, and the excess moisture falls as rain or snow.

You may be surprised to learn that even while rain is falling, relative humidity may be only 70 or 80 percent. Remember, though, that the cloud above you may contain 100 percent of the moisture it can hold, and the rain may be falling through air that is *not* saturated.

Most scientists agree that relative humidity between 40 and 60 percent is comfortable for most people. (We are always more uncomfortable in extremely high and low temperatures, though, regardless of the humidity.) If the temperature is seventy-five degrees Fahrenheit, you'll be more comfortable when the humidity is between 50 and 60 percent than you'd be if the relative humidity were 20 or 80 percent.

One reason for this is that perspiration evaporates faster when humidity is low than it does when humidity is high. Evaporation helps you stay cool. However, if your body moisture evaporates faster than you can replace it, you may suffer heat exhaustion or heat stroke. If the relative humidity is high, your body perspiration evaporates slowly, making you feel sticky.

Understanding relative humidity, therefore, can help you decide what to wear and the amount of exercise to do, as well as how much drinking water to take along.

Types of Clouds

Clouds formed by rising air currents are classified as *cumulus clouds,* because they're piled up, or "accumulated" formations. Sometimes clouds form without any vertical movement as fog does. These sheetlike formations are called *stratus clouds.* Other kinds of clouds include *nimbus* (rain), *fracto* (broken or fractured), *alto* (middle range) and *cirrus* (ice crystals). Can you think of ways to remember what "nimbus" and "cirrus" mean?

We can classify clouds as being high, middle, or low. *High clouds,* which form in the cold upper part of the atmosphere, are made up of tiny ice crystals. High clouds come in various forms. *Cirrus clouds* are thin, wispy, feathery clouds forming above 25,000 feet; they're often called "mares' tails" because they resemble the tails of horses streaming out in the wind.

Cirrocumulus clouds, which form between 20,000 and 25,000 feet, are rippled and thin. Many years ago, fishermen called these clouds "mackerel scales" because they looked like the scales of the mackerel these men caught off the coasts of New England and Canada. *Cirrostratus clouds,* which are sheets of high-ice clouds, are responsible for the halo you sometimes see around the sun or moon. Light shines only so far through the thin layer of clouds, producing the halo effect.

High clouds are usually followed in a day or two by middle clouds. *Middle clouds* form about 10,000 feet above the earth. They're classified as being either *altostratus* (veils or sheets, with some stripes) or *altocumulus* (patches or layers of puffy clouds). To some people, middle clouds look like cottage cheese.

Middle clouds are usually followed in a day or two by low clouds. *Low clouds,* which form anywhere from just above the earth to about 10,000 feet, are usually sheetlike formations. *Stratus clouds,* which are low clouds that can produce drizzle, are dull gray and resemble fog. *Nimbostratus clouds* are just what the name says they are: rain sheets. They even look wet. If nimbostratus clouds are broken by wind, they'll look broken and are called, logically, *fractostratus. Stratocumulus clouds* are irregular masses of clouds in rolling or puffy layers. These clouds don't produce rain, but they can change into nimbostratus clouds, which may.

Other clouds range from very low to very high. The common thunderheads, or *cumulonimbus clouds,* are good examples. Their bases may be almost on the ground, and their heads may rise to 75,000 feet. The top of a growing thunderhead often looks like a head of cauliflower. Many times the wind at high elevations flattens the top of a cumulonimbus cloud, making it look like an anvil.

Cumulus clouds are puffy clouds with changing shapes. For centuries, people have seen imaginary figures, such as animals, in them. Cumulus clouds are often called "fair-weather clouds," because they form during the day, rise, and disappear at night. You needn't worry about storms when you see cumulus clouds unless they keep growing, becoming cumulonimbus clouds.

Knowing the different kinds of clouds and what they mean can help you enjoy weather patterns and, more importantly, predict the weather. Cloud watchers know when to leave an area, when to expect showers, when a storm may hit, and what to wear on any given day.

Wind

Have you ever wondered how fast the wind is blowing? Many times, you may think the wind is blowing much faster than it really is. One way to check wind speed is to use an *anemometer,* an instrument that measures the velocity of the wind.

If your group is building a weather station, they may want to add this easy-to-build wind direction finder. To build a wind direction finder, you'll need a metal coat hanger, a tin can lid from a number ten tin can, an eyedropper without a bulb, rubber cement or masking tape, a nail, and a wooden dowel.

Start by cutting an arrowhead and a counterweight out of the tin can lid. Then bend the coat hanger so that it's straight, and cut off the badly-bent ends. Next, bend an oval loop in each end of the straightened coat hanger. Use the rubber cement or the masking tape to stick the arrowhead against one loop, and the counterweight against the loop on the other end. Then find the balance point on the straightened coat hanger by resting it on one finger to see at what point it will balance (it won't fall off in either direction). Next, bend a loop, the diameter of your eyedropper, at the balance point, and insert the eyedropper into the loop. Now drive a nail into the top of a dowel and clip the head off the nail. Set the eyedropper down over the nail. You now have a wind direction finder.

Stick the dowel of your wind direction finder in the ground. Then locate north with a compass, and place a peg in the ground on the north side of the wind direction finder. You can also place a peg for east, south, and west. When the wind blows, the arrow should always point to the direction the wind is blowing, But remember, wind direction is always stated by where the wind is coming from.

Thunderstorms

Thunderstorms generally follow a buildup of thunderhead clouds. In the mountains, thunderstorms can be especially severe, because hot air from the valleys rushes up the sides of the mountains and cools dramatically.

Whenever you see thunderhead clouds building up, even if the sky is otherwise clear and blue, be prepared to take cover. If you're on a lake, go to shore at once. If you're on a rocky area on a mountain, retreat to a lower elevation immediately. If you're in a meadow, lie down or go to the edge of the forest. If you're in a forest, take cover under shrubs or low trees. Never stand near the highest tree or the only tree in a field; lightning tends to strike the tallest object in an area.

Water is an excellent conductor of electricity, so you want to avoid it during thunderstorms. Hiding in a crevice in the rocks of a mountain may be safe, but not if water is running through the cracks in the rocks of your hiding place. That water may conduct the electricity to where you are standing.

You'll be safe in an automobile, an airplane, or a steel-frame building. But if you don't have access to any of those places, look for the next safest place: a clump of trees.

The best course of action during a thunderstorm is to get away from high places and water and to seek shelter under small trees until you're sure that the storm has passed. There may be lingering lightning strikes, so don't rush right out into the rain—wait at least twenty minutes. If you don't hear a thunderclap for twenty minutes, you can venture out and go on your way.

Tornadoes

Tornadoes often follow thunderstorms in the Midwest. West of the prairie states (North Dakota to Texas), tornadoes rarely occur. Most tornadoes strike in the lower Great Plains states, although they occasionally occur in the other Midwestern states and in the East.

A tornado moves relatively slowly across the ground, but the winds whirling around in the funnel itself may travel at 300 or more miles per hour, and the speed of the updraft may be 100 to 200 miles per hour. The tornado won't be very wide however, probably about 1,000 feet in diameter.

Signs of an approaching tornado include changes in the sky—it may turn a blackish green—and rising wind. When you observe those signs, seek cover. The safest place is the basement of a building, against an outside wall. When you're on a trip, though, no basement may be available. In that case, look for the lowest place you can find—a gully, a ditch, or a dry river bed. Get away from large trees. Small branches are less likely to cause serious injury if they fall on you, and small trunks are easy to hang on to with both arms.

Your chances of being caught in a tornado are very slight because the storm has a small diameter. Nevertheless, you must be prepared for a tornado and know what to do if one springs up.

Weather Sayings

Before the days of sophisticated weather instruments, pioneers, explorers, sailors, and trappers predicted weather by what the sky and clouds looked like, and they followed the advice given in well-known sayings. Some of these sayings follow:

Red sky in the morning, sailors take warning.
Red sky at night, sailors' delight.

If the sky is red in the morning, a thin layer of cirrus (icy) clouds is blocking the sun. Cirrus clouds are followed by alto clouds, and alto clouds carry rain. Therefore, rain will probably come by nightfall, and possibly a storm during the night. If the sky is red at night, the thin layer of icy clouds is far to the west, where the sun is setting. Weather probably won't be troublesome until the next day or the day after that.

Mackerel scales and mare's tails make lofty ships carry low sails.

This saying refers to those high, wispy cirrus clouds that are the forerunners of storms. When sailors saw these clouds, the storms were closer than when they saw just the red sky peeping through a thin layer of high cirrus

clouds mentioned above. The sailors then lowered their sails so they wouldn't be blown about by the storm.

When swallows fly low over a lake, it's going to rain soon.

When air pressure starts to fall, insects fly closer to the water, and the birds that eat them have to do likewise. Falling air pressure is usually followed by rain. Usually some cloud action verifies this prediction, but sometimes the clouds are too thin to see.

Find some other weather sayings or local ideas and see whether they are accurate or nearly accurate.

Now that you know what makes up the weather, you can try to predict it. You should be able to predict changes in the temperature and cloud cover from day to day. It's equally important, for safety reasons, to be able to predict thunderstorms, tornadoes, heavy rains, and other weather that can cause serious problems for campers.

You can predict the weather fairly accurately for a short time by following cloud cover, from high to low clouds. Try to predict tomorrow's weather, and then check the local newspaper, radio, or television to see how accurate you were.

APPENDIX A—LOW-IMPACT CAMPING QUIZ

☐ True ☐ False 1. In wilderness areas, it's a good idea to use brightly colored tents so your campsite can be spotted in case of emergency.

☐ True ☐ False 2. Low-impact camping standards suggest that cans and other metal containers be burned and then buried.

☐ True ☐ False 3. The maximum size of a party in wilderness areas should be ten to twelve persons.

☐ True ☐ False 4. Meadows and grassy areas are usually the preferred place to camp in a wilderness or primitive area.

☐ True ☐ False 5. Boy Scouts of America national policy prohibits the use of gasoline or other chemical fueled stoves.

☐ True ☐ False 6. To avoid damage to the environment, you should stay no more than a week at one campsite.

☐ True ☐ False 7. It's always a good idea to build a circle of stones to contain your cooking fire.

☐ True ☐ False 8. Your low-impact campsite should be at least 200 feet from trails, lakes, streams, or meadows.

☐ True ☐ False 9. A cathole latrine should be dug in dry, sandy, or gravel soil, at least fifty feet from water, camp, or trails.

☐ True ☐ False 10. Fish entrails should be tossed back into the lake or stream as food for other fish.

☐ True ☐ False 11. Since backcountry is so wide and spacious, loud games, campfire programs, and vigorous activities are unlikely to disturb others.

☐ True ☐ False 12. If trails are muddy, it is acceptable to leave the established trail as long as you parallel it closely.

☐ True ☐ False 13. Wilderness camping is a good opportunity to collect specimens of flowers, plants, and rock samples.

☐ True ☐ False 14. When breaking camp, you should leave a pile of wood at your primitive campsite for the next camper.

☐ True ☐ False 15. "Take nothing but pictures" is an appropriate motto for low-impact campers.

☐ True ☐ False 16. Most typical Boy Scout troops, Varsity Scout teams, and Explorer posts will need some specialized training before qualifying for a wilderness or backcountry camping experience.

☐ True ☐ False 17. It is a good idea to repackage food and other items in lightweight, burnable, or pack-out containers.

☐ True ☐ False 18. Using builders' plastic sheeting as "disposable" tents or flies is a good technique for backcountry camping.

☐ True ☐ False 19. When horses or pack animals are met on the trail, hikers should step off the *lower* side of the trail, stand still, and talk quietly or not at all while the riders and animals pass.

☐ True ☐ False 20. Each wilderness area may have specific rules for its use, and permits are sometimes required for entry.

Appendix B—Answers to Low-impact Camping Quiz

1. **Generally false.** Tents, clothing, and other equipment should be of a color that will blend into the environment. Earth tones, rust, and green are preferred. Red, yellow, orange, and blue are too conspicuous. The idea is for a hiker to pass your camp and not notice it. In some wilderness areas—the Adirondacks, for example—brightly-colored tents are *not* discouraged as campers are monitored by aircraft and bright gear is easy to spot. Check the local standards for the area visited.

   Note: One or two brightly-colored ponchos in the party are a good idea as they can be used as signaling devices and for air rescue panels.

2. **False.** If fires are permitted, it's a good idea to burn flattened cans to remove food scraps, but they must *always* be packed out.

3. **Generally true.** In some wilderness areas the maximum size of a party is limited to as few as six persons. A small group will allow cross-country trails to recover, reduce trampling in the campsite area, produce minimum impact on the land, and be less obvious to other campers and disruptive of wildlife.

4. **False.** Meadows and grassy areas are fragile environments and are easily damaged. Small forested ridges are preferred campsites. The camp will be warmer, less subject to insect pests, and less obvious to other campers.

5. **False.** The Boy Scouts of America policy on chemical fuels states that lighting and refueling of gasoline and liquid-fueled lanterns and stoves must be done under the supervision of, or by, a responsible adult who is knowledgeable in safety precautions and their use. The key words are "adult supervision."

6. **False.** The recommended maximum stay in one campsite is four days, and less is even better. This will assure that grasses and plants are not trampled beyond recovery and that the soil is not compacted.

7. **False.** Rocks are not needed to contain a fire if the ground has been suitably prepared. Smoke-stained rocks are unsightly. If a fire pit is dug, carefully preserve the sod and subsoil. When moving camp, drench the coals with water, remove them from the pit, and scatter them in woods or high grass where they will not be seen. Fill the pit with its original subsoil and replant the sod. Scatter ground litter over the area to further disguise its location.

8. **True.** Camping at least 200 feet from trails, lakes, streams, or meadows will assure that fragile environments are protected, wildlife have access to water, and the campsite is not obvious to others.

9. **False.** Latrines should be dug six to eight inches deep in biologically active soil at least 200 feet from water, camp, or trails. Biologically active soil will assure the speedy decomposition of human waste.

10. **False.** Fish entrails should be buried in the latrine or burned in the fire. If returned to the lake or stream, they are more likely to befoul the water than to serve as food for other fish.

11. **False.** The key to backcountry camping is to draw as little attention as possible to your party. Loud and vigorous activity can be disturbing to other campers, may do considerable damage to the environment, and can be disruptive to wildlife.

12. **False.** If trails are muddy, it's best to wait until they dry out. In no case should a new trail be established. This can lead to a network of parallel trails which is most damaging to the environment.

13. **False.** All flowers, plants, rock samples, and other natural features should be left for the enjoyment of others. If flowers are picked or plant samples collected, seeds will not form and the plants will not reproduce themselves.

14. **False.** The idea is to "leave no trace," and even a woodpile in a primitive site violates that principle. Leftover wood should be scattered conveniently in a realistic manner—the next camper will probably find it. In an established site, it *is* a courtesy to leave a supply of wood for the next party.

15. **True.** The best souvenirs of a wilderness experience are pictures and memories. Leave the wilderness in place for others to enjoy.

16. **True.** Most typical Scout and Explorer camp activities are not appropriate for wilderness or backcountry camping. Special training may be needed. Most Scouts and Explorers will need to be conditioned to accept and enjoy a wilderness or backcountry experience. The traditional vigorous camp activities are best reserved for the Boy Scout camp or youth camping areas in state or national parks and forests.

17. **True.** Repackaging food can save weight, space, and the need for packing out bulky containers.

18. **False.** The temptation to abandon a torn piece of plastic sheeting in the backwoods is too great for many people. Besides, sheeting makes a poor tent. If plastic sheeting is used for groundcloths, be sure each member of the party realizes that "if you carried it in, you'll carry it out."

19. **True.** If the hiker moves to the lower side of the trail, the horse is less likely to spook. If the horse should become frightened, a hiker on foot has less trouble maneuvering than the rider may have in controlling the mount. This is particularly important for pack trains where animals may be tied together. If one animal is spooked over the edge of a trail, it can drag the others with it.

20. **True.** Rules may vary widely from one wilderness area to another. Permits are often required to assure that campers understand the rules and that the number of parties in the area can be kept within reasonable limits. Be sure to check on rules and the need for permits well in advance of the trip. This will avoid the disappointment of being turned away at the trail's roadhead.

APPENDIX C—WILDERNESS POLICY OF THE BOY SCOUTS OF AMERICA

All private or publicly owned backcountry land and designated wildernesses are included in the term "wilderness areas" in this policy. The Outdoor Code of the Boy Scouts of America applies to outdoor behavior generally, but for treks into wilderness areas minimum impact camping methods must be used. Within the outdoor program of the Boy Scouts of America, there are many different camping skill levels. Camping practices that are appropriate for day outings, long-term Scout camp, or short-term unit camping do not apply to wilderness areas. Scouts and Explorers need to adopt attitudes and patterns of behavior, wherever they go, that respect the rights of others, including future generations, to enjoy the outdoors.

In wilderness areas, it is crucial to minimize our impact on particularly fragile ecosystems such as mountains, lakes, streams, deserts, and seashores. Since our impact varies from one season of the year to the next, it becomes important for us to adjust to these changing conditions, as well, to avoid damaging the environment.

The Boy Scouts of America emphasizes these practices for all troops, teams, and posts planning to use wilderness areas:

- Contact the landowner or land-managing agency (Forest Service, National Park Service, Bureau of Land Management, U.S. Fish and Wildlife Service, state agency, private, etc.) well in advance of the outing to learn the regulations for that area and to obtain required permits and current maps.
- Always obtain a tour permit (available through council service centers), meet all conditions specified, and carry it on the trip.
- Participate in training for adult leaders in low-impact camping or be proficient and experienced in the leadership and skills required for treks into wilderness areas.
- Match the ruggedness of high-adventure experiences to the skills, physical ability, and maturity of those taking part. Save more rugged treks for older youth members who are more proficient and experienced in outdoor skills.
- Limit the size of groups generally to no more than eight to eleven persons, including at least one adult leader (maximum: ten persons per leader). Two leaders per group is best. Do not exceed the group size if one has been established for the wilderness area. Organize each group (patrol, team, or crew) to function independently by planning their own trips on different dates, serving their own food, providing their own transportation to the trailhead, securing individual permits, and camping in a separate and distinct group. When necessary to combine transportation and planning or buying, small groups should still camp and travel on the trail separately from other groups of the same unit.
- Conduct pre-trip training for the group that stresses proper wilderness behavior, rules, and skills for all of the potential conditions that may be encountered.
- Use backpacking stoves, particularly where the fuel supply is limited or open fires are restricted. Supervision by an adult knowledgeable in the use of the stoves must be provided. If a fire is necessary, keep it as small as possible, and use established fire lays where available if in a safe area. After use, erase all signs.
- Emphasize the need for minimizing impact on the land through proper camping practices and preserving the solitude and quietness of remote areas. Camp at low-use areas—avoid popular sites that show signs of heavy use.
- Leave dogs, radios, and tape players at home.
- Use biodegradable (not metal or glass) or plastic food containers. Carry out unburnable trash of your own and any left by others.
- Dig shallow holes for latrines and locate them at least 200 feet from the nearest water source. Cover the latrines completely before leaving.
- Wash clothes, dishes, and bodies at least 200 feet from any source of natural water.
- Where a choice is available, select equipment in muted colors that blend with natural surroundings.
- Look at and photograph; never pick or collect.
- Follow trail switchbacks and stay on established trails.
- Treat wildlife with respect and take precautions to avoid dangerous encounters with wildlife. Leave snakes, bears, ground squirrels, and other wildlife alone.

APPENDIX D — OUTDOOR CODE

As an American, I Will Do My Best to—

Be clean in my outdoor manners. I will treat the outdoors as a heritage. I will take care of it for myself and others. I will keep my trash and garbage out of lakes, streams, fields, woods, and roadways.

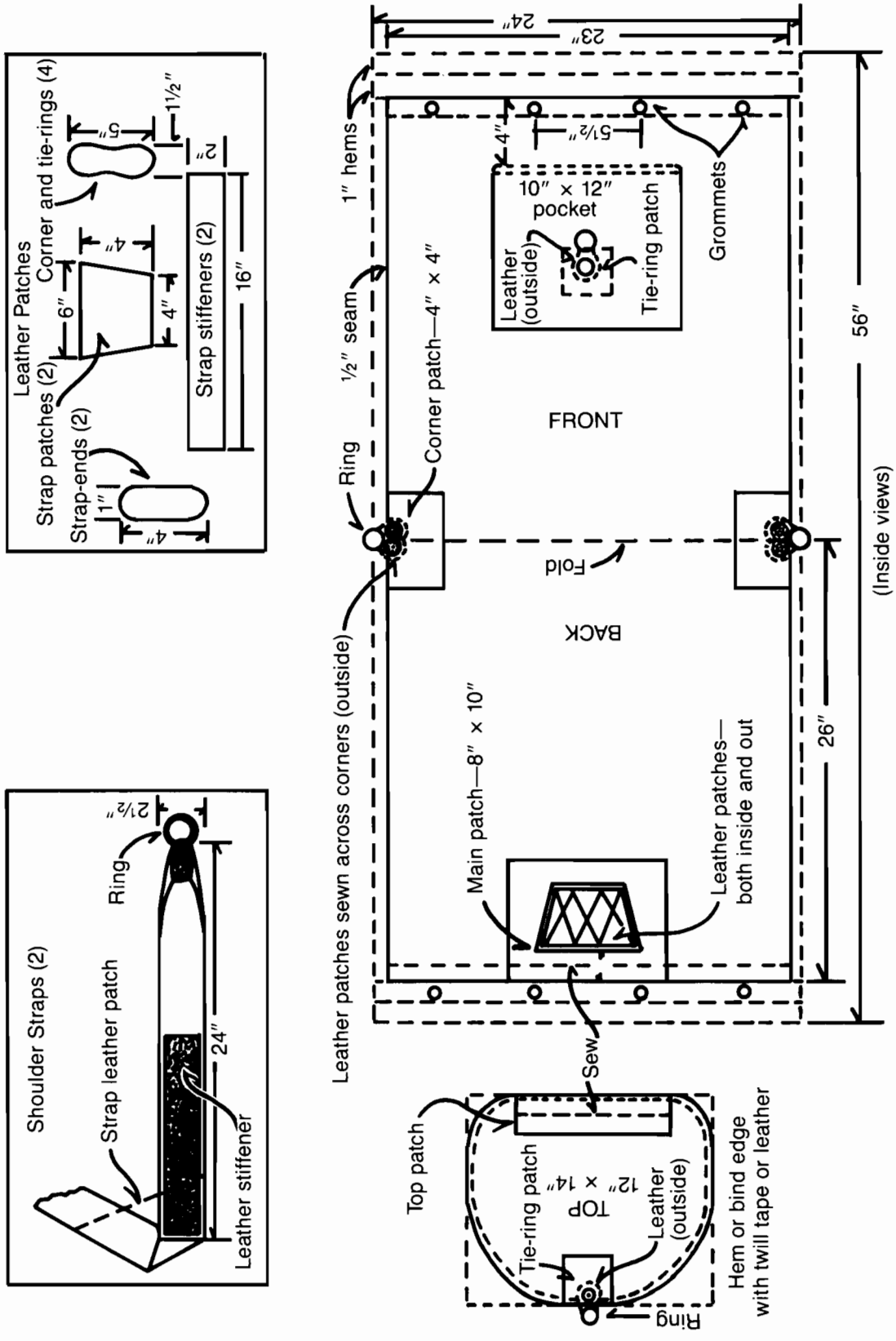
Be careful with fire. I will prevent wildfire. I will build my fires only where they are appropriate. When I have finished using a fire, I will make sure it is cold-out. I will leave a clean fire ring, or remove all evidence of my fire.

Be considerate in the outdoors. I will treat public and private property with respect. I will use low-impact methods of hiking and camping.

Be conservation-minded. I will learn how to practice good conservation of soil, waters, forests, minerals, grasslands, wildlife, and energy. I will urge others to do the same.

APPENDIX E—EQUIPMENT

Litepack



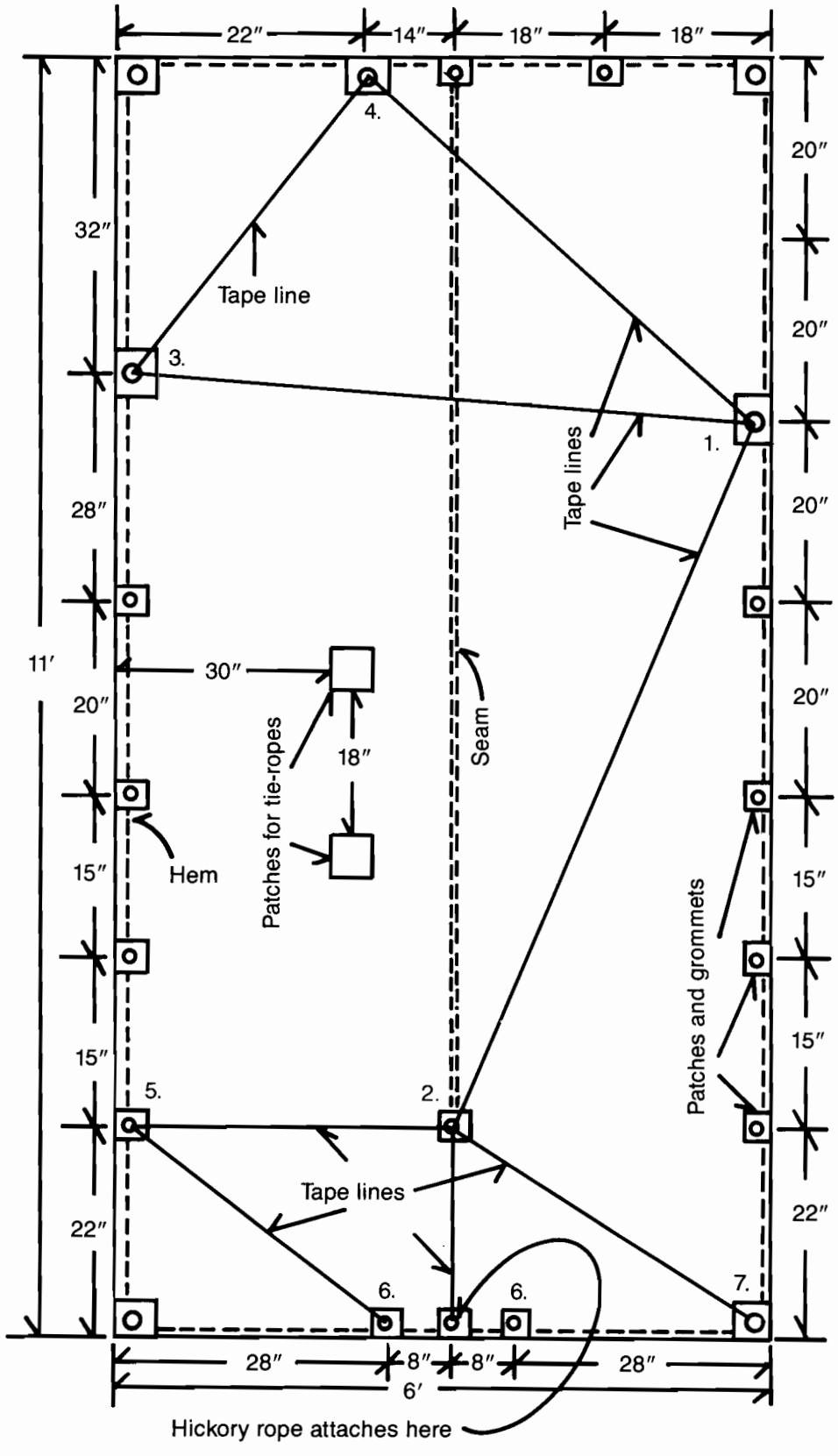
Hickory Tent

MATERIALS NEEDED

7⅔ yd. light canvas or muslin, 36 in. wide
12 yd. twill tape
22 grommets
35-ft. rope (awning cord is best)
Dye (brown or green)
Waterproofing

STEPS IN MAKING

1. Lay out material and cut.
2. Sew into 6-by-11-ft. rectangle.
3. Mark and sew on tapes.
4. Sew on patches.
5. Sew hems.
6. Set grommets.
7. Attach ropes.
8. Go camping!



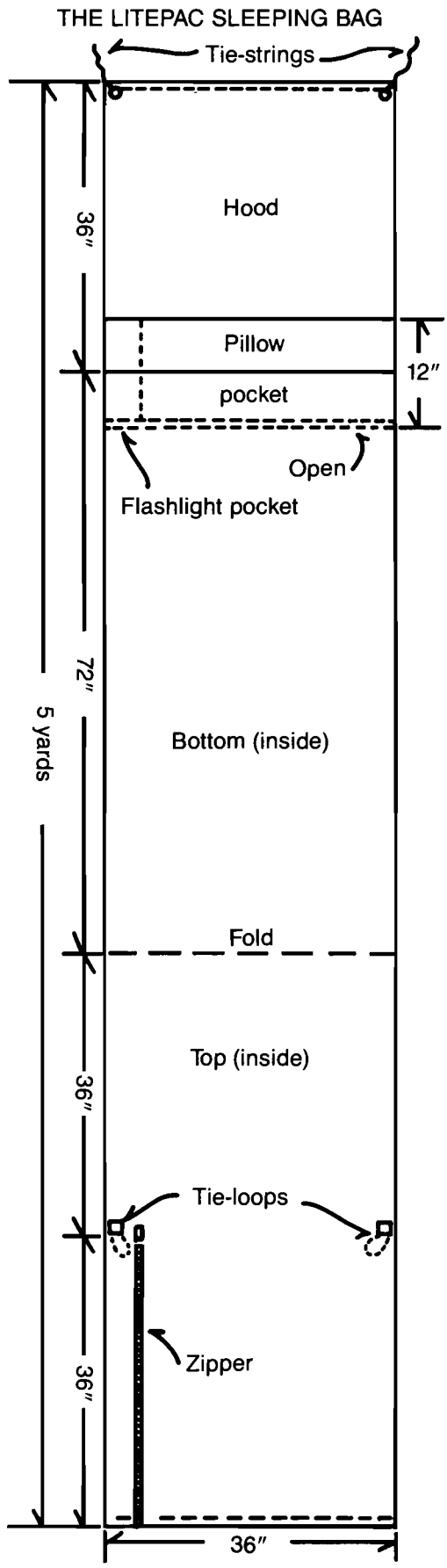
Sleeping Bag

MATERIALS NEEDED

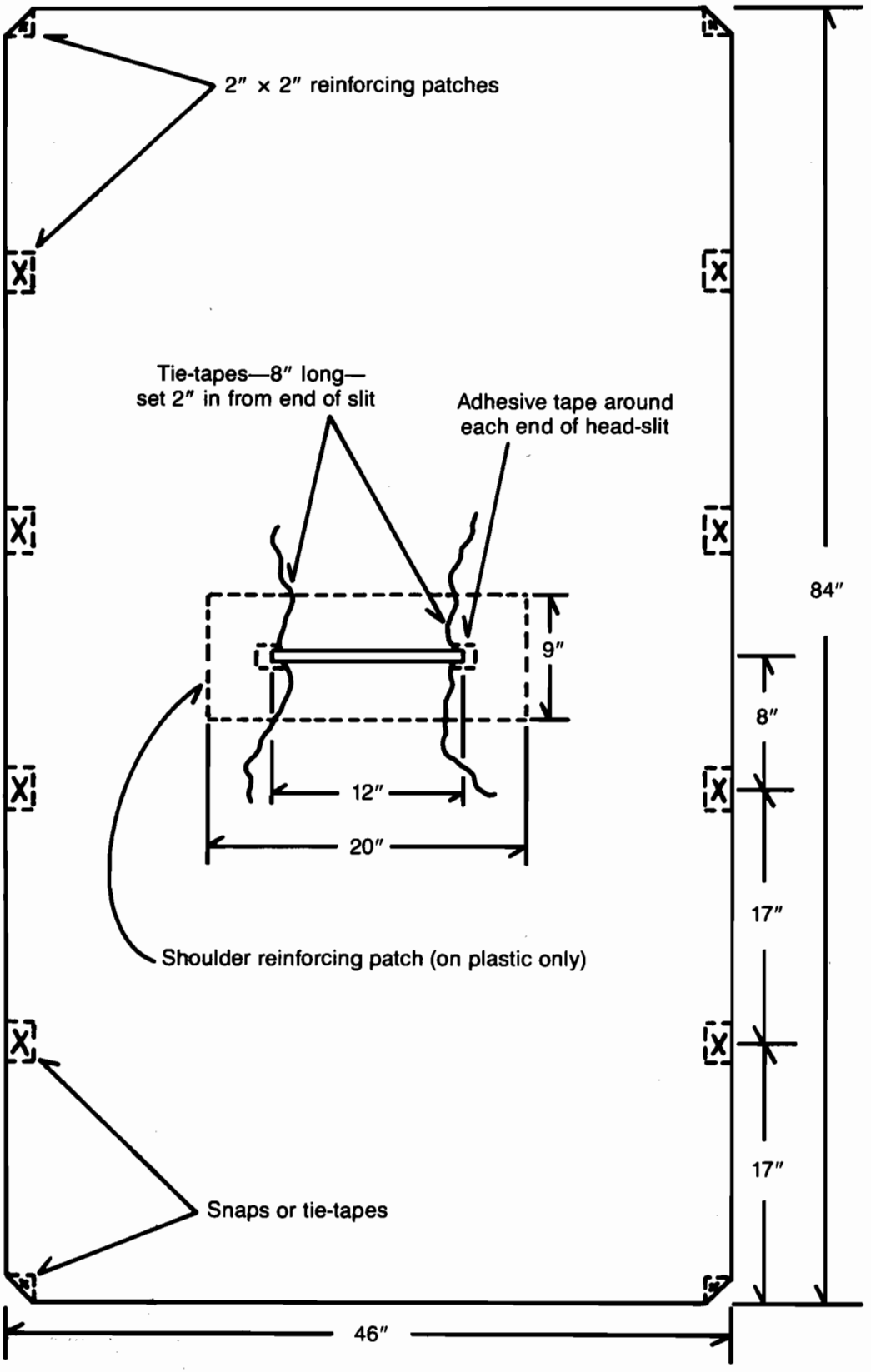
5⅓ yd. poplin or light canvas
1 zipper, 36 in. long
4 ft. of twill tape
Waterproofing
Dye (to be applied before step 1)

STEPS IN MAKING

1. Lay out material and hem ends.
2. Sew in zipper.
3. Sew in pillow bag and flashlight pocket.
4. Fold material and sew up sides.
5. Put in tie loops and tie strings.
6. Waterproof bottom of bag and hood (not top).
7. Go camping!



Groundcloth Poncho



Cruiser Tent

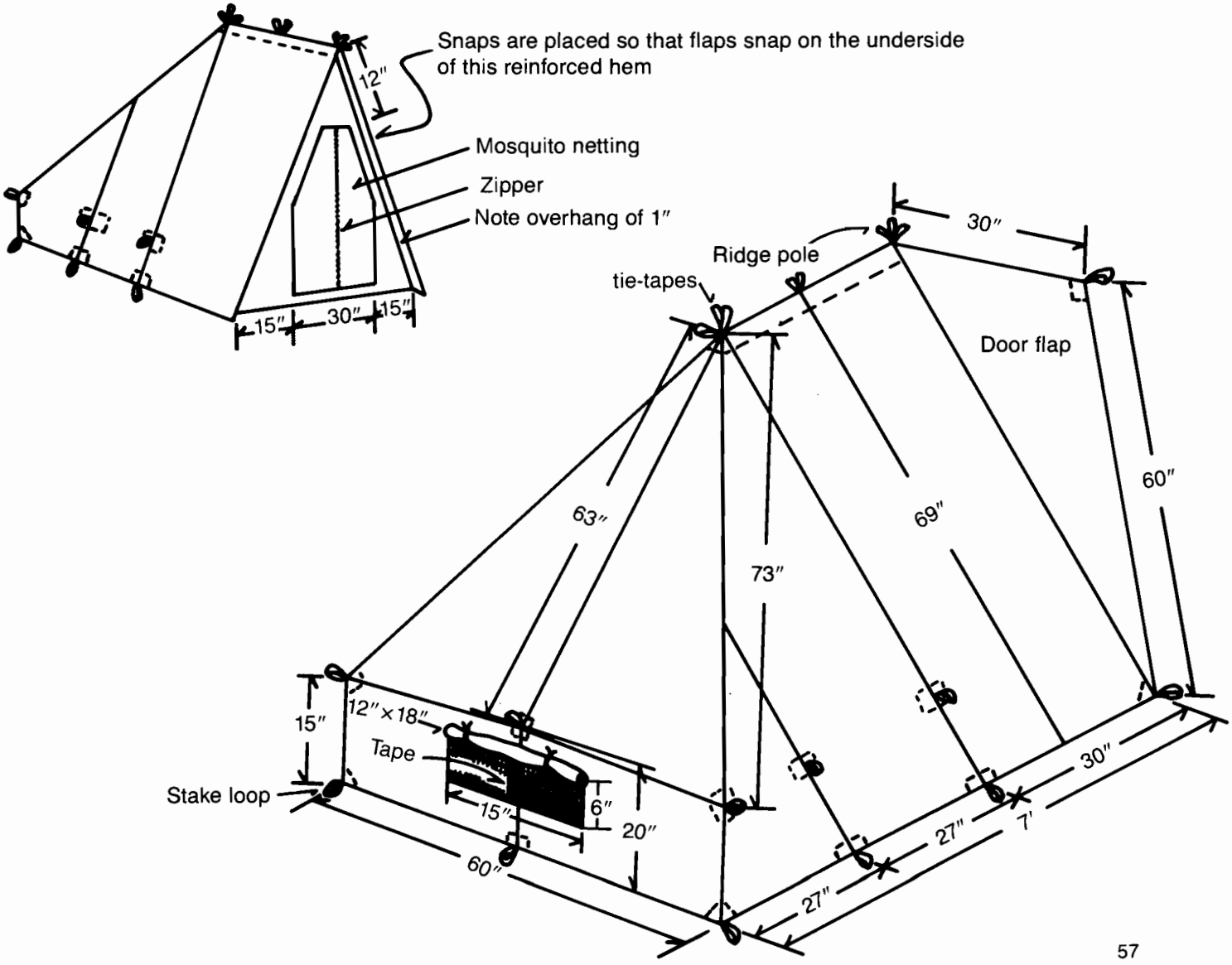
GENERAL INSTRUCTIONS

Here are a few tips on construction:

1. All seams are "flat-fell" type—two pieces of material sewn hooked into each other.
2. Use 1-inch hems. It is important to cut all hems at least 1 inch on all sides. Dimensions shown are finished sizes.
3. Reinforce stress lines with twill tape.
4. Reinforce points of stress with patches sewn to tent at least 2 inches out from the point of stress in all directions.
5. Space snaps 6 inches apart. Use the tent before installing snaps—to allow for stretching.
6. Sew door netting at the top and sides. It should be loose on bottom. Sew a 6-inch extension on the bottom of the net. The doorsill is stiffened with sewing or extra cloth.

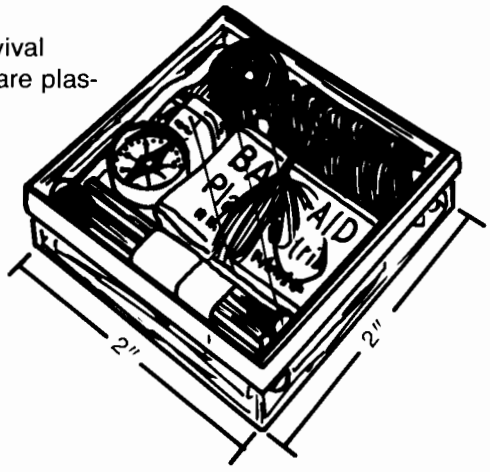
MATERIALS AND TOOLS

17 yd. of good lightweight cotton cloth
51 yd. of ¾-in. twill tape
6 spools of heavy-duty thread
48 snaps
Dye, if desired
Waterproofing
40 ft. of light nylon or cotton line (rope)
Tent poles—interior, "T" tent pole with 29-in. ridge; exterior, two 7-ft. shear poles with 3-ft. ridge; three 30-in. dowels for rear poles
Sewing machine (electric portable will do)
Scissors
Measuring tape
Straightedge
Marking pencil
Snap-fastener installing kit

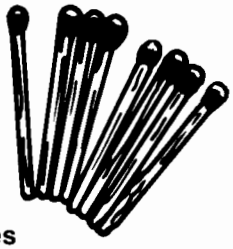


Survival Kit

You can fit all these vital survival necessities into a 2-inch-square plastic or metal container.



Adhesive Bandages
Plastic type for better sticking. Roll or fold tightly. Secure with cellophane.



Matches
Important! The camper's number one tool. Waterproof them with shellac or nail polish.

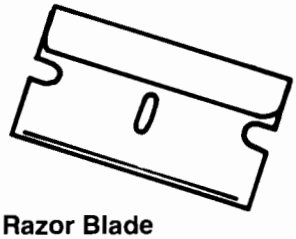
Compass
This won't find your camp for you, but it will keep you on a straight line.

Adhesive Tape
Eighteen inches of ½-inch tape. Roll tightly on a matchstick.

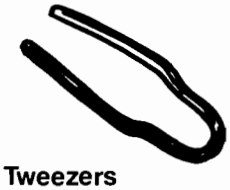
Fish Hooks and Lures
Medium-sized trout fly or streamer or foil for lure. Hooks will influence compass.

Gauze Pad
Two-by-two-inch square; fold to fit, but don't break paper. Keep this sterile.

Snare Wire
Fifteen feet of No. 32 soft copper wire for snares.



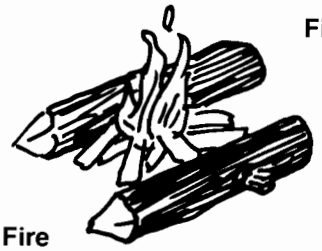
Razor Blade
Not meant to replace your knife, but useful. Single-blade type.



Tweezers
Make from a big cotter pin. Cut to fit, then file sharp, and spread points.

Fish Line and Sinkers
About 20 feet of 15-pound line; wind tightly. Split-shot sinkers.

Firemaking—An Essential for Survival



Hunter's Fire
A good, lasting fire. Use green logs for sides. Line up into the wind.

Rock Fire
Excellent for a semi-fixed camp. One of the best types of fires.