

Camping & Backpacking Gear Essentials

Introduction

This guide is a collection of information useful in understanding some of the technical aspects in the selection of light weight camping and backpacking gear. Where appropriate, comments specific to BSA Scouting needs are given. The content is largely compiled from information available from various Internet web sites. Of specific value for illustrations was *REI's Learn & Share* section. A focus of this guide is to provide a basic understanding of issues behind the selection criteria of a variety of camping, hiking & backpacking gear.

The reason you carry gear is to help you feel **comfortable, secure and content** in the backcountry. Making the wrong choice can compromise these objectives and can even cause unsafe situations. How much is enough? It depends on your individual standards of comfort, security and contentment. How can you know what those are? Take a hike, get some experience, ask friends for advice - educate yourself about what factors are most important to you in the outdoors. Equip yourself accordingly. I hope this guide will help you do just that.

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The Backcountry!

Get out there...

Hawksbill Crag –
Buffalo River, Arkansas



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Overnight Backpacking Checklist

The 10-Plus Essentials

The original "10 Essentials" list began appearing in mountaineering literature in the 1950s and '60s, but contemporary environmental factors have prompted the addition of sunscreen and a water filter. The list now also includes a GPS receiver as an option to consider.

We have also added a whistle, believing it is a crucial security item to keep handy when exploring unpredictable terrain. A whistle will last far longer than your vocal chords. Our last item, a food-storage device (such as a bear canister), is now required in some western parks and wilderness areas and is very helpful in any area where animals are known to seek out human food.

1. Map (in a watertight case)
2. Compass (plus an optional GPS receiver)
3. Extra clothing (men's, women's, kids')
4. Extra food and water
5. First-aid kit
6. Headlamp or flashlight (with extra batteries)
7. Matches (storm proof, or in a watertight container) & Fire starter
8. Knife (or multi-use camp tool)
9. Sunglasses
10. Sunscreen
11. Water filter (or other method of water treatment)
12. Whistle
13. Food storage device

Your Checklist

The 10+ Essentials

- ☐ Map of area (in waterproof case)
- ☐ Compass
- ☐ Extra clothing layer(s)
- ☐ Drinking water & Food
- ☐ First-aid kit
- ☐ Headlamp or flashlight (with extra batteries/ bulbs)
- ☐ Matches (in waterproof container) and fire starter
- ☐ Pocket knife (or multi-use camp tool)
- ☐ Sunglasses (with retaining strap)
- ☐ Sunscreen
- ☐ Water filter (or other method of water treatment)
- ☐ Whistle
- ☐ Food storage device

Choose items that match your trip plans and the expected weather conditions.

Hiking Clothing

- ☐ Quick-drying pants/shorts
- ☐ Fleece jacket or wool sweater
- ☐ Short-sleeved shirts
- ☐ Wicking long underwear (top/bottoms)
- ☐ Long-sleeved shirts
- ☐ Regular underwear
- ☐ Warm pants (fleece or wool)
- ☐ Quick-drying swimsuit
- ☐ Fleece or wool vest

Outerwear

- ☐ Rainwear (top/bottoms)
- ☐ Fleece or wool gloves/mittens
- ☐ Wide-brimmed rain/sun hat
- ☐ Waterproof gloves/overmitts
- ☐ Warm hat (fleece or wool)
- ☐ Bandanna

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Footwear

- ☐ Hiking socks
- ☐ Extra laces
- ☐ Wicking liner socks
- ☐ Gaiters
- ☐ Hiking boots/shoes that match the terrain

Camping Gear

- ☐ Backpack
- ☐ Funnel
- ☐ Day/summit pack
- ☐ Matches/lighter
- ☐ Pack cover
- ☐ Cook set, dishes
- ☐ Tent, tarp or bivy sack
- ☐ Cooking/eating utensils
- ☐ Rainfly
- ☐ Drinking cup
- ☐ Tent stakes
- ☐ Pot grabber
- ☐ Footprints
- ☐ Biodegradable soap
- ☐ Tent broom
- ☐ Pot scrubber/dish towel
- ☐ Sleeping bag (in waterproof stuff sack)
- ☐ Plastic garbage bags
- ☐ Compression sack
- ☐ Resealable plastic bags
- ☐ Sleeping pad
- ☐ Water filter/purifier
- ☐ Sit pad or sleeping pad chair kit
- ☐ Water-purification tablets
- ☐ Extra nylon stuff sacks
- ☐ Water bottle(s)
- ☐ Food (adequate supply for your trip)

- ☐ Collapsible water container
- ☐ Stove and fuel
- ☐ Lantern

Personal Items

- ☐ Toilet paper
- ☐ Lip balm (with sun protection)
- ☐ Toothbrush and toothpaste
- ☐ Insect repellent
- ☐ Small bath towel
- ☐ Head net
- ☐ Brush/comb
- ☐ Trowel
- ☐ Other personal toiletry items

Other/Extras to consider

- ☐ Altimeter
- ☐ Repair/sewing kit
- ☐ Binoculars
- ☐ 100-foot accessory cord
- ☐ Field guides
- ☐ Axe/saw
- ☐ Camera and film
- ☐ Money
- ☐ Notebook and pencil
- ☐ Photo ID
- ☐ Travel games
- ☐ Camping/fire permits, if needed
- ☐ Watch/alarm clock
- ☐ Fishing license
- ☐ Weather radio
- ☐ Trip Plan (left with a responsible friend)
- ☐ Hiking poles

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Tents

The Standard:

Three-season hikers who stick to forest campsites should consider a 2-to-3 person tent with two or three poles, plentiful mesh, and a vestibule that shelters the main entrance. Factory seam taping, a bathtub floor, and a full-coverage rainfly are desirable features, as is a trail weight of less than 10 pounds.

Variables:

Do you often hike in nasty weather? Look for a big vestibule (or two) for storage and cooking also, a tent with ample headroom height will be more comfortable during long rainy days.

1. Pick a tent equipped to withstand the harshest conditions you might encounter. Example: If you're a three-season backpacker who hikes late into the fall, you might want a four-season tent or a convertible model.
2. Four-season tents are roughly 10 to 20 percent heavier than three-season models (typically due to extra poles). Convertible tents allow you to add or omit poles as conditions dictate.
3. Freestanding tents (those that can stand without the aid of stakes) are very handy. You can move them easily or lift them to shake out debris. Very lightweight tents are rarely freestanding.
4. Capacity ratings, assigned by individual manufacturers, tend to be optimistic. A two-person tent may be a tight squeeze for two adults.
5. Always use a tarp, ground cloth or footprint to extend the life of a tent's floor.

Types of Tents

Backpacking tents fall into two general categories: three-season (general backpacking) and four-season (winter/mountaineering) models. Here's a look at how tents differ:



Lightweight **three-season tents** are intended for spring, summer and fall usage in temperate climates. They perform well in wind and rain, though their designs are not suited to handle significant snow loads. A three-season model won't collapse if two inches of snow fall on it, but 20 inches could be a problem.

Super-sturdy **four-season tents** usually integrate one or two additional poles into their designs to fortify walls and help them stand firm against severe wind or heavy snow loads. Winter tents feature some type of rounded dome design, thus eliminating flat spaces on a tent's rainfly where snow can accumulate. Of course, these winter/mountaineering tents work just fine during mild conditions. Their extra poles will make them a touch heavier compared to the three-season model.

Convertible tents are four-season models that can be converted into three-season tents. This usually involves shedding one or two poles from the tent's four-season design. Models may also offer zippered panels that can be opened during milder conditions or feature a detachable vestibule.

Warm-weather tents are lightweight shelters, usually designed for one or two people, which feature large mesh walls for superb ventilation. They can be used in three-season settings, but their special appeal is their usefulness in warmer, humid climates.

Single-wall tents are designed with the minimalist in mind. Essentially, they are rainflies equipped with a few vents you can zip open during warmer conditions.

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Bivy sacks are minimalist solo shelters that offer little space for anything but you and your sleeping bag. If saving weight is your chief priority, a bivy is worth considering. If you like room to move inside your shelter, look elsewhere.

Sleep screens and tarp tents are ultra light shelter options. Sleep screens, including screen houses, are useful in warm conditions and offer mesh coverings, some fully enclosed, some not, to keep occupants shielded from bugs, but not rain. Tarp tents offer minimalist shelter, at a minimal weight, for three-season usage.

Family tents and shelters can accommodate large groups (between four and six usually, sometimes more). Dome-style models can be transported into the backcountry, as long as group members are willing to carry a share of the load; house-like models are intended for campgrounds and basecamps.

A Few Terms Explained

- **Dome Tents:** Most four-season tents involve some form of rounded, geodesic-dome design. Domes avoid flat spots and shed snow more easily. They stand strong in the wind and provide generous interior headroom.
- **Tunnel Tents:** Many three-season models use this narrow, linear design, typically involving a rectangular floor plan. Also called hoop tents, these models use fewer poles, less fabric and often have wedge-like shapes. Their rainflies, which lie flatter, can collect snow. A heavy snow load could flatten them.
- **Freestanding Tents:** Domes are freestanding, meaning they do not require stakes in order to stand up. You can pick up a freestanding tent (it's like a huge beach ball) and move it to a different location. You can also easily shake it out before you disassemble and pack it.

Which Type is Right for You?

Questions worth asking:

Q: What times of year will you use your tent?

- Winter campers need a four-season tent, period. If you have an Arctic expedition in mind, consult with people who have already made such trips and get their advice.
- If you're a three-season hiker who heads out in March or tries to squeeze in late trips in October and November, give yourself an extra buffer of security - get a four-season tent or at least a convertible.
- If you're a recreational traveler and do the bulk of your camping between May and September, choose a three-season model.

Q: How many people usually travel with you?

- Do you consistently travel with a partner? You need at least a two-person tent. Are the two of you large people? You might need to bump up to a 2-to-3-person model or even a three-person tent.
- Does your group size vary? You'll probably need more than one tent to fulfill your needs. If your budget is tight, buy the size that fits most of your trips; when your group size changes, rent a tent.
- If you're sharing a tent at the end of the day, share the load as you hike. Someone can carry the poles, another person the rainfly, and so on. A multi-person tent should weigh about four pounds per occupant.
- Do you travel solo? If you demand lots of space, look for a compact two-person model. If you count every ounce, select either a bivy or a very light one-person tent.

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Q: Won't a cheap tent from a discount store work just as well as a brand-name model?

- Department-store tents are typically mass-produced items that direct less attention to details. Example: Examine the stitches of a quality tent. You'll find a greater number of stitches per inch in that tent than you'll find in the discount tent. This means a stronger tent is at work for you when the weather turns nasty. Quality tents use high-grade aluminum poles. Bargain tents often rely on fiberglass poles, which are less shatter-resistant.
- Inexpensive tents use large panels of coated nylon on their canopy (side walls). That material is not breathable, so if it's a balmy night, you might swelter inside.

Understanding Tent Specifications

Suggested use: Descriptions include "general backpacking" (good for spring, summer and fall usage in temperate climates) and "Winter/mountaineering" (good for harsher weather conditions; designed to shed snow loads). Basically, winter/mountaineering tents are good any time of year - which is why they're also called "four-season tent's - yet are capable of withstanding severe weather conditions, even for prolonged periods. General backpacking tents, or three-season tents, are intended for non-winter use in weather that can be nasty but rarely extreme.

Average minimum weight: The total weight of the body, rainfly and poles only - the bare essentials. It is the weight you should use for comparative purposes when buying a tent.

Average packaged weight: The total weight of all tent components: body, rainfly, poles, stakes, stuff sack, pole sack, instruction book, and any additional items a manufacturer may include.

Sleeping capacity: The number of adults that manufacturers estimate can sleep comfortably inside their tents. Sometimes these numbers are a bit generous.

Floor dimensions: A tent floor's maximum measurements, shown in inches. The first number is length; the second is the crucial one - width. Thus a measurement of 98" x 60" means a tent is 98 inches from head to foot and 60 inches wide at its widest point. Keep in mind that tents often have a tapered design, so a tent with a 60" maximum width may actually be much narrower in the foot area.

Peak height: The maximum interior height. This tells you how much room you have to sit up inside a tent. Roughly 42" to 48" is typical.

Floor area: The square footage of a tent's interior.

Vestibule area: The square footage of the ground covered by a tent's vestibule. A vestibule is an extension of the rainfly that, when staked out, shields a section of ground outside a tent's door. Protected from rain, it's a good place to store your backpack and boots overnight.

Packed size: The size of a folded and rolled tent when stored inside its stuff sack. A reference to 7" x 24" means a tent's packed size is 7" in diameter, 24" long.

Pole material: Two options are customarily available: aluminum (preferred for its strength and durability) and fiberglass (less expensive option). Easton aluminum poles are highly regarded. Both aluminum and fiberglass tent poles are almost always hollow and are usually linked by long elastic cords. These are known as "shock-corded" poles. These are popular because they make pole assembly a quick process. Some inexpensive tents sold in discount store use solid fiberglass poles. Solid poles can easily split or break when stressed.

Number of poles: More poles give tents added rigidity and stability. Winter/mountaineering tents, designed to stand up to brutal weather, typically have more poles (at least three) than general backpacking tents. Extra poles, of course, mean extra weight.

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Rainfly fabric: Typically this is coated (waterproof) nylon taffeta, a heavier, more abrasion-resistant fabric than used for the canopy.

Canopy fabric: Most often this is ripstop nylon, a lightweight fabric where every quarter-inch or so the nylon weave is reinforced, creating a tiny checkerboard appearance.

Floor fabric: Again, this is most often coated (waterproof) nylon taffeta - a heavier fabric designed to withstand abrasion.

Doors: The number of doors a particular model offers. An extra door gives people an optional entry/exit point - a nice feature if your companion is snoozing and you want to step outside. Single-door tents usually have doors placed at the head of a tent. A side entrance on a single-door tent may be awkward if one person wants to leave without disturbing the other. Tents with more than one door are usually more expensive.

External guy points: The number of guy points (or lash points) on a tent's rainfly. You use guy points, guy lines and stakes to establish tautness in your rainfly during bad weather. Doing so helps your rainfly shed water effectively and prevents it from sagging and touching the uncoated tent canopy. (If the two touch, moisture could get inside the tent.) Guy points are reinforced loops of webbing stitched into the edge of a rainfly.

Guy lines included: Indicates whether or not the manufacturer includes guy line with the tent.

- **Using guy lines and guy points:** Procedure: 1) Attach guy lines to guy points; 2) pull the rainfly taut by stretching it out and away from the main tent body; 3) tie the lines to stakes and drive them into the ground, maintaining tension on the rainfly and the lines. Rainflies usually include at least two guy points, sometimes more. Do not stretch a rainfly too tightly; it could weaken stitch points or distort the weave of the nylon.

Pole diameter: In backpacking tents, a common diameter is 0.34 inches.

Seam sealer included? Some manufacturers include a bottle or tube of seam sealer, which you apply to your tent's rain-exposed seams at home - *before* you use it in the field.

- **Why must seams be sealed?** Wherever panels of fabric have been stitched together, the sewing process generates thousands of tiny needle holes. In areas exposed to moisture - the rainfly, the tent's floor - water could work its way inside your tent through these holes. You might think: "Oh, come on; those holes are too tiny to matter." Trust us - anyone who has spent a rainy night in a tent with unsealed seams *knows* how much water can find its way inside via those little holes. To prevent this, you must "seal the seams" - plug the holes - with a product that resembles liquid cement. It is, we admit, a laborious exercise. Happily, more and more manufacturers are offering "factory-sealed seams" - usually a strip of tape stretched over seams and heat-bonded to the fabric. It's an attractive, time-saving bonus worth a few extra bucks if a manufacturer offers it.

Tent Capacity

Manufacturers classify their tents according to sleeping capacity: solo tents, two-person tents, three-person tents and so on. You'll also find references to items such as 1-to-2-person tents or a 2-to-3-person model.

Mountaineering & Backpacking tents

Solo (1-person) tents: Personal, lightweight shelters for the rugged individualist - and not another soul. You'll find no fudge factor for extra space in this minimalist category, which includes bivy sacks. Examples: REI SoloLite, Walrus Micro Swift.

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1-plus or 1-to-2-person tents: These are shelters with enough space to provide a spacious shelter (at a reasonable weight) for a solo hiker and a snug fit for 2 people. Examples: Sierra Designs Clip Flashlight CD, Moss Starlet.

2-person tents: The most popular size in backpacking tents, with plentiful choices. Designs can vary widely, so seek out one that offers a combination of features that appeal to you. Examples: Walrus Rapeede XV, Sierra Designs Orion CD.

2-to-3-person tents: These are 2-person tents cut wider and often taller to provide extra elbow room for its inhabitants. In a pinch, you could squeeze in a third person; it's unlikely, though, you would want to do this on a regular basis. These models can make good choices for parents with a small child. Examples: REI Trail Dome, North Face Nebula.

3-person tents: If your trail party is consistently a threesome, these models are custom-fitted for your needs. Or, if you have a 2-person party and you simply prefer loads of room inside a tent and don't mind carrying a little extra weight, these models offer a luxurious amount of space. Examples: Moss Little Dipper, North Face Stratos.

4-person tents: Compact, low-profile group backpacking tents designed to be split up and carried by all members of the party. They typically weigh between 13 and 16 pounds. These also make good car-camping tents for those who want to avoid the bulk of a traditional cabin tent and don't mind a tent where you can't stand up. Examples: Kelty Vortex 4, Sierra Designs Stretch Prelude.

Family tents: A few models, such as the Moss Base Camp Titan, are huge backpack-styled tents (small-diameter poles, lightweight fabrics) that can be transported in the wilderness by several people who share the load. Standard family tents, meanwhile, use inch-thick poles and heavy-duty materials that are great for drive-in campgrounds. A favorite for the scouting youth is the Eureka Timberline 4.

Getting a Good Fit

How do you know if a tent is a good fit - physically - for you?

Here's one technique, not perfect, but certainly useful. To help you envision how you might fit into a tent: Measure your backcountry sleeping pad and use its dimensions as a general guide when you consider a tent's measurements.

- **Example:** The popular Therm-a-Rest standard model from Cascade Designs is 72" long and 20" wide. Width is the crucial measurement. To fit two people inside a tent, you will thus need at least 40 inches of width to feel even marginally comfortable - if you don't mind sleeping close. If you need a few inches of separation, then add a couple of inches to your measurement. If you thrash around a lot at night, you might need to add several inches.

Compare your numbers with the **floor dimensions** provided with each tent. That gives you some idea of how snug, or spacious, a tent might feel. Floor dimensions, of course, indicate only the maximum width a tent offers, typically the spot where your shoulders lie. Tents often taper in the foot sections, and walls angle in toward the ceiling. All of this impacts the amount of space found inside a tent's walls. Roomy tents are nice, but tend to weigh more.

Additional Considerations

Weight: As a general rule, a group tent should weigh no more than four pounds per person. Some 1-person or 1-plus tents exceed that guideline - understandable because a solo hiker will be toting all tent components (stakes, poles, etc.) on his or her own.

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Pole sleeves or clips? Poles hold the tent's canopy upright and give you space to move around inside. Poles connect to the tent in one of two ways - via sleeves or clips. Some tents have "continuous" pole sleeves, meaning you don't have to thread poles through multiple sections of smaller sleeves. It makes tent setup a little easier and speedier. Clips are a breeze to use. They generally provide a larger gap between the rainfly and canopy, which helps minimize condensation on the body of the tent. Sleeves are considered more stable.

- **Note:** In damp or wet conditions, avoid letting your tent canopy touch the rainfly. If it happens, count on moisture invading your tent space at that point. Use guy lines to keep it taut.

Ventilation: On balmy or humid nights, you want your tent to encourage air flow. If you frequently hike in warm-weather environments, consider tents that offer plenty of mesh openings to take advantage of nights when you don't need a rainfly.

- **Note:** Ventilation is one reason why you want to buy a quality backpacking tent. Inexpensive **department store tents** offer very little, if any, breathable fabric on their canopy walls. If you're inside such a tent on a mild night, your body heat can turn it into a sauna and leave you sweltering. These tents may also include lower-quality poles and irregular, mass-production stitching. Their low prices are head-turners, true, but their durability is suspect. These tents may be fine for backyard campouts, but not for long-term trips into the backcountry.

Pole sections: Length is a factor to some people. Shorter sections are handy, making it possible to pack a rolled tent in a more compact spot inside your pack. Long poles often must be carried vertically while strapped to the outside of your pack.

Shape: Domes are the most popular shape in tents these days. Their symmetric design, strength-to-weight ratio and relative ease of assembly has endeared them to the camping and hiking masses. Weight-saving designs, particularly wedges, have also remained popular.

Ground cloths: Many manufacturers are now creating "footprints" of their tents - customized ground cloths tailored to fit specific tent models. Most come with attachment points that connect them to the tent. Both footprints and traditional ground cloths/tarps help shield a tent's floor from abrasion and, in the morning, offer you a dirt-free place to roll up your tent. It's smart to carry one.

Extras: Look for helpful nuances such as inside wall pockets (very nice to have), gear lofts, factory-sealed seams and convenient vent windows. Roomy vestibules are also nice.

Do you camp often in rainy climates? Take a look at roomier tents, and consider adding a gear loft. That's basically a piece of interior netting that stretches out, hammock-like, near the ceiling of your tent. Overnight you can dangle damp items from a loft and hasten their drying process.

Setup: Practice setting up a new tent before you take it into the backcountry. If you need to seal the seams, you'll have to set it up before your first trip.

Quick Review

- Tents serve both a physical and psychological function; they protect you from the elements and surround you with a sense of security.
- Anticipate what awaits you in the backcountry - the weather, number of people in your party - and seek out a tent equipped to accommodate your most demanding ambitions.
- General backpacking (three-season) tents are excellent, lightweight performers; winter/mountaineering (four-season) tents are good year-round and give you extra stability during harsh conditions.

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Best Choices! Source – Backpacker.com

The best choices here include only ultralight and backpacking style tents. For more choices of all styles, see the examples given under the *Tent Capacity* heading.

Sierra Designs – www.sierradesigns.com

Meteor Light CD: Adequate interior space. A giant vestibule. Two side doors. Great ventilation and stargazing opportunity. Uncompromising weather protection. Easy setup. Respectable weight. A less-than-\$250 price. Pick any three or four of these features and you'd have a super tent. But the two-person, three-season Sierra Designs Meteor Light CD manages to roll all of these qualities and more into a great tent and just may be the ideal choice for three-season backpacking. 6 lbs. 12 oz., \$249.



MSR / Walrus – www.walrusgear.com

Trekker Tarp: The "awning" of a new day. This 10' x 9'8" A-frame is three homes in one. In light rain and gentle wind, guy out the broad door like awning and enjoy the view as you cook or play cards. When the rain, wind, or snow get serious, zip the door closed and the rugged nylon/polyester fly provides tent like weatherproofing. For complete containment, bring along the mesh inner tent, which clips into buckles in the ceiling. 2 lbs. 10 oz. (fly); 2 lbs.(inner tent), \$129.



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Backpacks

It takes a backpack for any overnight into the backcountry. Modern backpacks feature intelligent design concepts that provide surprising comfort and load-carrying efficiency. Such advancements have made the art of self-propelled adventure a much more agreeable pursuit.

Here are some tips that can help you sort through your options:

The Standard:

An internal frame pack with 4,000 to 5,000 cubic inches of capacity offers good versatility. Make sure the torso fits, and then look for a firm hipbelt, curved shoulder straps that end just below your armpits, and enough clearance for your elbows and thighs.

Variables:

Do you want water-bottle pockets or a bladder-ready pouch? This dilemma and other decisions about features will help you select the perfect pack. Women should try out frames, harnesses, and hipbelts designed specifically for female hips and torsos.

Select Your Style: Internal or External

Long-haul backpacks (suitable for 2-day trips or longer) are known as frame packs, meaning a metal frame supports the packbag and helps shift the weight where your body can most effectively carry it on your hips. Manufacturers offer 2 styles of frame packs: **internal-frame** and **external-frame**.

Internal-Frame Packs

Internals feature a narrow, tower like profile and integrate their framework inside the pack, behind the shoulder harness. The frame usually consists of "stays," or flat bars, about an inch wide and 1/8-inch thick. Stays are usually aluminum and are configured in a V-shape. Alternative frame materials (such as composites) and stay-alignments (parallel, X-shaped; U-shaped) are sometimes used. Stays are removable and can be shaped to conform to your torso.



Internals are popular packs with many advantages:

- **Flexibility.** Stays make internals stiff, but not rigid. This allows the pack to more easily move in harmony with body movements, a big plus for climbers and skiers.
- **Balance.** Internals hug your body. This holds your equipment closer to your natural center of gravity and helps you keep your balance when it counts - for example, while you're scooting across a log above a stream.
- **Stability.** Compression straps are everywhere on an internal. You use them to cinch down your load and keep individual items bunched together. This keeps them from shifting and throwing you off-balance if you make any abrupt moves.
- **Maneuverability.** Because internals feature a slimmer shape, it's easier to swing your arms freely - another reason why these packs are popular with climbers and Nordic skiers. This narrow profile also helps hikers whenever they have to squeeze through tight spots or when they're bushwhacking through thick brush.
- **Adjustability.** Internals use suspension systems (involving the shoulder harness and hipbelt) that can be adjusted more precisely than external-frame systems.

The downside of internals:

- **The black hole.** Most internals have one cavernous main storage compartment, plus a separate section for a sleeping bag. Other than a lid pocket, nearly everything gets stuffed into that single, deep compartment. So, if it's necessary to find one particular item during a rest stop, you may have to hunt a while to locate it.

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- **Hot stuff.** You'll sweat more wearing an internal because it rides so close to your back. The design offers little room for ventilation.
- **Cost.** Internals typically cost more than externals of a similar size.

External-Frame Packs

Externals connect a packbag to a rigid frame made of aluminum tubing. Externals ruled the backcountry until internal-frame design was introduced in the late 1970s. Internals have surged in popularity, yet externals are still a great choice for transporting heavy loads along trails. With an external, the pack's weight sits more squarely on your hips; with an internal, the back, shoulders and hips share the load.



The advantages of externals:

- **Cooler to carry.** An external's load does not sit flat against your back, allowing air to circulate.
- **Easier to pack.** Externals feature at least two main compartments plus several side pockets. You can organize your gear into "zones" and locate it more easily.
- **Heavy loads won't sag.** They might in an internal, depending how you pack it. Plus, since your center of gravity sits higher in an external, it's easier to walk upright.
- **Cost.** You'll pay less for an external.

The shortcomings of externals:

- **Minimal agility.** They tend to make you walk more stiffly, making externals cumbersome when you try to walk off-trail. Attempting to scramble up rocks or hop across a boulder field while wearing one is difficult, even unpleasant.
- **Poor traveling companions.** Sometimes you can squish a loaded internal into a car trunk or back seat; an external frame won't give an inch. Plus, in the luggage-transport systems of airports, externals sometimes can take a pounding.

Rucksacks

Rucksacks are a third category of overnight packs. These are usually frameless packs (some models include a single stay) that can store between 2,500 and 3,500 cubic inches of gear, enough for 1 or 2 nights - or more, if you are an ultra light specialist. These are essentially overgrown daypacks and often feature lightly padded backs. They are popular with skiers, trail-runners and rock scramblers.

Which Is Best for Me?

The answer depends on your hiking style and the types of places you explore most often.

Which people are better suited for an **internal**?

- Climbers/mountaineers
- Scramblers
- Skiers
- Off-trail (cross-country) hikers covering rough terrain

Why? The snug fit of an internal allows your load to move with you, helping you stay balanced and agile on uneven terrain. Recreational backpackers have also grown to prefer internals, valuing their comfort and versatility. Internals have emerged as very popular general-purpose packs, typically outselling externals by a sizable margin.

Camping & Backpacking Gear Essentials

Which people are better suited for an **external**?

- Beginning hikers
- Hikers hauling heavy loads over easy to moderate trails and terrain

Why? External appeal to juniors and beginners because they cost less. For people toting monster loads, the frame becomes an efficient extension of your upper thighs and pelvic region - an area of stout bones and thick muscle groups that are well-suited to the task of bearing the weight of a backpack. Are externals becoming obsolete? Don't count on it. Tradition is on their side, and they're a great bargain.

What Features Should I Look For?

Hipbelt: Generously padded hipbelts (unlike the thin cloth waistbelts found on Sixties-era backpacks) represent a major advancement in pack design and greatly enhance your ability to carry tonnage into the backcountry.

Most consist of various grades of foam: open-cell foam for cushioning, closed-cell or molded foam for firmness. The hipbelt should straddle your "iliac crest" - the 2 prominent bones on the front of your hips. This is the area where your pelvic girdle begins to flare out, providing the hipbelt with a stable, fortified foundation.

Some packs offer interchangeable belts, permitting a more customized fit, and even belts where the angle of the fit can be adjusted. The hipbelt's padded ends should not touch; you need some space to be able to cinch the belt securely. On the other hand, don't tighten a belt excessively. Your hips could be irritated if you do.

Internal-frame models include a lumbar pad. This large pad should offer cushioning yet should not feel spongy. If it does, it could break down quickly under a load.

Framesheet: Some internal packs place a thin but stiff sheet of plastic between you and the packbag. Often this is a material known as HDPE, or high-density polyethylene. This adds stiffness to the frame without adding much weight. Plus, it prevents objects in your pack from poking you in the back.

Internals sometimes include some type of mesh or foam panel that rests near the middle of your back. This is an attempt to separate the pack from your back and encourage some air flow between the two. It offers modest help. Here is a trail-tested truth: Count on having a sweaty back if you tote an internal.

Suspension system: This involves the shoulder straps (padded and contoured), load-lifting straps, a sternum strap and belt-stabilizer straps. So-called ladder suspensions typically allow you to reposition the shoulder harness in 1-inch (or, preferably, smaller) increments. The more fine-tuning a pack permits, the better the fit.

Packbags: Common materials are packcloth (a sturdy grade of nylon) and Cordura, a burly fabric with a brushed finish. Both resist abrasion and are coated for water resistance. Cordura is tougher and a bit heavier. Ballistics nylon, a strong, lightweight material, has popped up in newer pack designs and seems to work well. Internals usually offer an "extendable collar" or "spindrift collar" - additional nylon with a drawstring closure that allows the main compartment to stretch higher and hold extra gear.



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Detachable pocket: Many internals allow you to detach the "floating lid" pocket from the pack and convert it into a fanny pack or daypack. That's a handy feature when you choose to make day hikes from a backcountry basecamp.

Water-bottle holders/hydration pockets: Externals offer plenty of side pockets where you can stash a water bottle. Internals rarely do, although several now offer elasticized mesh "holsters" on the side where you can keep small bottles handy. Hydration systems (water reservoirs, or bladders, connected to a long sipping hose) have boomed in popularity. Many high-end packs now offer such systems.

Extras and attachments: **Lash points** allow you to attach even more gear to your pack if you feel the need. Climbers and early-season hikers should look for **ice-axe loops**, **daisy chains** (a series of small loops where you can dangle gear, such as carabineers) and **crampon patches**. A so-called **shovel pocket** holds items tight against the back of your pack; it's a good place to stash wet things. All of these extras, of course, add weight to a pack.

Loading options: Most internals are "top-loaders," where all gear passes through one big hole at the top of the packbag's main compartment. This requires you to keep quick-access items near the top. Some internals now provide zippered, slit-like openings on the sides of their main compartments. This allows you to stash smaller items (water bottles, for instance) lower in your pack but still have quick access to them. Most externals, meanwhile, are "panel-loaders." In this configuration, a zipper follows a U-shaped track along one side of a compartment. When unzipped, the compartment's side panel falls away like a flap to give you wide access to the compartment's interior.

Packs for women: Several packs, both internal and external models, have been modified with narrower shoulder straps, smaller hipbelts and shorter torso lengths.

Packs for travel: Travel packs offer you the ability to conceal and protect a pack's suspension system when using it on public transportation. Typically, the suspension systems are not quite as substantial as regular internal-frame packs.

Packs for kids: External-frame packs are traditionally the first choice for a youngster's first pack. Some options: The Kelty Long Trail Junior, the Long Trail Scout and Long Trail or the JanSport Scout. Midsize daypacks may be sufficient if an adult can transport the child's sleeping bag. If your child needs to be self-sufficient, one of the beginning externals mentioned, all around \$100, represent good choices.

Packs for dogs: Even your pooch can carry a pack. Dog packs are sized according to a dog's weight.

How Much Can I Expect to Spend?

You can find some external-frame packs for less than \$100 and they rarely exceed \$200. Most internals cost between \$200 and \$300 and few high-end internals sell for nearly \$500.

If you regularly visit the backcountry and anticipate at least one overnight trip per year, invest in a quality pack with a capacity that matches your ambitions. Inexpensive discount-store backpacks are poorly made, rarely last, have inadequate padding and can be miserable to wear. An uncomfortable pack can ruin an otherwise beautiful outing.

What's the Right Capacity?

As the phrase goes, your numbers may vary. But here's a general guide for internals:

Up to 3,000 cubic inches: Good for day hiking or a 1-night trip in warm weather where your supplies will be minimal.

3,000-4,000 cubic inches: Enough space for 1- or 2-night trip. You can go even farther if you team up with a partner who could help carry the load of shared items.

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4,000-5,000 cubic inches: Generally good for up to 3 days of overnight camping.

5,000-6,000 cubic inches: Can accommodate up to 6 days of overnight camping. The lower end of this range is good for most backpackers. Don't buy too large a backpack, though, if you don't anticipate needing the space. The more compact and lightweight your load, the better.

6,000-plus cubic inches: For long hauls lasting a week or more.

Keep in mind: Capacity figures for internal and external packs **vary significantly**. Sleeping-bag storage accounts for the discrepancy. Internals carry sleeping bags in a special compartment behind the hipbelt, and synthetic bags can consume 2,000 or more cubic inches of a pack's stated capacity. With externals, bags are usually strapped to the underside of the packbag. This does not included in the pack's capacity figures.

By the numbers: Not every manufacturer measures cubic inches the same way. So one company's measurement of 4,000 cubic inches may differ a bit from another company's calculation.

Weight: Internals tend to be a touch lighter, but the differences are minimal. Large packs can weigh up to 8 pounds. That's 8 pounds on your back before you add any gear! This should remind you to buy a pack that fits your ambitions. If you hike only modest distances, you don't need a monster pack.

How Do I Know If It Will Fit?

Forget about the color and the fancy logos. What really matters when selecting a new backpack is making sure that it's a good fit for your body.

You want to choose a pack well suited to your individual dimensions, then you need to customize it to your body shape. Here are some tips to help you accomplish that:

Determine Your Torso Length

Torso length is a crucial measurement. It is important to distinguish between your height and the length of your torso. Just because you are a certain height - say a 5' 9" female or 6' male - does not mean you automatically need a "large" or "tall" pack. Your torso length, not your height, determines your pack size. Here's how to measure yours:

- Enlist the help of friend. Have that person locate the bony bump at the base of your neck, where the slope of your shoulder meets your neck. (It's known as the 7th vertebra.) Tilt your head forward to locate it more easily.
- Using a flexible tape measure, ask your friend to start at that spot and measure down your spine, following the curves of your back along the way.
- Place your hands on your hips so you can feel your iliac crest - the twin pointy protrusions on the front of your hips. (The iliac crest serves as the "shelf" of your pelvic girdle, the area that is gripped by your pack's hipbelt.) Position your hands so your thumbs are reaching behind you.
- Have your friend finish measuring at the point where the tape crosses an imaginary line drawn between your thumbs. This distance is your torso length.



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Generally, your measurement will fall into one of these frame-size categories:

Small: Up to 17 1/2".

Medium/Regular: 18" to 19 1/2".

Large/Tall: 20" and up.

Pack manufacturers typically use general terms (small, medium, large) to identify their frame sizes; look at each pack's technical specifications to find the actual numeric range.

Determine Your Hip Measurement

While not as crucial as your torso length, your hip measurement is useful to know. It's very helpful if you are considering a pack that offers interchangeable hipbelts.

Take your tape measure and wrap it around the top of your hips, the "latitude line" where you can feel your iliac crest - those two pointy bones just above the front pocket on your pants. A properly positioned hipbelt will straddle your iliac crest, about an inch above and below that line.

A Good Fit, Step-by-Step

If possible, start with about 20 or 30 pounds of weight to place inside the pack: sandbags or weighted pillows supplied by the store; items of personal gear packed into stuff sacks; climbing ropes. (If you're able to visit a store, throw some things in a duffel bag and bring them with you.) Distribute these throughout a pack's interior, keeping the weight close to your body with the heaviest portion near your shoulder blades. Next:

1. Loosen the pack's shoulder straps, load-adjustment straps and hip belt.
2. Slip your arms through the shoulder straps.
3. Position the hipbelt so it basically straddles your hipbones (iliac crest); close the buckle and make the hipbelt straps snug.

Tip: The belt should completely, comfortably cover your hips, but its two ends should not touch. If the belt is too loose or too tight, reposition the buckle pieces on the hipbelt straps. If this doesn't give you a secure fit, you may have to try a different pack or hipbelt. Do not tighten your hipbelt excessively. Keep it snug, but if it's too tight or too long on the trail, you'll have sore spots on your hips the next morning.

4. Cinch the shoulder straps down tightly, then ease the tension slightly.
5. Look sideways in a mirror. Check the position of your shoulder straps:
 - For internal-frame packs: The padded sections of the shoulder straps should wrap around the crest of your shoulders comfortably and attach to the frame about 1-inch below that point. No gaps should appear
 - For external-frame packs **without** load-lifter straps: The shoulder straps should attach to the pack frame at a point slightly higher than the top of your shoulders.
 - For external-frame packs **with** load-lifter straps: The padded sections of the shoulder straps should wrap around the top of your shoulders comfortably and attach to the frame about 1-inch below that point.
6. Check your load-lifter straps. These should attach to your shoulder straps at a point just above your collarbone and just below the top of your shoulders. From there, they should rise up to join

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with the frame at an angle of between 40 and 50 degrees. If the angle is higher than that, your frame is too long. Any lower and your shoulders will carry too much of the load.

7. Check the shoulder strap length and width:
 - The buckle on the strap should be far enough below your armpit that it won't chafe. How far? Try a hand-width.
 - The straps should be far enough apart that they don't squeeze your neck, but close enough together that they don't slip off of your shoulders during hiking. The width is sometimes adjustable.
 - Women need to pay special attention to the fit of shoulder straps. On some unisex packs, the distance between shoulder straps may be too wide, or the straps themselves are wide enough to gouge an armpit or breast. If you find a good fit is elusive, seek out a pack designed specifically for women.
8. Check for a good torso fit. If the pack fits you correctly, you should be able to redistribute the weight of the pack between your shoulders and your hips simply by loosening and tightening your shoulder straps slightly.

Tip: Make any adjustments by moving the shoulder harness up or down, using whatever means the individual pack provides. On a "ladder" system, for instance, you can rethread the webbing and fasten it at a new position on the ladder.
9. Adjust the sternum strap. Position it about 2-inches below your collarbone. You should be able to breathe comfortably when the strap is fastened. It is not essential that you keep your sternum strap fastened at all times. It is most helpful when you are negotiating uneven terrain.
10. Check for comfort:
 - Does the pack feel good on your back?
 - Does it pinch or bind or unusually restrict your movement?
 - Can you look up without hitting the pack with your head?
 - Can you squat down without cutting off the circulation to your legs?

This may seem like a lot to keep in mind, but all of the above will become automatic as you gain experience. Now walk around with your pack. Climb and descend a flight of stairs. Hop from spot to spot. Reach. Walk a line. If anything is pinching, try adjusting the various straps.

Quick Review

Internal-frame packs, with their body-hugging design and low center of gravity, are ideal for any outdoor activity - mountaineering, skiing, scrambling and hiking on or off trail. They offer you good balance and more freedom of movement. Internal packs are the popular choice of most outdoor adventurers.

External-frame packs are good choices for carrying heavy loads over easy to moderate terrain, primarily trails. Their rigid design makes you walk more stiffly and is not the best for rock-hopping or other types of cross-country travel. They cost less than internals.

Rucksacks are, in essence, extra-large, frameless daypacks that can accommodate enough gear for a lightweight overnight trip.

Fit is crucial. Make the effort to have your pack customized for your torso. People may be the same height yet have different torso lengths. Make a backpack purchase based on your torso length.

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Best Choices! Source – Backpacker.com

Mountainsmith Mountainlight Packs - www.mountainsmith.com.

Specter: Capacity approaching expedition size – lightweight suspension; capacity: 5,600 cu. in., 5 lbs. 5 oz., \$299.

Auspex (Men's) / Chimera (Women's): The packbag on these models is a long, slender, single-compartment top-loader; capacity: 4,200 cu. in., 3 lbs. 14 oz., \$249.

Ghost: Ultralight, fair-weather backpacking; capacity: 3,100 cu. in., 2 lbs. 6 oz., \$179.

Gregory Professional Series Packs - www.gregorypacks.com

(specs for medium frame and harness)

Denali: This flagship of the Pro Series is a combination panel- and top-loader with maximum cargo capacity and pocket options; 6,588 cu. in., 7 lbs. 8 oz., \$450.

Robson: Narrower and simpler, this slim yet high-volume pack sports a compression flap for clothes, a shovel, or rope; 5,577 cu. in., 7 lbs. 9 oz., \$425.

Petit Dru: Designed to fit women, this is a scaled-down version of the Denali, with similar features and pockets on a smaller packbag; 5,300 cu. in., 7 lbs. 8 oz., \$425.

Makalu: Stripped lean for minimal weight and sporting a more flexible framesheet, the Spectra-cloth Makalu is suited to the balance and weight conscious demands of go-light mountaineers and off-trail scramblers; 4,563 cu. in., 4 lbs. 14 oz., \$325.



Kelty K.I.D.S. Expedition – www.kelty.com

Expedition: Well suited for extended backcountry trips and designed for youth. It has 3,675-cubic-inch cargo capacity and the same suspension features (sternum straps, load-lifter straps, adjustable torso length, and a substantial, padded hipbelt with lumbar straps) found on top-of-the-line backpacks, 7lbs. 10 oz., \$250.

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Daypacks

Modern daypacks are highly evolved and specialized load-carriers. They are efficient and high-performance compared to early knapsacks.

Name your activity. Whatever it is, it's likely a daypack has been designed to help you enjoy it with greater ease and convenience..

1. Choose a daypack with enough capacity to handle the most demanding situations you expect to encounter.
2. Many daypacks effectively serve two purposes: transporting books at school, then carrying gear on the trail.
3. Climbers often use specialized packs for day trips.
4. Hydration daypacks make it possible for you to take a drink without dropping your pack to dig out a water bottle.
5. Fanny packs and lumbar packs are ideal for minimalists or trail runners who want to keep their loads light.

Matching Packs With Your Activity

Day Hiking: Any pack like, rucksacks, school packs, even computer packs will work for day trippers. Make sure the one you choose includes certain features you value the most - a large capacity rating, side pockets, compartments for organizing gear, etc.

Evaluate your ambitions and expectations. For instance, will your pack get as much use (or more?) at school as it will on the trail? Then steer yourself toward a larger-capacity book bag. Plan to do a little scrambling when you're out for a walk? Consider some packs with thinner profiles such as those listed under climbing packs.



Quick Backcountry Overnights: Your best options will be found either under rucksacks (larger-capacity daypacks without frames) or smaller-capacity internal frame packs.

If you are equipped with a space-saving down sleeping bag, a pack with a capacity of roughly 2,500 cubic inches can accommodate enough gear for a comfortable overnighiter.



The best of these packs typically offer padded backing (or some type of framesheet), a modest lumbar pad and a padded (though not necessarily beefy) hipbelt. Some models offer a single aluminum stay to help accommodate a heavier load. However, if you require lots of amenities (even during an overnight trip), consider instead a lower-volume internal-frame pack. These models will allow you to carry a heavier load more efficiently.

Tip - Typically, you do not want to exceed 20 pounds in a daypack if it offers no framesheet for your back or hipbelt. Otherwise, the weight may hang too heavily on your shoulders. Some rucksacks provide a modestly padded hipbelt. If that's a feature you want, make sure the belt is something more substantial than a simple stabilizing strap made from webbing.

Camping & Backpacking Gear Essentials

Scrambling: Stick with a narrow-profile pack, one that includes a padded back or a framesheet. A hipbelt and a sternum strap will be especially helpful. Often you'll be climbing to higher elevations where the air is cooler, so you'll need a capacity of around 2,500 cubic inches (or more) to accommodate extra clothing.



short climb

Climbing: Your ambitions will determine whether you need a low-capacity internal-frame pack or a technical daypack. Compare your standard equipment load (ropes, carabiners, etc.) with the list of specialized features a pack may provide (ice axe loop, crampon patches, daisy chain).

Avoid side pockets; you want a pack that's lean and clean. A sternum strap and a variety of compression straps (which consolidate your load and keep it from shifting) are also important.

Ski Touring: A smooth, narrow profile is a must. Your range of travel (and the extra clothing you customarily carry) will determine your capacity requirements. Look for wand pockets on the sides of the pack; they come in handy when carrying your skis. A sternum strap is essential; a hipbelt of some type will serve you well. Climbing packs work very well for ski touring.



ski

Trail Running: A fanny pack, lumbar pack or water-bottle pack is your first choice. Lumbar packs are less inclined to shift while you run, and it's nice to keep your back clear so perspiration can escape. In cooler times of year, a hydration pack (which offers more capacity to carry additional clothing) makes a good choice.

School: Daypacks have largely replaced briefcases in the past quarter-century. Somewhere along the line "daypacks" morphed into "school packs," and pack manufacturers have kept pace with the trend. If toting books, not gear, is your primary interest, look for school packs that offer at least one divider, two compartments, or an organizer.



school

Some packs, like the Yahoo! Hardware line, include padded cases for laptops that can be removed and carried separately. A carry handle is a nice option for warmer days when you want to keep your back clear. Plus, these packs easily transform into outdoor-minded gear carriers on weekends.

Specialized Packs

Hydration Packs: People love hydration packs - standard-sized daypacks that include a removable reservoir (or bladder) with a sipping hose attached. With the drinking end of the hose clipped to one shoulder strap for easy access, you can go for miles without dropping your pack when you need a drink



hydration

The simplicity of their design encourages you to hydrate more often, which is a good thing. Sometimes, in order to maintain a pace, you postpone a drink stop because that's the last thing you want to do. Hydration systems (found in many full-sized backpacks as well) can keep you refreshed while you keep moving.

The popular CamelBak.



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Fanny Packs: These are nice items for day hikers, cyclists, skiers, even city strollers. For shorter outdoor jaunts on hotter days, a fanny pack and the full ventilation it affords your back is a great option.

This type can include water bottles.



fanny pack

Lumbar Packs: These are larger-capacity fanny packs that ride on the small of your back as well as your waist. Their snug design is very popular with trail runners.



lumbar

Additional Considerations

Panel Loaders vs. Top Loaders. Traditionally, many daypacks feature a panel-loading style, where the main storage compartment is accessed via a long, U-shaped zipper. Fully opened, one side wall of the compartment falls away like a flap. This wide opening makes it easy to pack bulky items such as cold-weather clothing or books.

Top loaders usually do a better job of keeping loads from shifting, especially if they offer compression straps. For activities where balance is vital (climbing, ski touring, scrambling), give a top loader some serious consideration. Just recognize that organizing gear in a top loader (where something important is always on the bottom) is a greater challenge.

Little Extras: You know your own preferences. Manufacturers have tried their best to accommodate the ones shared by the most people. So read through each description in search of specialties that are close to your heart, from ski slots to key loops to a carry handle. Think through all your potential needs before you make your selection.

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Sleeping Bags

The Standard:

A 15° or 20°F bag suffices for most three-season trips. Down is a highly compressible insulation and provides the most warmth for its weight. Synthetic fills, although not as warm, are preferable for use in wet conditions. Look for a zipper draft tube, a draft collar, and a trim-fitting design for maximum heat-trapping efficiency for colder conditions. Condensation will dry faster on a dark-colored shell.



Variables:

Adjust the temperature rating up or down if you're a very cold or warm sleeper, or if your typical camping exposes you to sweltering desert temperatures or frigid mountain air. If you have a large build, you may want to trade off some warmth of the mummy design for a more spacious rectangular bag.

1. Match your sleeping bag's comfort rating with the coldest nighttime temperatures you expect to encounter - and maybe even exceed that number for a little security.
2. Bags using down insulation are lighter (providing a higher "warmth-to-weight" ratio) than bags using synthetic fill. They compress into smaller shapes and last longer, but they cost more, insulate poorly when wet and dry slowly.
3. Synthetic - fill bags can provide some insulation even when wet and they dry out fairly quickly. Plus, they cost less than down bags.
4. A bag's shape matters. Mummy-style bags insulate most effectively and are your best choice for colder, high-elevation conditions; rectangular bags give you more room to roll but offer more space that your body must heat up.
5. A good sleeping pad is essential. Your body weight compresses a bag's insulation when you lie on it, so you need a reliable buffer between, your bag and the cold ground.

How Do Sleeping Bags Work?

Sleeping bags keep you warm by trapping and holding a layer of "dead" (non-circulating) air next to your body. This air, which is warmed by your body heat, forms a barrier between you and colder air or cold surfaces.

When evaluating bags, consider these key factors:

- Comfort rating
- Insulation (down or synthetic fill)
- Weight
- Size when compacted
- Fit
- Personal sleeping tendencies (are you, for example, a "cold sleeper"?)

Comfort Rating

A sleeping bag's temperature or "comfort" rating identifies the most extreme temperature the bag is designed to accommodate. When you hear a bag described as a "+20 bag," it suggests most users should remain comfortable if the air temperature drops no lower than 20 degrees Fahrenheit.

Are such ratings infallible? No. Humans all have different metabolic rates, and no industry standards exist that uniformly determine sleeping bag comfort ratings. Instead, each manufacturer assigns a rating to its bags based on its own research. Therefore, use these numbers as a guide, not a guarantee. If you have trouble deciding between two bags, it's not a bad idea to select one that offers a little more warmth than you think you might need.

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Many factors affect your ability to keep warm inside a sleeping bag:

- The insulating **pad** beneath your bag (when sleeping on frosty ground at high elevation, you need a full-length pad to keep you separated from the cold; when sleeping on snow or frozen ground, two pads are recommended)
- The presence/absence of a **tent** (a tent or bivy shelter traps an extra layer of dead air, warming it by up to 10 degrees)
- Your **metabolism**; you might be a "cold sleeper" (and thus one who prefers extra insulation when sleeping) or a "warm sleeper" (someone who kicks the covers off at home)
- Your **gender** (women frequently prefer bags with lower temperature ratings)
- **Clothing** worn while inside the bag (dry long underwear and clean socks are good choices on cold nights, plus they help keep body oils off your bag; a cap and neck gaiter keeps body heat from radiating away; fleece pants and jackets help on colder-than-expected evenings)
- **Adjustments** you make while in the bag (keep the bag zipped up and the hood cinched on cold nights; be careful to not breathe into the bag, since moisture has a negative effect on the insulation)
- **Food** in your stomach (the process of digestion helps produce warmth)
- **Hydration** (if you're not well hydrated the food won't help much)

Even experienced campers and backpackers can be surprised by unexpectedly cold overnight conditions, particularly during trips in the spring and fall. It's smart to be prepared.

Tip - To be ready for those extra chilly nights, select a bag with a temperature rating that slightly exceeds the low end of the temperature range you expect to experience. If a +20° F bag sounds right for you, a +10° bag would probably work well, too. On warm nights, you can always vent a bag (by using the double zipper to open the area near your legs) or simply drape it over you, unzipped. It never hurts to be a little over-prepared.

Recognizing that comfort ratings are merely general guides, a rule-of-thumb might suggest the following categories:

Bag Type Comfort Rating (°F)

Summer Season +35° and higher	3-Season Bag +10° to +35°	Cold Weather -10° to +10°	Winter/Extreme -10° and lower
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Please note: Even in summer, a +35° bag may leave you feeling chilly when sleeping in the high country. If you think of yourself exclusively as a warm-weather camper, yet plan to routinely camp at higher elevations (3,000 feet and up), choose a bag with a comfort rating at least in the 20s.

Down or Synthetic Insulation?

The insulation or "fill" inside a sleeping bag largely determines a sleeping bag's:

- Weight (and thus its "warmth-for-weight" ratio)
- Compressibility
- Durability

Down

Down is the wispy, fluffy undercoating found just beneath the outer feathers of geese and ducks. This natural fiber is an extraordinary insulator. Goose down is preferred to down from ducks, prized because it is believed its plumes offer a higher "fillpower" (explained below).

Camping & Backpacking Gear Essentials

Down's positives include:

- It offers tremendous warmth for surprisingly little weight (thus offering a superior "warmth-to-weight" ratio).
- It can be compacted into very small sizes.
- Its effectiveness outperforms synthetic insulation by years - decades, even.

Down, though, does have a downside:

- If it gets wet, it is of no value until it dries - and in the field, that can take a long time.
- It is expensive. (Keep in mind, though, that its resistance to deterioration makes it an outstanding long-term value.)

Down is graded according to fill power - meaning the number of cubic inches one ounce of down will displace. The Outdoor Recreation Coalition of America (ORCA) ranks down with fill power of up to 450 cubic inches as fair, 500-575 good, and 600 and higher excellent.

Synthetic Materials

Synthetic materials are basically plastic threads (extruded polymers, to be technical). The threads are most commonly a continuous filament (a long, single strand). They can also be arranged in short "staples" up to four inches long. Usually the threads are hollow, reducing their weight and enabling them to trap more air.

The advantages of synthetic fill include:

- It's less expensive than down.
- It's non-allergenic.
- It still provides some insulation when wet; plus it dries fairly quickly.

The shortcomings of synthetic fill are:

- It's bulkier than down (so it takes up more space when you're carrying it).
- It's heavier (it takes more weight to get the same warmth down provides).
- The filaments gradually degrade over time.
- The insulating "batts" of filaments are stiffer than down and do not drape over the contours of your body as effectively.

The most popular synthetic material in use is Polarguard®. It is available in various grades:

- Polarguard 3D: This third-generation product features a finer filament, a softer feel and greater compressibility. It's the leader of the synthetic pack.
- Polarguard HV: HV refers to the "high void triangular" shape of the hollow core running through the filament. This is a second-generation product, and is a touch heavier than 3D.

You may also see bags containing Hollofil or Quallofil. Like the original Polarguard, these are the older-generation fills (not as light or compressible) are now found in budget-level bags.

Which is Right for You?

Down works well for just about everyone except people who frequently find themselves in rainy conditions.

Synthetic insulation is a good choice for kids and newcomers to camping and backpacking. It costs less than down and dries out relatively quickly in case it accidentally gets wet.

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Women often value down's warmth, softness and minimal weight. (Note: Some bags are cut to accommodate a woman's body shape and preference for extra insulation. Sierra Designs, for one, offers such bags, plus some "stretchable" bags that move with sleepers who often twist their bodies and change positions.

Down always wins in terms of weight, compressibility, warmth and durability. Yet the value and performance of synthetic bags makes them very popular. Synthetic bags are improving each new model year, and they're champs when rain is a threat or cost is a factor.

What about length? Do you need a "regular" or "long" model? The general rule is as follows: If you are no taller than 6 feet, choose a "regular" length bag. If you are up to 6-feet-6, you want a "long" bag.

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Sleeping Pads

Sleeping pads perform two important functions. 1) They keep you comfortable when you're sleeping on hard, uneven ground. 2) They provide an important layer of insulation between you and the ground to cut down on conductive heat loss.

How do they work?

Sleeping pads insulate the same way that sleeping bags and clothing layers do. They trap and hold a layer of dead (non-circulating) air between your body and the cold (in this case, the cold ground). Your body gradually warms this layer of dead air and it becomes an insulating barrier. The insulative performance of a pad depends upon how much air it holds inside and how free that air is to circulate.

Step #1: Consider Your Plans

Like any other equipment purchase, choosing a sleeping pad involves making compromises. The primary variables to consider when choosing a pad are:

- Insulation
- Comfort
- Weight/Bulkiness
- Durability

To decide which of these variables are most important to you, consider your outdoor plans. Think about:

- **The kinds of weather you expect** - if you're a fair weather camper/backpacker, comfort will probably be more important than insulation. But if you hit the trail year-round or enjoy early spring or late fall trips, make sure you get a pad that provides protection from the cold.
- **The level of comfort you want while sleeping** - some people prefer to save money, space and weight by sticking with very basic pads. Other prefer to spend (and carry) a little more to stay as comfortable as possible in the wilderness.
- **How much extra weight you want to carry with you** - Thicker, more comfortable pads can be heavy, which can cause problems on long backpacking trips. But if your trips are short or you're a car camper, weight will be less of an issue.
- **How much space you have for storage** - If you're backpacking with a full gear load, a light, compact sleeping pad will be far easier to pack. Space will be less of a problem if you're carrying all of your gear in your car, or boat.

Step #3: Consider Your Options

- **Air mattresses** - basic, inflatable air bladders

Positives - They're comfortable, adjustable and inexpensive.

Negatives - They tend to be heavy, bulky and they can be punctured/ripped easily. Air inside is free to circulate, so they tend to be poor insulators.

- **Open-cell foam pads** - sponge-like foam pads made up of tiny, open air cells

Positives - They're comfortable, lightweight and inexpensive. The tiny foam cells restrict air circulation, so they are also more effective insulators than air mattresses.

Negatives - Open-cell foam is absorbent, which can cause problems in wet conditions. It's also less insulating than closed-cell foam (it must be cut about four times as thick to get the same insulation). Open-cell foam tends to be bulky, difficult to compress (for packing) and not very durable.

- **Closed-cell foam pads** - pads made out of dense foam filled with tiny closed air cells

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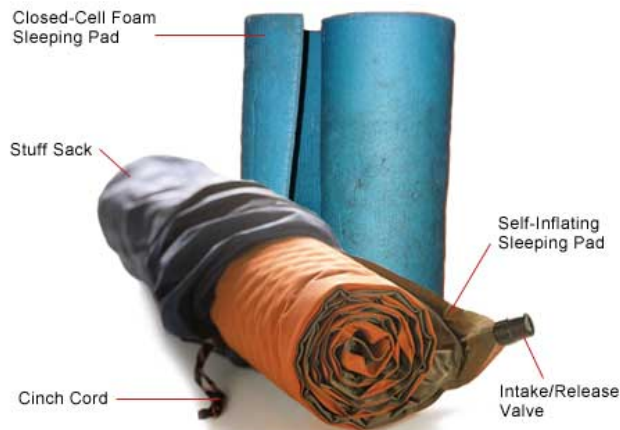
Positives - They're cheap, durable (won't pop when tromped on) and extremely insulative (almost no circulation of air in pad, so they can be cut thin yet still provide good insulation). Closed-cell foam is also non-absorbent.

Negatives - They're relatively heavy, far less cushioning than open-cell foam (so you'll need a thicker, even heavier piece to be as comfortable).

- **Self-inflating pads** - open-cell foam pads wrapped in air-tight, waterproof nylon shells.

Positives - They're as comfortable as open-cell foam, but much more insulating (the nylon shell limits air circulation, while also protecting against water absorption). They're adjustable (built-in air valves let you control the amount of air inside and thus the firmness of the pad) and they're extremely compact when rolled up.

Negatives - They're more expensive than the options listed above. Can be punctured or ripped (though field repairs are not difficult). Heavier than open- or closed-cell pads.



Step #4: Try Before You Buy

Sleeping pads come in a variety of styles, shapes and lengths. If possible, try out a number of different pads before deciding on a single model. This will help you get a feel for:

- How much cushioning you need to be comfortable
- How long and/or wide you want your pad to be (many models are cut short to save weight and packing space)
- How easy the pad is to inflate, deflate, and/or pack away

Step #5: Consider the Extras

Finally, consider any extra pad features that might affect your decision - like multiple air chambers (for a more custom adjustment), built-in pillows (for comfort), textured pad surfaces (for better insulation, less slip and more comfort) and tapered pad shapes that cut down on weight and bulk. If you'll be traveling with a close friend, consider pads that can be attached together to form a larger sleeping area for two.

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Water Filters and Purifiers

The Murky Truth About Clear Water

Free-flowing mountain streams, for all their beauty and clarity, are not always the fountains of purity we imagine them to be. Backcountry water sources like crystal-clear rivers, lakes and streams - always harbor microscopic pathogens (disease-causing agents) that are tough to pronounce, difficult to spell and, for many people, awful to ingest.

Giardia lamblia. Cryptosporidium. Campylobacter jejuni. Hepatitis A. All are members of an invisible fluvial zoo that may be present in pristine-looking backcountry water.



How do they get there? When water becomes tainted by animal or human feces. What impact could such microbes have? They can leave you reeling with diarrhea, abdominal cramps, nausea, weight loss and fatigue. How long might these symptoms last? Between 4 and 6 weeks. Maybe longer. Ugh.

Explaining Water Filters and Purifiers

Portable water filters and purifiers both operate on the same mechanical principle. Using a hand pump and intake hose, both slurp up "raw" water from a lake or stream and force it through an internal element (a filtering "medium"). This medium traps suspended elements - from fine sediment to invisible microorganisms - before dispensing clean water into a container of your choice.

What's the Difference?

First some definitions:

Water filter - A microbiological device that removes bacteria (e.g., *Campylobacter jejuni*) and protozoan cysts (*Giardia lamblia*, *cryptosporidium*) from contaminated water.

Water purifier - A microbiological device that removes bacteria, protozoan cysts **and viruses** (e.g., hepatitis A) from contaminated water.

Viruses are infinitesimal organisms too tiny to be trapped by a filter. Devices identified as "purifiers" usually cause water to interact with iodine (often in the form of iodine resins), which can render viruses inactive. Another purifier uses a positive electrostatic charge in its filter medium to capture viruses.

Viruses:

- may exist in water wherever there is a reasonable chance of human fecal contamination;
- are believed to be less prevalent in North American wilderness water sources than protozoan cysts or bacteria, but may be a greater threat in less developed countries.



Over time, filters have proven that they reliably protect wilderness travelers from the most common waterborne pathogens found in the North American backcountry: giardia and cryptosporidium. Still, purifiers and their antiviral feature offer an elevated level of security.

To fully disinfect suspect water using a water filter, the Centers for Disease Control and Prevention recommends 1) mechanically filtering the water, 2) treating it with a halogen (chlorine or an iodine

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solution), 3) letting it sit 15 to 60 minutes before drinking.

The difference between water filters and purifiers can seem arcane.

How Purifiers Differ From Filters

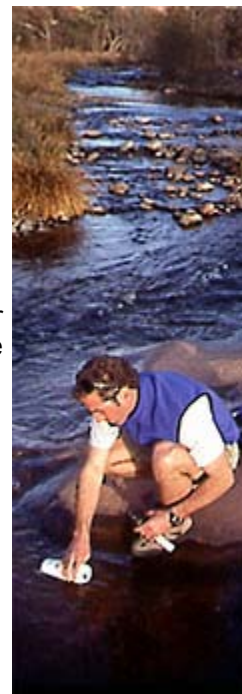
To be identified as a water purifier, a device must conform to a US Environmental Protection Agency protocol (last revised in 1987). Purifiers are required to "remove, kill or inactivate all types of disease-causing microorganisms from the water, including bacteria, viruses and protozoan cysts so as to render the processed water safe for drinking." A device must inactivate 99.99 percent of viruses to be labeled as a purifier.

Does this mean purifiers are **superior** to filters? Not necessarily. Depending on conditions (when water is very cold or obviously contaminated, for example), manufacturers of iodine-based purifiers may recommend that users double-filter their water or significantly reduce the rate at which water is pumped through the unit. (The slower flow exposes water to the iodine or iodine resins for a longer period of time.) Sometimes resins must be allowed time to "recharge" after treating a few quarts of water.

Filter makers, meanwhile, contend that quality filters routinely capture 99 to 99.9 percent of viruses on the first pass since viruses (and bacteria) often become clumped with organic or mineral particles in water. These clumps are easy for filters to trap. Still, when these clumps are "smashed" into the wall of a filtering element as you pump the water, it's possible a virus could separate from its clump and still slip through.

The purifier vs. filter question stirs spirited debate among manufacturers. There is a movement within the industry to work toward a common filter and purifier standard through the American Society for Testing and Materials.

Note: Pregnant women and people with thyroid conditions often have adverse reactions to iodine. Consult a physician before selecting a purifier.



What Really Matters

In an ideal world, a water filter or purifier will be:

- Simple to use
- Easy to pump
- Capable of sustaining a steady, generous flow
- Effective against waterborne pathogens
- Slow to clog, easy to clean
- Long-lasting

How can you tell if a filter or purifier delivers in these areas? Look for clues in the specification chart that accompanies each product description.

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Understanding Specification Charts

Here's how to interpret the information:

Filter medium - This is the cartridge that actually traps pathogens (plus silt and other debris). The composition of the medium contributes greatly to the quality (and cost) of a device. Medium materials include:

Ceramic: This is an effective, high-quality earthen material that can be cleaned many times before it needs a replacement. A ceramic cartridge captures most particles within .005 of an inch of its surface, so it's easy to brush away clogged pores and expose new ones. Cartridges themselves are fragile and require careful handling. Ceramic elements are the longest-lasting mediums and make a good choice for frequent backcountry visitors.

Ceramic with a carbon core: This additional layer helps filter out the taste of halogens (chlorine and iodine) plus some organic chemicals, herbicides and pesticides.

Fiberglass (or glass fiber): As effective as ceramic in straining out pathogens, but not as long-lasting.

Structured matrix, or labyrinth: A dense, honeycombed material that effectively captures pathogens.

Iodine resin: A chemical layer integrated with a purifier's filtering medium that deactivates viruses, though it does not actually remove them.

Field cleanable - A desirable feature. This means you may open the filter to brush or scrub the filter medium and increase water flow. Clogging should not cause you alarm; it shows the filter or purifier is working. Ceramic filter media can usually accept dozens of cleanings. Some models can be cleaned through backwashing (feeding clean water through the filter in reverse) but you need ample clean water in order to do so.

Longevity: How long will a filter or purifier last? Ceramic filters that can accept cleaning will last the longest, but the life of any filter depends on the **clarity of water** you pump through it. If possible, seek out clear water in still pools. You're likely to find less sediment in such water than in rushing water. Use a prefilter if your device includes one. Manufacturers sometimes include an estimate of the number of liters a filter or purifier is expected to treat effectively.

Pump force - The higher the number, the harder it is to pump. The Katadyn Pocket Filter, for example, has a pump force number of 16.5. While this is one of the longest-lasting filters available, it really gives users a workout as they pump.

A few additional considerations not listed in spec charts include:

Effectiveness - All reputable filters and purifiers will knock out larger microorganisms such as giardia and cryptosporidia. So what do you get for choosing a more expensive filter? Usually a longer lasting filter medium, cleanability features and maybe a more efficient pump handle. Which filter is right for you?

Here's a basic guide:

- If you're a recreational backpacker, someone who takes 1 or 2 overnight trips per year, an inexpensive filter will serve you well. Still, be careful about what type of water you send through it. Make it as clear as possible and the filter will last longer.
- If you visit the wilderness regularly, seek out a field-cleanable model designed to provide years of service
- People who explore terrain closer to urban areas, at lower elevations and who travel outside the United States and Canada are candidates for a purifier.

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Pore size - A familiar benchmark for determining a filter's effectiveness is to establish that it is a "point-2 (0.2-micron) filter." The number refers to the size of the pores (openings) in a filter medium. It's not a bad gauge, since the smallest bacteria measure 0.2 microns, yet some microbiologists will tell you it is a simplistic standard. Factors such as maximum flow rate, minimum wall thickness and adsorptive capacity can influence such a conclusion. Arguments can be made to show that a 0.3- or 0.4-micron filter can be as effective at trapping the particles as a 0.2-micron filter.

Tip: Look for "absolute" pore size (the largest and least effective holes) when evaluating filters, not "nominal" pore size.

Adsorption - When filter media block particles while clean water streams through, the process is known as "sieving." When particles stick to the media in the manner of a magnet, this is "adsorption." Activated carbon, found in some filters and purifiers, is especially effective at adsorption.

Product Summaries

Here are brief performance overviews of some popular filters and purifiers. Our product mix occasionally varies from the lineup shown here.

MSR WaterWorks II

A popular filter that may offer the finest microfiltration of any device found on this list. Its ceramic filter medium (which screens out protozoan cysts and bacteria) includes a carbon core (which removes elements such as pesticides and chlorine) and is embellished by an ultra-fine membrane captures the tiniest bacteria (0.2 microns). It's field-maintainable, long-lasting and the pump is easy to use. Its clear housing makes for interesting viewing while the filter is in action, too.



MSR MiniWorks

A lighter, more compact version of the WaterWorks II. It includes the carbon core but lacks the added membrane. A lot of filter (cleanable, too) for a good price.

Pur Explorer

A popular purifier-class device that uses iodine resins to deal with viruses. Independent testing showed that it's capable of producing a flow of 1.39 liters per minute - and that's terrific output. Twist the handle a quarter-turn and it becomes a brush that can abrade the glassfiber medium and prolong its life. Its exit filter, the "Stop Top," is a carbon-filled cap that can be fitted into water bottles and eliminate any iodine aftertaste.



PUR Scout

This purifier is a lighter version of the Explorer, without the built-in brushing function. Its filter medium can still be cleaned in the field.

PUR Voyageur

A reliable, lightweight (12.5 ounces), affordable purifier that performs well with proper care. Once clogged, its filter media must be replaced.

PUR Hiker

One of the all-time easiest filters to use and, for its reliability, a great value.

PUR Pioneer

A dependable filter for beginners and short-haul casual users. Easy to use, but its glassfiber disks can clog quickly in water with above-average sediment.

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Katadyn Pocket Filter

This Swiss-made ceramic filter is a standard-bearer for durability and reliability. Its silver-impregnated core helps retard any bacterial growth when not in use. The manufacturer estimates that it can produce up to 13,000 gallons of clean water and its ceramic cartridge can be cleaned up to 300 times. Drawbacks: It's heavy and it can be a chore to operate. But what a workhorse.



Katadyn Mini Filter

A lighter, less elaborate version of the Pocket Filter, though its ceramic filter offers the same silver impregnation found on its big brother. Expected lifetime: 2,000 gallons.

First Need Purifier

This unit's proprietary "structured matrix" design is "electrically charged" and uses sieving and adsorption to produce its purified output. You can use this unit's stuff sack to convert it into a drip filter when you're in camp. Over time, clogging can be a problem with this noncleanable device.



SweetWater Guardian

Light, fast and safe, many people enjoy this filter's long-handled pumping mechanism.

Sweetwater Walkabout

Popular among users who prefer a small, lightweight, inexpensive filter. Reliable, though not as long-lasting as some models, and a little tougher to pump.

Other Considerations

Replacement cartridges are available for most all filters and purifiers. They cost roughly one-half of the original unit's cost.

Some models **attach directly** to specific **water bottles**, which is a nice touch. It can prevent a heartbreaking spill in the field.

If you're visiting places where **turbid water** is a factor (say, the desert southwest), a cleanable ceramic filter should be tops on your list. The same goes if you'll be filtering for a **group**.

Avoid filtering water in area where **animal or human activity** is obvious.

Try and filter water from **still, clear water** sources. Many microorganisms tend to sink to the bottom of still water; a turbulent stream keeps them suspended.

Rather than filter directly from the stream or lake, **put water in a pot** and filter from that. This gives you a chance to examine exactly how the water looks before you send it through your filter. This helps prevent clogging. If the water is cloudy, let it sit in the pot for an hour or so, then skim the clearest water off the top.

Don't save the first few streams of output from your filter. They don't taste as fresh.

When you clean your filter, recognize you are handling a **potentially contaminated object**. Don't handle food or put your hands to your mouth after cleaning your filter.

Follow manufacturer instructions for cleaning and **storage**. At home, consider pumping a weak bleach-and-water solution through the filter to sterilize it. If you can disassemble your unit, allow it to **dry out completely** before storing it.

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Water Bottles

The same qualities you want in a trail partner - reliability, trustworthiness, durability - are the same features you want in your water containers. On a lengthy outdoor excursion, a water bottle becomes your portable fountain of life and one of your most valued companions. You want to know that you can count on it.

Trail-worthy water bottles can either be rigid or collapsible. Rigid bottles are tougher to break or puncture, but they take up space in your pack even when they're empty. Collapsible water bags fold up tight when empty to save space in your pack, but at times they can be a little awkward to handle.



Materials

Almost all rigid water containers (and many collapsible ones) are made of plastic. It is inexpensive, durable and lightweight. Customarily your choices are:

- **Polyethylene** (usually a cloudy white color) - Inexpensive, flexible and won't crack easily. Used in hard-sided water jugs, collapsible water storage bags and some hydration reservoirs.
- **Polycarbonate** (Lexan®, a clear plastic) - Won't retain odors or flavors from acidic drinks or leave a plastic taste like polyethylene bottles can. Slightly more expensive than polyethylene bottles, but also more durable.
- **Coated fabric** - Some collapsible water containers are made of coated nylon fabrics. Others use it as outer shell material to protect flexible plastic bags inside.

Considerations

How many do you need? - Two quart-sized containers are the norm for just about any self-propelled activity where a hydration system is not involved. If you're hiking in warm weather, it's likely you'll drink a gallon or more per day. But water is heavy - approximately 8.3 pounds per gallon, so it's smarter to carry modestly sized containers and replenish your supply as you go. Just make sure your route passes lakes or streams and always treat water before you drink.

Note: If you are exploring an arid environment, often you need to place a water cache along your route. You may be able to do this in advance of your trip, or you must lug in extra containers and conceal them within the rocks and weeds for retrieval on your way out. This is a customary practice, for example, for hikes into the Grand Canyon's interior from the park's more remote trailheads. Accordingly, you will need enough containers to address your needs. Be prepared!

Bottle mouth size - Large-mouth bottles tend to be more convenient for filling and drinking. Smaller openings offer more control when pouring (important to some backcountry gourmets).

Compatibility - If possible, choose water bottles that can connect directly to your water filter/purifier. This helps you avoid heartbreaking spills while you're pumping. (Nalgene wide-mouth bottles and MSR's MiniWorks filters, for example, make a good match.)

Shape - Round bottles will slip into your pack pockets more easily. Square bottles are easier to stack in main pack compartments. Bike-sized squeeze bottles are fine for day hikes, but their small capacity makes them less than ideal for a long-haul trip.

Camp containers - To avoid multiple trips to a water source while camping, bring along a collapsible container. These bags range in size from a quart container to a 5-gallon bag.

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Hydration Systems

Water is the outdoor athlete's most precious commodity. Until recently, transporting water was limited to how many canteens you could strap on your belt or fit in your pack. However, through the miracle of modern materials and some clever engineering, water is now easier to carry with you than ever before.

Which Option Is Best for You?

Water Bottle - For the casual hiker or biker, a water bottle stuffed into a daypack or a bottle cage is sufficient. However, if the hike goes for more than an hour or the bike ride is more than a few miles, you'll need to start adding water bottles. There are several hip packs and backpacks designed to carry 1, 2 or even 3 water bottles. Anything more, however, and you'll want a hydration pack.

Hydration Pack - A fairly new invention, hydration packs were developed for the mountain biker in need of a hands-free way to drink water while dodging trees. Now, athletes find them useful in almost every sport. Hydration packs use a tube with a valve at the end so that a simple bend of the neck and a bite introduces your mouth to the water it craves. The first packs were simple, collapsible reservoirs surrounded by neoprene and attached via shoulder straps. Today's options are more stylish and comfortable and include hip or backpack styles, 1 reservoir or 2 and streamlined or robust, with extra room for lunch and gear.



The Advantages of Hydration Packs

Sure, hydration packs are all the rage, but is their convenience worth their cost? Here's a look at some of their features and benefits to help you decide.

- **Reservoir capacity** - Some hydration packs carry as much as 110 fluid ounces, providing more hydration for longer or hotter journeys.
- **Fit** - Hydration packs are as utilitarian and comfortable as any backpack.
- **Care and cleaning** - While hydration packs do take more maintenance than water bottles, new features such as wide fill-mouths and zippered bladders make care and cleaning a simple matter.
- **Insulation** - Surrounded by a protective shell, hydration packs keep your water cool - or warm - depending on your need.
- **Options** - Some hydration packs now offer 2 reservoirs in 1 pack. One can hold a sports drink, the other, just water.

Not Sure? Consider a Collapsible Bottle

If a water bottle is too inflexible and a hydration pack is more than you need, you may want to consider a collapsible water bottle. These have been around for even less time than hydration packs, but they offer the advantage of taking up less space when empty. Coming in a variety of sizes, most will slip easily into any pack. Even your bike's saddlebag can provide all the space these handy bottles need.

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Backpacking Stoves

How Do Backpacking Stoves Work?

Most modern backpacking stoves use either liquid or compressed gas fuels. Both types burn fuel by igniting it in its gaseous form. Liquid fuel stoves store their fuel as a liquid, then convert it into a gas just prior to ignition. Compressed gas fuels are also stored in liquid form (because of the high pressure in their pressurized canisters.) But they exit the stove as a gas as soon as they are released.

Liquid fuels (white gas, kerosene, unleaded gas)

- **Positives**
Cheaper and easier to find (worldwide) than compressed gas. Easier to transfer from container to container.
- **Negatives**
Must be converted from a liquid to a gas prior to being lit. This process can be difficult in some situations, depending on weather conditions, the type of fuel and the specific stove being used (see details below).

Compressed gas fuels

- **Positives**
Come out of their containers ready to burn. Cleaner, easier to light and easier to work with than liquid fuels. Also easier to simmer with. No priming required.
- **Negatives**
More expensive than liquid fuels. Must be stored under pressure in special canisters that take up space in your pack. Canisters cannot be refilled and must be carried in and out of the wilderness. Harder to find in many areas of the world.

Basic operation

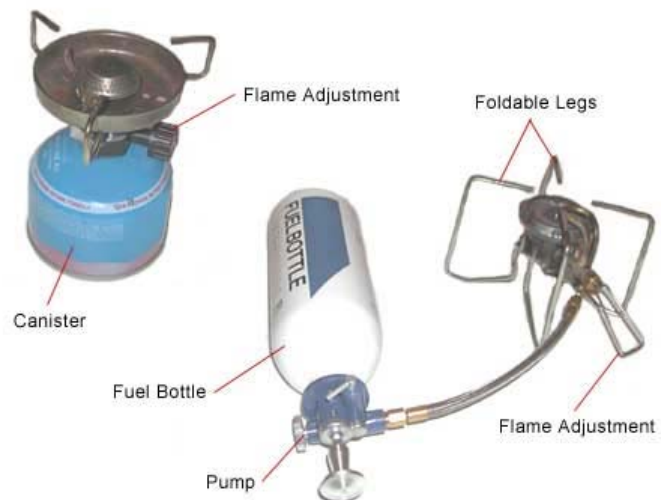
Most backpacking stoves have two main parts, a fuel container and a burner unit. The two can either be combined in a single piece or connected by a short fuel line. When a stove is in operation, fuel is forced from the fuel container into the burner unit by pressure. This pressure is either already present in a pressurized fuel container or it must be created (by you) using a small pump device. This pressure forces fuel through the fuel line and out through a small nozzle or "jet" in the burner unit where it mixes with oxygen and is ignited.

Converting fuel from a liquid to a gas

To burn efficiently, fuel must be ignited in its gaseous form. Liquid fuel stoves are designed to vaporize their fuel just prior to ignition by routing the fuel close to the hot burner unit before it reaches the jet. Heat from the burner (combined with the pressure in the fuel container) turns the liquid fuel into a gas as it flows through the fuel line (this takes place in a section of the fuel line called the generator). The hotter the burner unit is, the more efficient this conversion is.

Priming

Priming is the process of igniting a small amount of stove fuel (or other flammable substance) at the base of the burner unit to warm up the fuel's path before the stove is lit. This process heats up the burner, the



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fuel line and the generator so that when the stove is first turned on, liquid fuel will come out of the jet already vaporized for easy lighting. Priming is not necessary for stoves that use compressed gas fuels, since the fuel is already a gas when it reaches the burner. Some regular stove fuels (like white gas) can be used both for priming and regular stove operation. Others (like unleaded gas or kerosene) do not work well for priming. If you have trouble using your regular fuel for priming, carry a small container of priming paste of alcohol to use instead.

Choosing The Right One

Step #1: Consider the Kinds of Trips You have Planned

To find the right backpacking stove, focus on two things - the kinds of trips you want to take and the kinds of meals you want to enjoy.

Try to figure out how many people you'll be cooking for (which will affect how big a stove you'll need), what kinds of temperatures you'll be cooking in (which may affect the kinds of fuels you burn) and how complex your meals will be (which will affect how adjustable your stove will have to be).

Step #2: Choose the Right Size

Backpacking stoves come in a variety of sizes - from lightweight micro-stoves that fit in your pocket to two-burner platforms that barely fit in your trunk. In general, stick with the lightest, most compact model you can find, unless your plans include short trips, big meals and large groups of people.

To save space and weight in your pack, look for stoves that:

- Can be disconnected from their fuel supply - Many stoves can be unhooked from external fuel bottles for easier storage in your backpack and less chance of breakage.
- Fold up/collapse - The legs, base supports and pot holder arms of many backpacking stoves can be collapsed or folded for easier packing.
- Fit inside of cookware - Some stoves are designed to fit inside of popular cook sets. This can be a great space-saver (be sure to bring a plastic bag to put your stove in so no fuel spills onto your pots and pans).

Step #3: Consider your Fuel Options

Before you look at specific stove models, take a few minutes to decide which type (or types) of fuel will work best for you. This will help you narrow down your options:

Butane & butane blends - (Compressed gas)

- **Positives**
Convenient, clean-burning and easy to light. Burn hot immediately and do not require priming. Can be adjusted easily for simmering. Can't spill.
- **Negatives**
More expensive than other fuel types. You must carry and dispose of the fuel canisters (most are non-recyclable). Performance may decrease in temperatures below freezing (blended alternatives - Butane/Propane and Isobutane - work better than straight Butane in cold conditions. Pure propane works well down to 0°F. Butane will not work below 32°F).
- **Overall review**
Great for warm-to-moderate-weather campers who want easy adjustability, few hassles and who don't mind carrying a little extra weight in their packs.

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Kerosene - (Liquid)

- **Positives**
Inexpensive, easy to find (throughout the world), high heat output, spilled fuel does not ignite easily.
- **Negatives**
Somewhat messy (burns dirty, smelly). Priming is required (easier if a different priming fuel is used), tends to gum up stove parts. Spilled fuel evaporates slowly.
- **Overall review**
A cheap, versatile fuel choice, especially for backpackers who plan on traveling outside of the United States (where white gas and Butane blends may not be readily available). Not as clean or easy to deal with as butane or white gas.

White gas - (Liquid)

- **Positives**
Inexpensive, easy to find throughout the United States. Clean, easy to light, spilled fuel evaporates quickly.
- **Negatives**
Volatile (spilled fuel can ignite quickly), priming is required (fuel from the stove can be used). Can be hard to find outside of the United States.
- **Overall review**
A great overall performer, perfect for travel throughout North America in just about any weather conditions. Reliable, inexpensive and efficient.

Denatured Alcohol - (Liquid)

- **Positives**
A renewable fuel resource, low volatility. Burns almost silently. Alcohol-burning stoves tend to have fewer moving parts than other types, lowering the chance of breakdown.
- **Negatives**
Lower heat output, so cooking takes longer and requires more fuel. Fuel can be hard to find outside of the US and Canada.
- **Overall review**
A viable, environmentally-friendly option for travel in the US and Canada, especially if you crave peace, quiet and a slow pace on your backpacking trips.

Unleaded gas - (Liquid)

- **Positives**
Very inexpensive, easy to find throughout the world.
- **Negatives**
Burns dirty/sooty, can lead to frequent stove clogs. Extremely volatile.
- **Overall review**
Usually used as a last resort only. Price and availability make it an attractive option for backpackers traveling in extremely remote areas.

NOTE: Never use oxygenated gasoline in your backpacking stove. Sold in many parts of the US in the winter months, its additives can destroy rubber stove parts and seals.

Multi-fuel stoves

Many backpacking stoves are designed to burn more than one type of fuel. They tend to cost more than

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single-fuel models, and they can be more difficult to maintain. But if your plans involve visits to a wide range of destinations, the added flexibility will be worth the extra cost.

Step #5: Look for a Stove Design that Works for You

Backpacking stoves come in all kinds of shapes, sizes and designs. Once you've decided on a general size and fuel type, take a look at your options and ask yourself:

- How easy is the stove to set up? Does it require assembly every time it's used? If so, is the assembly easy or complex?
- Is the stove sturdy? Is it stable on uneven ground? How hard is it to balance a pot on top?
- If a gas canister is used, is it easy to attach and remove? Can it be detached before it's completely empty?
- How easy is the stove to light? Does it require priming? Can it be primed with fuel from the stove itself?
- How easy is the stove to control? Can the heat output be adjusted easily? Will the stove simmer?
- How easy is the stove to maintain in the field? Can I handle basic maintenance myself?

Step #6: Consider Performance

Finally, once you've narrowed down your stove choice to a handful of specific models, consider their overall performance. A good way to do this is with a retailer's comparison chart. Consider variables like:

- **Average boiling time** - This measures how hot the stove burns.
- **Water boiled per pint of fuel** - This measures how efficient the stove is. It's like comparing cars based on how many miles-to-the-gallon they get.
- **Burn time at maximum flame** - This measures how long the stove will burn on a given supply of fuel before it has to be refilled.

Hints for improving your stove's performance:

- Use a lid when cooking.
- Use a windscreen.
- Use a heat-exchanger on trips of more than a few days (to improve fuel economy).
- Use alcohol for priming (this will help keep your stove soot-free).
- Learn how to clean and maintain your stove properly.
- Use a coffee filter to filter all of your liquid fuel before use.
- Use the sun or body heat to melt snow (rather than your stove).

Camping & Backpacking Gear Essentials

Cookware

How to Choose the Right Cookware

Step #1: Consider the Trips You have Planned

Short trips and simple menus will require the basics only (see below). Longer journeys and bigger groups will likely require more.

The basics (per person)

- Single pot, with a lid that can double as a plate
- Cup
- Basic utensils (spoon and knife)
- Some way to pick the pot up (either a handle, bail or pot-grabber)

Step #2: Decide Between a Cook Set or Individual Pieces

Collecting your cookware and utensils piece by piece gives you the freedom to choose exactly what you want. You can use items from home, borrow pieces from friends or even raid garage sales.



But purchasing a backpacking cook set will save you space, weight and time. Cook sets (specially designed collections of pots, pans and lids) are designed to "nest" together so the entire set takes up only the space of the largest pot. Many are also designed so stoves (and other utensils) fit inside for even more space efficiency. Because they're designed specifically for outdoor uses like backpacking, most cook sets are made of lightweight, durable materials that weigh very little but last season after season.

Step #3: Consider the Material Options

- **Aluminum**
Positives - Lightweight, affordable, a good conductor of heat. Good for simmering foods without scorching.
Negatives - Breaks down slowly when exposed to acidic foods. Dents and scratches easily.
- **Stainless steel**
Positives - Tougher, more scratch-resistant than aluminum. *Negatives* - Heavier than aluminum, doesn't conduct heat as uniformly (can cause hot spots that scorch food).
- **Titanium**
Positives - Super lightweight, extremely tough. A must if weight is your number one concern.
Negatives - More expensive than other options. Conducts heat less evenly than stainless steel.
- **Non-stick coatings (Available on some metal cookware)**
Positives - Make clean up a breeze.
Negatives - Less durable than regular metal surfaces. Most can be scratched by metal utensils.
- **Plastic**
Positives - Lightweight, cheap, non-abrasive. Perfect for utensils and air-tight food containers.
Negatives - Not as durable or heat-resistant as metal. Some plastics can pick up and retain food flavors/odors.

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Step #4: Focus on the Important Variables

- **Pot size** - The largest pot in your cook set should hold approximately one pint per backpacker. Smaller pots should fit snugly inside the largest one.
- **Number of pots** - One pot is usually fine for 1 or 2 people (especially if the lid doubles as a plate). A three-pot set should be enough for groups up to 5 people, unless you have complex meals planned.
- **Lids** - Lids cut down on cooking time and save fuel. They can also be used as plates or even frying pans. Make sure your lids fit your pots snugly and that they're easy to pick up. You should have one lid for every pot in your set (or one that fits multiple pots).
- **Lifters** - Make sure you have some way to pick up your pots and pans. Wire bails and collapsible handles are convenient, but they can break and/or get too hot to touch. Pot-grabbers are durable and easy to use. But you have to remember to pack them!
- **The extras** - Some cook sets come complete with "extra" pieces (cups, basic utensils, plates). Ask yourself if you really need them, and keep in mind that many of these extras can also be purchased separately, often at a lower price.

A note on utensils

When it comes to utensils, minimalist backpackers often make do with nothing more than a knife, spoon and a pot scrubber for clean up. But everything from garlic presses to miniature espresso makers are available these days, if you care to treat yourself and bring them along. The utensils and "extra" cookware you carry with you should match your tastes and your menu. Other examples of cookware extras to spice up your backcountry kitchen, including:

- **Utensils** - Spatulas, serving spoons, whisks
- **Extras** - Frying pans, coffee/tea pots, backcountry ovens, espresso makers, spice containers, squeeze bottles

Best Choices! Source – Backpacker.com

GSI Outdoors – www.gsioutdoors.com

Hard Anodized Extreme Cookware: Lightweight, durable, and easy to clean, this is the best camp cookware we've used. The Extreme pots are made from lightweight aluminum that's been "hard anodized," a process that alters and toughens the cooking surfaces. Even better, the pots distribute heat more efficiently than other camp cookware which translates into faster boiling times, even cooking, and reduced fuel consumption. 1 lb. 10 oz., \$61.00

Backpacker's Pantry – www.backpackerspantry.com

Outback Oven 10: Look no further if you want trail baked goodies that taste just like home cooked. Serves 2 to 4 people. The system consists of a simple nonstick coated frying pan and lid, plus a heat diffuser that raises the pan from the stove burner to prevent scorching and an aluminized fiberglass dome that fits over the oven to trap and circulate heat. A thermometer built into the lid handle helps you keep the brownies from burning. The Outback Oven comes in three sizes. 1 lb. 7 oz., \$54.90

Camping & Backpacking Gear Essentials

Flashlights & Headlamps

For safety's sake, you should carry a portable light source with you every time you travel in the wilderness. Sooner or later you'll be glad you did!

Step #1: Consider Your Options

Choose a portable light source that makes sense for the kinds of trips you'll be taking. Most backcountry travelers carry compact personal flashlights or headlamps. But larger groups often carry an area light (or 2) as well, to brighten up tents and eating/socializing areas.

- **Personal flashlights** - Battery-powered flashlights are by far the most common type of light used in the wilderness. They're compact, lightweight and easy to use. And you can direct the light exactly where you need it. One of the best choices considering weight, durability and size to light output is the Mini Maglite that uses two AA cells. This basic design also comes in a hard rubber case for even less weight. Avoid flashlights that use larger cells (C, D, or lantern) especially for backpacking.



- **Headlamps** - Battery-powered headlamps work like traditional flashlights, but they let you keep both hands free to tackle the task at hand! This can be a great bonus when you're trying to set up your tent, cook dinner or fix a stuck zipper in the dark. Models that use two AA cells are quite adequate.



- **Candle lanterns** - Candle lanterns offer reliable, long-lasting performance at an affordable price. They're perfect for activities like reading at night or eating dinner when you need a moderate level of area light for a long time, but you don't want to burn lots of batteries.



- **Lanterns/area lights** - Designed to illuminate large spaces, lanterns and area lights are great on longer trips with lots of people. But they're heavier and bulkier than most other options. Gas and liquid fueled models are harder to set up and use than models that run on batteries but less expensive to operate.



Step #2: Consider the Power Source

The power source a light uses affects how bright it is, how long it lasts and how easy it is to work with. It will also determine how much extra weight you have to carry with you to stay charged up.

- **Batteries** - These are convenient, easy to find and relatively inexpensive. But they can get heavy if you have to pack dozens for a long trip. Don't forget to pack them out with you and dispose of them properly.
 - Alkaline - Inexpensive, relatively long-lasting, dim slowly (so you know when it's time to switch). Performance drops significantly in cold conditions.
 - Lithium - Longer-lasting than alkaline, lighter, and work down to -20°F with little loss of life. More expensive, however, and when they're done, they quit without warning.
 - Nickel-cadmium - Rechargeable (some up to 1,000 times). More expensive up front, but a better deal in the long run. Don't last as long on a single charge and they lose the ability to hold a charge over time. Lightweight, compact solar chargers are now available that work great in the backcountry!
- **Candles** - Lightweight, inexpensive and long-lasting! Provide a little warmth along with light. Not as bright as other options. Can be a safety hazard if used carelessly.

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- **Liquid fuel, compressed gas** - Some lanterns/area lights run on the same fuels used in cooking stoves. This can be convenient if you're already carrying a fuel supply for your stove. But you'll have to carry more fuel with you, and you may not be able to use the light while you're cooking.

Step #3: Consider the Design Features

To find a light that meets your needs, ask yourself what you want your portable light to do. Consider your answers to the following questions and then look for features that address your needs:

- Do you want a light that's easy to transport, easy to carry?
- Do you want one that can be adjusted to different brightnesses?
- Do you need one that's easy to turn on and off (or light up)?
- Do you want a light that's easy to focus in one area?
- Do you want a light that you can suspend or hang easily to provide overhead light?
- Do you need one that can be held (or worn) easily when performing other tasks?

Different models will meet different needs.

Camping & Backpacking Gear Essentials

Maps

How to Choose the Right Map

Step #1: Consider the Kinds of Trips You Have Planned

The map (or maps) you bring with you on a backpacking trip should match the route you have planned. The longer and more complex that route is the more detail you'll need to keep track of where you are.

On short trips over popular, well-marked trails, you'll need a map that helps you find basic features like campsites, water supplies and points of interest. But on longer, more complex journeys, you'll need details about the lay of the land so that you can make it from point A to point B even if you lose the trail.

Step #2: Consider Your Options

- **Planimetric maps** - Planimetric maps describe the world as if it were a flat surface. They typically show basic details like main trails, lakes and campsites. But they do not provide any elevation information. Use a planimetric map only when traveling short distances along well-established trails.
- **Topographic maps** - Topographic maps describe the physical features of the land. They show elevation gains and losses, the steepness of hills and valleys, and the location of natural features. This topographic information is essential for navigating using a map and compass. Some topographic maps (but not all) combine topographic information with basic information about trails, campsites and natural attractions. The main supplier of topographic maps in the US is the United States Geological Survey (USGS).
- **Special interest maps** - These special topographic maps cater specifically to outdoor enthusiasts. They combine basic topographic information with detailed information about backpacking trails, established campsites, interesting side trips, and recreational opportunities. Most are produced by private companies rather than the US government.

Quadrangles vs. specialty maps

Topographic maps sold by the USGS cover rectangular areas of land called quadrangles. The borders of these maps are determined by latitude lines, longitude lines and the smaller divisions between them (minutes and seconds). The benefit of this system is that every square inch of the United States is covered by a USGS quadrangle map, and that each map lines up exactly flush with the ones around it. The down-side is that backpacking trails often wander across these predetermined borders, so you may have to carry more than one map.

Some private map companies address this situation by offering topographic maps that are drawn specifically to cover popular backpacking trails. These maps offer the same basic information as USGS maps. But they have irregularly shaped borders so they cover an entire route or area with a single map.

Step #3: Choose the Right Scale

The scale of a topographic map determines how much land the map covers and how much detail it provides. Scales are described in ratios (1:24,000, for example, means that one inch on the map is equal to 24,000 inches - or 2,000 feet on the ground). The scale of a map is usually displayed along the bottom edge of the map.

- **Small-scale maps** (maps with scales smaller than 1:62,500) cover a lot of area, but they provide less detail as a result. They tend to be a poor choice for beginning backpackers.
- **Large-scale maps** (1:62,500 or larger) focus on more specific areas and provide more detail. You may have to carry more than one to cover your route. But they provide much more useful information for basic backpacking.

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The most popular map scale choice for basic backpacking trips is 1:24,000 (also known as 7.5 minutes of longitude wide). 1:62,500 scale maps (also known as 15 minutes maps) are also popular, though they are no longer produced by the USGS and are becoming more difficult to find.

Step #4: Ask the Experts for Help

As a beginning backpacker, it may be hard for you to know ahead of time what kind of map you'll need for a given trip. Don't be afraid to ask for help! Talk to friends who are experienced backpackers or contact the local park rangers who manage the lands you'll be visiting. These experts can help you get prepared for your first few trips. After that, experience will guide you.

Step #5: Learn How to Navigate

Simply having the right map in your backpack won't protect you from getting lost. You still have to learn how to use a map and compass to navigate in the wilderness. Pick up an introductory book on map and compass navigation or take a class from an experienced teacher. It's never too early to learn the basics of navigating in the backcountry - the sooner you understand the basics, the safer you'll be.

Step #6: Be Sure to Check the Date

Before you take any map into the wilderness, be sure to check the publication date. Road, trail and land information can go out of date over time. Make sure you have the latest maps available for the area you want to explore.

Note on map storage

Be sure to protect your maps from water, fuel and other liquids during your backpacking trips. Either apply a special water-repellent coating to the maps or store them in a durable, clear plastic map case. Some maps are now printed on tear-proof, waterproof plastic paper, eliminating the need for special cases.

Camping & Backpacking Gear Essentials

Compasses

Even in this era of high-tech, satellite-assisted navigation, a compass remains one of the “10 Essentials” of wilderness travel. True, you may hike for days on a trail and never even look at it, yet if you take a wrong turn or a whiteout blows in, a compass (in tandem with a map) suddenly becomes one of the most important tools in your pack.



The ability to navigate with map and compass is a crucial wilderness skill, especially if you travel off-trail. Take the time to learn it; some day it may save your life.

Inexpensive, basic compasses are quite adequate for wilderness travel; specialized features such as a declination adjustment and/or mirror is worth a little extra money to experienced backcountry explorers.

1. Basic and specialized compasses share many features; slightly more sophisticated models offer a sighting mirror, a declination adjustment, a magnifying lens and other extras.
2. A compass and a GPS receiver are complementary instruments; a GPS unit, however, does not replace a compass.
3. Metal, magnets and electrical fields can affect the accuracy of a compass.

Types of Compasses

Accessory Compasses: The type found on key rings or watches, or small round compasses with no base plate. They accurately point toward magnetic north, but are designed more for fun and quick reference than serious navigation.

Basic Compasses: Inexpensive, yet quite sufficient for wilderness travel; well-suited for beginners. They have all the essential components but lack some bonus features, such as a declination adjustment or a mirror. Example: Suunto A10 Partner II.



Specialized Compasses: Full-featured models with many extras (a mirror, magnifier, et al.). Well worth the added cost if you are a regular wilderness explorer, particularly one who regularly travels off-trail. Example: Silva Ranger Type 515 CL.



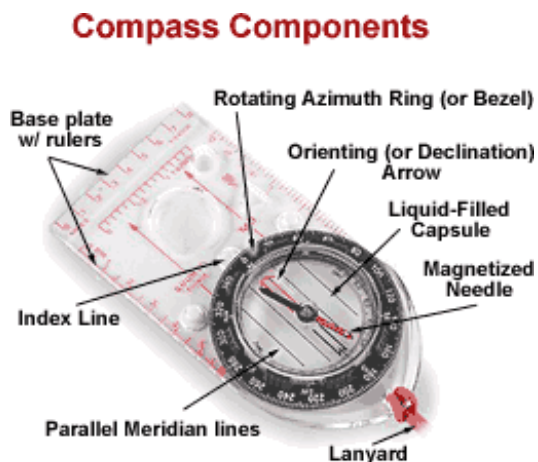
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Basic Compass Features

Backpackers customarily use what is known as a "base plate" or "orienting" compass. ("Orienting" refers to the act of determining your exact position; "navigation" is the process of determining your destination and guiding yourself toward that objective.)

- **Magnetized Needle** - Usually the red end of a pivoting compass needle. This end points to the strongest magnetic field, which is usually the **magnetic North Pole**. "Magnetic north" is different from "**true north**" - the geographic North Pole, where all longitude lines meet. Magnetic north, one of earth's two magnetic poles, lies in an island chain within the Canadian Arctic. True north and magnetic north are separated by more than 1,000 miles.

Note: When working with a map, you must compensate for the difference between true and magnetic north. See **Declination Adjustment**.



- **Liquid-Filled Capsule** - The housing (or dial) that contains the needle, the needle's bearing (or pivot) and damping fluid. The fluid protects the needle from jarring and minimizes needle movement during readings.
- **Rotating Azimuth Ring (or Bezel)** - A ring marked with degrees from 0 to 360 (preferably in 2° increments) that encircles the outer edge of the compass capsule. The "azimuth" is your direction of travel (expressed in degrees) between two points. Azimuth and "bearing" have come to mean the same thing.
- **Base Plate** - A rectangular, plastic, preferably transparent base where the capsule sits. Better compasses have rulers (in inches and centimeters) etched into the "straight edges" of the plate. These are helpful when measuring distances on a map. Try to select a compass that offers scales you are likely to use. Common scales are 1:24,000 and 1:25,000.
- **Orienting Arrow and Parallel Meridian Lines (or, North-South Lines)** - Located on the bottom of the compass housing. The non-magnetic arrow's directional end is usually red and, coupled with the meridian lines (which you align with the north-south lines on a topographic map), helps orient your line of travel on a map.
- **Index Line or Direction-of-Travel Line** - Located at one end of the base plate.

Specialized Compass Features

- **Declination Adjustment** - A more sophisticated orienting arrow, one that can be aligned to reflect the "magnetic declination" in your area of travel. (This is the difference between true north and magnetic north.)

In many cases, a tiny adjustment tool, usually connected to the lanyard, is used to turn a small screw on (or near) the compass housing. When adjusted, the orienting arrow is no longer parallel with the north-south lines; instead, it will be offset for the difference you dial in. This should correspond to the area you are planning to traverse. Then, when the north-south lines are aligned on a map, the adjusted arrow will accurately point toward magnetic north, indicating the angle of declination. New adjustments must be made for different area of the country.

A fixed orienting arrow, meanwhile, requires you to "do the math" and make manual adjustments for each new measurement. (Some people use a piece of tape to mark the angle of declination on

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an inexpensive compass.) An adjustable arrow, though, allows you to "set it and forget it," a very nice convenience.

A note on magnetic declination: In parts of the central United States, magnetic declination has nearly zero impact on compass readings. In parts of Washington state, meanwhile, magnetic north can make a compass needle lean east of true north by as many as 20°. In northern Maine, the needle may swing west of true north by 20°. In northern Alaska, the angle of declination can exceed 30°. Maps sometimes include an angle-of-declination "pie" in their legend. The newer the map, the more reliable the angle shown in the pie. This is because the rotation of the earth causes magnetic north to shift roughly 1/10 of 1 degree each year.

- **Magnifying Lens** - A small lens mounted into the base plate; handy for reading tiny map symbols.
- **Sighting Mirror** - A fold-out surface that can improve accuracy when gauging readings on distant landmarks. It also doubles as a signaling/personal mirror.
- **Luminescent Indicators** - These are good to have on your magnetized needle, on both sides of your orienteering arrow, even on the azimuth ring's four cardinal points.
- **Clinometer** - Allows you to measure the angle of a slope; helpful for assessing avalanche hazard and the heights of objects.
- **Lanyard** - A piece of string that allows you to attach a compass to a belt or pack.

Which One Is Right for You?

Basic Compasses: These models are great for **beginning adventurers**, unless the beginner is an especially ambitious person who intends to progress rapidly to an advanced level. People who almost always stick to trails (experienced dayhikers, recreational backpackers) can easily get by with an inexpensive model. The extras found on specialized models (mirrors, magnifiers, declination arrows) are nice but not essential for casual explorers.

Specialized Compasses: Anyone who makes frequent compass checks knows the value of an adjustable declination arrow. For those who have owned a compass with this feature, there is no going back; a declination adjustment is a must. If your travels regularly take you **off-trail**, seriously consider spending the extra money for a model that includes this feature. Some less expensive models, such as the Suunto M-2D, offer it. A sighting mirror is next to essential especially for accurate land-navigation.

Can a GPS Receiver Replace a Compass?

A compass and a satellite-based Global Positioning System receiver are complementary tools. A compass does one thing a GPS unit cannot - point toward magnetic north. GPS units equipped with an electronic compass are gradually coming to market. Still, GPS receivers are battery-powered devices that potentially could run out of power. A compass, relying solely on the earth's magnetic forces, has no such limitations. Thus, even if you own a GPS unit, you will always want to carry a compass as well.

GPS receivers are splendid devices. They are designed to **measure direction of movement** by calculating the difference between your current position and last position. They can also tell you your position without relying on visible landmarks for bearings. On days of snow or heavy fog, that's a big plus.

Another GPS advantage: When following a bearing via compass, obstructions sometime cause you to stray from your ideal line of travel. This requires you to keep careful track of any deviations you take from your bearing, to the point of counting the paces you take while sidestepping the obstacle. Once past the obstacle you might need to adjust your compass bearing, but key landmarks may no longer be in view. With a GPS unit, however, you can easily obtain a new bearing and reset your compass with a revised line of travel.

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Compass Tips and Terminology

- **Metal** can distort a compass reading, so be sure to take bearings away from your car, camera or other metallic objects. Metallic interference can easily alter a compass reading by 20 to 60 degrees. So, if you are plotting bearings at a picnic table, check to see if your compass is being exposed to metal bolts or brackets that may affect its accuracy. Electrical fields (a running car engine, for example) can also throw off the accuracy of a compass.
- Be careful **where you store a compass**. For example, do not store a compass on top of a stereo speaker, which is equipped with a powerful magnet, or a place exposed to strong electric current. Over time, such exposure could demagnetize the needle. A compass responds to the dominant polar source in its vicinity; you want it to be the earth.
- Compasses not only need to be held level to "swing" properly, they need to be appropriate for the latitude. In general, the earth has 5 different magnetic "**dip**" zones. These areas can cause a compass needle to point up or down, affecting the accuracy of a bearing. Fortunately, all of the contiguous United States fall within the same magnetic dip zone.

Note: Most compasses correct for dip by slightly unbalancing the needle. This works fine as long as you stay near the same latitude. If you visit a place with a much different latitude (the Southern Hemisphere, perhaps), your compass may not work properly. Some compasses (e.g., the Suunto Global Compass) are specially designed to work anywhere on the planet.

- The 4 principal directions shown on a compass - north, south, east and west - are known as **cardinal points**. The face of a compass is sometimes referred to as a **compass rose**.
- A **bearing** (once known as an azimuth) refers to the direction of travel - expressed in degrees - you follow to arrive at a destination. Traditionally, bearings have been measured from the north or south points of a compass. A bearing of N60°E (angling to the east-northeast) has an azimuth of 60°. A bearing of N90°W (due west) has an azimuth of 270°. Such a nuance is irrelevant to most compass-users, though there is a distinction that advanced navigators will wish to consider.

Note: To avoid confusion when communicating with others, it is helpful to express all bearings with the north references. For example: 30 degrees true; 10 degrees magnetic.

Bottom Line: A compass remains an essential tool for safe wilderness travel. Strengthening your grasp of map and compass skills through practice and field work will make you a more self-assured backcountry traveler.

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First-Aid Kits

Whether you're day hiking or undertaking an extended backcountry adventure, always equip yourself with a first-aid kit. Minor scrapes, cuts, a bee sting or a headache can happen anywhere, anytime. It pays to be prepared.



Pre-assembled kits are convenient for beginning backpackers.

1. Always carry basic supplies on trips of any length; adapt your kit for more demanding trips.
2. Understand basic first-aid principles; always carry a manual.

Pre-Assembled First-Aid Kits

Most beginning backpackers select pre-assembled first-aid kits as a matter of convenience rather than building their own. It's an easy way to make sure you have not forgotten any of the basics.

Most kits are packed compact, water-resistant pouches that can be refilled and reused.

First-Aid Basics

Whether you're choosing a pre-assembled kit or building your own, make sure you carry the supplies that match your trip plans. Think about:

- the number of people participating
- your trip's duration
- the strenuousness and potential dangers inherent in your route
- the distance you must travel to reach medical assistance

The Essentials

Every first-aid kit should include:

- **A manual:** a comprehensive, easy-to-follow first-aid instruction booklet that clearly explains how to handle basic problems
- **Basic bandages:** assorted adhesive bandages, athletic tape and moleskin
- **Basic drugs/lotions:** aspirin, antiseptic, antacid tablets, sunscreen and any prescription medicines
- **Basic first-aid tools:** tweezers, a small mirror, razor blade or knife
- **Miscellaneous items:** bee-sting kit, venom-extraction pump (if visiting rattlesnake territory), handy wipes, plastic gloves and eye pads

The Extras

For long trips and difficult routes, you may wish to include a larger selection of items such as:

- **Additional bandages:** gauze pads, ace bandages and butterfly bandages
- **Additional drugs/lotions:** burn ointment and Caladryl (for relief of skin irritations)
- **Additional first-aid tools:** sling, basic splint, forceps, instant ice pack and thermometer

Additional items depend on your specific needs.

Know Basic First Aid

A fully stocked first-aid kit is useless unless you know how to use the supplies inside. Make sure you know basic wilderness first aid before you leave home.

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Rainwear

Your outer shell does more than keep off rain. Rainwear also protects you from wind, snow and cold. Different garment styles, fabrics and construction are available to suit a wide variety of needs.



1. Your choice of rainwear depends on expected weather and climate, your planned activities and your budget.
2. The main fabric choices for rainwear are waterproof/breathable, water-resistant/breathable, and waterproof/non-breathable.
3. Waterproof/breathable fabrics, available in different weights, are the most versatile fabrics.
4. Features such as vents, zippers and linings can add to your comfort.
5. Other considerations include a garment's style and cut, plus how well it packs.

Consider Your Needs

Choose rainwear appropriate for your outdoor plans. How and where will you be using it? Anticipate the most extreme conditions you might encounter and plan accordingly. Will you be in a canoe, waiting for the fish to bite? Hiking or running a trail? Visiting a rainforest? Skiing or climbing in a snowstorm? Walking around town?

Begin your search for the right rainwear by considering all of the following:

- Temperatures you expect to encounter most often
- Amount and type of precipitation you anticipate
- Types of activities where you'll use your rainwear
- Budget

Consider Fabric Choices

Fabric affects the performance and comfort of your outer layer. Rainwear fabric falls into three basic categories:

- Waterproof/Breathable
- Water-Resistant/Breathable
- Waterproof/Non-Breathable

Waterproof/Breathable

Because water vapor is able to pass through the fabric, waterproof/breathable shells are appropriate for the widest range of activities and weather conditions. Such fabrics are not 100 percent waterproof or perfectly breathable, but they do an impressive job of repelling water while allowing water vapor to escape as you work up a sweat.

Typical Uses - Waterproof/breathable fabric can be found in a variety of garments - technical parkas for skiing and mountaineering, more casual rainwear for hiking or around-town use.

Positives - Waterproof/breathable layers are an excellent choice for a wide range of weather conditions and activities. Their combination of breathability and moisture protection means that you can buy a single layer for everything from summer backpacking to backcountry skiing.

Negatives - Even waterproof/breathable fabrics have their limits. Exact performance depends on the specific type of waterproof/breathable fabric used, the outside temperature, your activity level and other factors. Waterproof/breathable fabrics are more expensive than other types of outerwear.

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Examples - There are two types of waterproof/breathable fabrics: laminates and coated fabrics. Both are very effective. A membrane such as Gore-Tex®, REI Elements® or Marmot MemBrain™ is laminated to a base nylon or polyester fabric. Or a waterproof/breathable coating is applied. Coated, waterproof/breathable fabrics include Hydroseal®, Columbia Sportswear Omni Tech Ceramic™ and Lowe Triple Point® Ceramic. All of these fabrics also have a durable water-repellent finish (or DWR) on the outside that causes water to bead up and roll off.

Water Resistant/Breathable

These shells serve as breathable outer layers for mild weather, light precipitation and high activity level. They're made of tightly woven fabrics (such as mini ripstop nylon) that block the wind, and they're also treated with a durable, water-resistant (DWR) outer finish to make water bead and roll off.

Typical Uses - Water-resistant/breathable fabrics are perfect for anyone who needs weather protection during strenuous outdoor activities such as running, cycling or Nordic skiing. They're also appropriate in warm conditions where breathability is important and the chance of heavy precipitation is low.

Positives - Water-resistant/breathable layers repel wind and light precipitation while providing excellent breathability to keep you cool when your body heats up. They tend to be lighter, less bulky and less expensive than other outer layers.

Negatives - They are not adequately weatherproof to protect you in harsh conditions or during extended periods of rain.

Examples - This rainwear is typically made of lightweight polyester or nylon, which is tightly woven to keep out wind and light drizzle while allowing water vapor to escape. The fabrics have a durable water repellent (or DWR) finish that causes water to bead up and roll off before it can be absorbed.

Waterproof/Non-Breathable

Typically made of a durable, polyurethane-coated nylon or PVC, these economical shells are water- and windproof, making them ideal for light activity in heavy precipitation.

Typical Uses - Waterproof/non-breathable layers are most commonly used during low-energy activities and when the chance of heavy precipitation is high. Because they're so affordable, waterproof/non-breathable fabrics are also used occasionally in moderate conditions. Examples include ponchos and vented rain suits.

Positives - Waterproof/non-breathable layers offer the ultimate protection from rain and wind. They are more durable and less expensive than most other outer layer options.

Negatives - Non-breathable layers can get extremely uncomfortable with even moderate exercise and outdoor temperatures. The moisture and heat that your body produces cannot pass through the fabric itself so these layers must be cut extremely loose (ponchos, for instance) or they must have generous vents to allow body heat and sweat to escape. This type of rainwear is generally heavier and bulkier than other styles.

Examples - PVC and polyurethane-coated nylon jackets, pants and ponchos typically make up this type of rainwear.

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Consider Design Features

There's more to choosing rainwear than simply deciding on the right type of fabric. The cut of the garment and features such as vents and zippers also contribute to its overall function. Consider the following when making your rainwear choice:



Parka, Jacket, Anorak or Poncho - Full-zip jackets or parkas are easier to put on and take off than anoraks (pullover jackets). However, more zippers mean a higher risk of leaks. Parkas cover the hips for better overall protection, but shorter-cut jackets typically pack down smaller and provide ample coverage when paired with rain pants. Ponchos are inexpensive, waterproof and allow plenty of ventilation.

Full-Zip or Pull-On Pants - While more expensive than pull-on types, rain pants with full side zippers allow quick changes on the trail, opening wide for boots or shoes. Pull-on rain pants can provide better protection in continued heavy rain. Again, fewer zippers mean fewer chances for leaks. Some feature ankle zips to allow easier changes.



Hoods - Integral (permanently attached) hoods offer the best resistance against leaks. Hoods that can be rolled up or folded away when not in use are less bulky.

Elastic cords with toggles that can adjust the hood around your face can greatly increase comfort and visibility. Some rainwear styles have hoods with stiffened visors, and some even have brims that can be shaped to fit better. Look for adjustment tabs on the back of the hood to allow for better fit and visibility.

Chin Guards - Chin guards are fleece or knit synthetic fabric linings on the inside of the collar that protect your face from zipper abrasion and the cold, wet and frost that can build up from freezing breath.

Pockets - The more pockets an outer layer has, the easier it will be for you to store essential gear items. But keep in mind that pockets increase the weight of the layer and can result in more leaks. Pockets should be easy to reach, easy to open and close, and well protected against leaks. Some jackets feature a Napoleon pocket, a vertically zipped pocket that allows you to assume the posture of Napoleon who often posed with his hand inside his jacket. We're not sure about Napoleon's rationale. Today, the pocket is designed to secure small items where they can be easily accessed.

Linings - Free-hanging nylon or polyester linings are often used to protect waterproof/breathable fabrics from wear and tear. Mesh linings weigh less and breathe better than solid linings but don't offer as much protection. Some outer layers (like 3-ply Gore-Tex®) have lining materials that are attached right to the inside face of the outer layer fabric, eliminating the need for a separate, free-hanging liner. More technical jackets feature moisture-wicking linings for comfort during high-energy activities.

Sealed Seams - Sealed seams are a must for any waterproof outer layer, since they keep water from seeping through sewing holes. Sealed seams are not necessary for water-resistant layers. Some manufacturers, including those making Gore-Tex® garments, seal their seams at the factory. Others recommend that you apply seam sealer at home, although this is not as common as factory sealing.

Vents - Vents enhance a garment's ability to breathe, no matter what type of fabric is used in its construction. The larger the vent, the better the airflow, but the greater the risk of leaks. Typical vents

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include under-arm zips, mesh-lined chest pockets that double as vents, and mesh shoulder yokes with draft flaps across the upper back.

Storm Flaps - Storm flaps cover zippers, pockets and other openings to protect against leaks. They are commonly found on front zippers, underarm zips, full-zip pants and external pockets.

Technical Design Features

Some rainwear is specifically designed for alpine sports or cold, wet conditions. Look for the following if your planned activities include climbing, mountaineering, skiing or snowshoeing:

- **Fabric Reinforcements** - prevent wear and tear at the seat, knees, elbows or shoulders from pack straps or contact with rocks or snow.
- **Articulated Elbows and Knees** - allow excellent range of motion.
- **Scuff Guards** - protect fabric on the inside edges of pant legs from skis or crampons.
- **Longer Sleeves** - keep arms covered while reaching with climbing tools.
- **Shorter Hems** - allow easy access to the climbing harness.
- **Drawcord Hem or Powder Skirt** - seals out wind, snow and rain.



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Backpacking Socks

The socks you wear on the trail can have a significant effect on your backpacking experience. Like footwear, socks must be chosen carefully to match the kinds of conditions you expect.

Step #1: Consider the Kinds of Trips You Have in Mind

Backpacking socks are designed to provide warmth, cushioning and abrasion resistance in a variety of conditions. The right sock for you depends on the kinds of trips you have planned and the weather conditions you expect. Here are the basic categories you have to choose from:

- **Liners** - Sock liners are thin, lightweight wicking socks designed to be worn right next to your skin. These liners wick sweat away from the surface of your foot to keep you dry and more comfortable. Liners also limit the amount of abrasion between your outer sock and your skin. They are designed to be worn under other socks.
- **Lightweight hiking/backpacking socks** - Designed for warm conditions and easy trails, lightweight backpacking socks stress wicking performance and comfort over warmth. These socks are thicker, warmer and more durable than liners alone. They also provide more cushioning. But they are relatively thin so that you can stay comfortable on warm weather trips. Because most lightweight backpacking socks are made from wicking materials, they can be worn with or without liner socks.
- **Midweight hiking/backpacking socks** – Sometimes called trekking socks - these socks are designed to provide reliable cushioning and insulation in moderate to cold conditions. They tend to be thicker and warmer than lightweight hiking socks. Many models have extra padding built into high-impact areas like the heel and the ball of the foot for maximum comfort. These socks should be worn with liners.
- **Mountaineering socks** - Mountaineering socks are the thickest, warmest and most cushioned socks available. They are designed for long trips, tough terrain and cold temperatures. Usually, mountaineering socks are too thick and warm for basic backpacking journeys in warm conditions.

Step #2: Consider Your Material Options

- **Wool** - Wool is an extremely popular natural sock material. It is warm, cushioning, and retains heat when wet. Unfortunately, wool can take a long time to dry and it can be scratchy next to your skin (NOTE: many new wool options, including mohair, do not have this problem). It can also wear out quickly if not reinforced with other materials. Wool blends (combinations of wool and synthetic materials) are extremely popular because they address many of these problems.
- **Synthetic insulating materials** – There are a number of man-made materials designed to insulate like wool and wick moisture, without the negatives mentioned above. These materials (Hollofil(R), Thermax(R), Thermastat(R)) trap warmth like wool, but they are softer on the skin. They also dry more quickly and are more abrasion resistant. These materials are available in a variety of sock styles and thicknesses.
- **Silk** - Silk is a natural insulator. It's comfortable and lightweight, but not as durable as other options. It's occasionally used in sock liners for reliable wicking.
- **Synthetic wicking materials** - The synthetic wicking materials (like polypropylene and Coolmax) used in wicking sock liners are often woven into thicker backpacking socks as well, to enhance wicking performance.
- **Cotton** - 100% cotton is not recommended as a sock material for backpacking. Cotton absorbs sweat, dries slowly, provides no insulation when wet and it can lead to discomfort and blisters out on the trail. However, cotton is extremely comfortable. And when combined with wool or other wicking and insulating fibers, cotton can be a great choice for light hiking in summer.

Cushioning materials - Many backpacking socks provide extra cushioning around the heel, the ball of the foot and the toe area to increase comfort. The padding is created either by increasing the density of the weave in those areas, or in some cases by weaving long-wearing materials like acrylic into those areas. This extra padding can be a real foot-saver on hard trips over rough terrain.

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Support materials - Many of today's hiking socks include a small percentage of either stretch nylon or Lycra(R) spandex. These elastic materials help socks hold their shape and keep bunching and wrinkling to a minimum.

Step #3: Take a Test Drive

When possible; take a quick walk in the sock styles you are considering to get a feel for how much cushioning they have. And be sure to buy the right size - your socks should fit snugly. Bunched up sock material can make any backpacking trip an uncomfortable one.