Subject: How to pack and adjust an internal and external frame backpacks

Catchy Title:

Presenters Name:

When to teach this topic: At the last meeting when gear and food have been distributed and everyone is ready to pack packs.

Who is this for (level of experience and age of participants): For those interested in the outdoors from 6th grade on. OLE and Passages Participants.

Resources:
- Backpackers Field Manual
- Wilderness Basics
- Internet resources
- Expeditionary books

Materials needed: Two backpacks – an internal frame and an external frame PSO can provide both and we would like it done with the PSO backpacks. So make sure you are familiar with them.

Outcomes: Things for you to know and teach so that all participants will be able to know and do each following bullet by the end of this lesson.
- Leaders will understand how to pack equipment into a backpack so that the backpack is balanced and equipment is accessible.
- Leaders will understand how and where to pack, food, fuel, pots and pans.
- Leaders will understand how to adjust packs starting with the torso height, then going to the shoulder straps, then to the riser straps and finally to the sternum strap.
- Leaders will understand the difference between packing an internal and an external frame pack.
- Leaders will understand the difference in how women and men carry weight.
- Leaders will understand how to help each other and participants on with their packs and why to role model this on trail with participants. This is role modeling asking for help and helping other.
Leaders will understand that hanging stuff on the outside of the pack is not packing a pack well because it does not create a tightly packed pack and it is easy to loose things (the exception is with pads, sleeping bags and tents on external frame packs.

**Introduction/Hook:** If you are going to take a horse to water...make sure it’s thirsty. Make sure you are doing this at a time when the participants need this information and are ready to hear it (are people warm, hydrated and well fed?).

**Very short activity/introduction:**

**Procedures & Activities:** Steps, e.g. models, structured practice, guided practice, independent work. Include time allotments for all steps in each section. Usually 5-10 minutes per section. Timing is very important.

**Explain & Demonstrate:**

Step 1 __ minutes

Step 2 __ minutes

Step 3 __ minutes

Step 4 __ minutes

**Practice (individually if appropriate):**

**How to Assess each individuals skills:**

**Closure/Evaluation:** How will you close the lesson? How will the students remember what they learned today? Homework? Summary? Quiz? When? Usually allow at least 5 to as much as 10 minutes for this section.

**Evaluation:** Analyze the strengths and weakness of the lesson as it actually happened. Include things to avoid next time you teach the lesson, and what went particularly well. How was the timing of the lesson?
FITTING

Proper fitting of boots is essential. You should try new boots on in the afternoon, since your feet swell during the day. Select a sock combination of a liner sock and outer sock, and try the boots on. The boots should fit comfortably with moderate tension on the laces so you can tighten or loosen the boots as needed. With your foot flat on the ground, try to lift your heel inside the boot. There should be only ¼ to ½ inch (6 to 12 millimeters) of heel lift.

BREAKING IN

Break in a pair of boots before your trip. Begin with short walks and gradually increase the time you wear them to allow the boots to soften and adjust to your feet. Easy day hikes are a good way to break in boots. Each time you lace your boots, take the time to align the tongue and lace them properly; otherwise the tongue will set into a bad position. If you haven’t worn your boots for a while, it is a good idea to wear them for several days before a trip to rebreak them in.

BOOT CARE

Boot care varies with the type of material—leather, synthetic leather, nylon, and combinations of these. If you have leather hiking boots, find out what type of leather it is. Oil-tanned leather is usually treated with wax or oil, chrome-tanned leather with silicone wax (a beeswax-silicone mixture is recommended). The primary reason for treating boots is not to completely waterproof them, but to make them water repellent and to nourish the leather to prevent it from drying and cracking. Boots should be treated when they are new and on a regular basis to keep the leather supple.

Wet boots should be air-dried slowly or with low heat (put them in the sun). Don’t try to dry boots quickly (for example, near a fire or a radiator)—different thicknesses of leather dry at different rates, which leads to cracking and curling. I’ve seen boots peel apart from drying too fast, and a boot that was too close to some hot coals actually caught on fire. While walking on the trail, the heat from your foot will help dry the boot. At the end of the day, when you take off your boots, open them up as much as possible to help them dry out. (This will also make them easier to put on in the morning.) You may want to leave your boots upside down at night to prevent dew from forming inside.

UP THOSE COLD BOOTS

On a cold night, turn your sleeping bag sock inside out and put your boots inside. Sleep with the stuff sock between your legs. The coated nylon of the stuff will keep the wet boots from soaking your sleeping bag, and your body heat will keep the boots warm and help dry them out a bit so you won’t have to face cold or even frozen leather in the morning.

When you return from a trip, always clean your boots before you store them, or the dirt will corrode the stitching at the seams. Use a stiff, nonwire brush to remove caked-on dirt. For leather boots, rub them with moistened saddle soap. Wipe off the residue, air dry them thoroughly, then apply a generous coating of wax or sealer. Store your boots in a cool, dry place to prevent mildew. Boot trees can help maintain the shape of your boot and cedar boot trees can absorb moisture from the inside of the boot, helping it dry slowly.

THE BACKPACK

There are two basic types of frame packs: external and internal. The purpose of the frame is to transfer most of the weight of your gear onto your hips, so the strong muscles in your legs carry the load, rather than your shoulders. If you remember trying to carry loads of books home from school in a day pack, you know what I mean. The ideal distribution is about 80 percent of the weight on your hips and 20 percent on your shoulders. This split in weight also lowers your center of gravity, making you more stable. Recent advances in pack design offer an incredible range of sizes and options.

External Frame | Internal Frame
**External Frame** The external frame pack helped revolutionize backpacking. Suddenly, much larger amounts of weight could be easily and safely carried, allowing for longer trips. External frame packs typically use a ladder-like frame of aluminum or plastic. The hip belt and shoulder straps are attached to the frame (see diagram, page 23). A separate pack bag attaches to the frame, usually with clevis pins and split rings. Some external frame packs come in specific sizes based on the length of your spine; others are adjustable to fit a range of sizes. Look for good lumbar padding, a conical hip belt, recurved shoulder straps with good padding, and a chest compression strap. *Pro:* Good for carrying weight. The external frame allows for some air space between your back and the pack bag so you don’t sweat as much. The weight is carried higher in the pack, allowing for a more upright posture. Frame extension bars and space for a sleeping bag outside of the pack allow you to strap on lots of gear when you need to, making the carrying capacity of the pack more versatile. Less expensive than many internal frame packs. *Con:* Most external frame packs have little, if any, flexibility, so the pack tends to wobble from side to side as you walk. This is usually not a problem on a regular backpacking trip, but can throw you off balance if skiing or snowshoeing. Don’t take it on an airplane unless you have boxed it up—that is, if you want to be able to use it again. Pack volumes range from 3,000 to 4,500 cubic inches (49 to 73 liters).

**Internal Frame** Internal frame packs use a wide variety of materials—aluminum stays, carbon fiber, plastic sheets, and foam—to create a rigid spine to which the hip belt and shoulder straps are attached (see diagram, page 23). The pack bag runs the full height of the pack, although it may be divided into several compartments. Some internal frame packs come in specific sizes based on the length of your spine; others are adjustable to fit a range of sizes. As with an external frame pack, you should look for good lumbar padding, a conical hip belt, recurved shoulder straps with good padding, and a chest compression strap. A removable top pocket and a bivy extension (a fabric layer sewn around the top opening of the pack bag) that, when pulled up, adds to the overall pack volume on the pack bag will let you lift the top pocket and store more gear. Also, make sure that the pack has side compression straps to squeeze the pack down if you are carrying a smaller load. *Pro:* Good for carrying lots of weight. Conforms to the body for better balance. Generally more comfortable to wear for long periods. *Con:* Since the pack bag and frame are directly against your entire back, back perspiration can be a problem. Since the weight is carried lower in the pack, you may have to bend over more. You can’t cram as much on the outside, so the overall carrying capacity of the pack is somewhat fixed by its internal volume. Tends to be more expensive than external frame packs. Pack volumes range from 3,000 to 7,500 cubic inches (49 to 122 liters).

**Day Packs** Day packs typically forgo a frame and use a foam sheet for the back panel. This provides some rigidity and helps distribute weight to the hips (up to a point). Look for well-padded shoulder straps, a foam hip belt rather than just a webbing strap, and a chest compression strap. Day pack volumes range up to 3,000 cubic inches (49 liters).

Size is an important factor when selecting a pack. You need to make sure that you can adequately carry all the equipment and food you will need for the length of your trip. Keep in mind that the pack bags of internal frame packs are smaller than external frame packs. This is because there are spaces on the external frame pack to strap large items directly to the frame. For example, a sleeping bag in a stuff sack may be 1,000 to 1,500 cubic inches (16 to 25 liters). Here are some rough guidelines on pack size and trip length.

<table>
<thead>
<tr>
<th>Length of Trip</th>
<th>External Frame Pack Volume</th>
<th>Internal Frame Pack Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-4 days</td>
<td>1,500+ cubic inches (25+ liters)</td>
<td>3,500+ cubic inches (57+ liters)</td>
</tr>
<tr>
<td>5-7 days</td>
<td>2,000+ cubic inches (33+ liters)</td>
<td>4,500+ cubic inches (73+ liters)</td>
</tr>
<tr>
<td>8-10 days</td>
<td>3,000+ cubic inches (50+ liters)</td>
<td>5,500+ cubic inches (90+ liters)</td>
</tr>
</tbody>
</table>

**Wax Runt**

**Choosing a Pack:** When you go to the store and try on a pack, the selection will help you adjust it, and it will feel great. Then she will give you a few sand bags (25-30 pounds or 11-13 kilograms) to add some weight. These are it will still feel good. The real test is when you get home and carry 50 to 70 pounds (22-31 kilograms). Make sure that the store will let you take the pack back if it doesn’t feel right. I bought a pack once without doing this test until I hit the trail. With 60 pounds in the pack, the hip belt rode off my butt and I ended up carrying much of the weight on my shoulders. I hiked in discomfort for days.

**EXTERNAL FRAME PACKS**

**Sizing an External Frame Pack**

It is essential to have a pack that fits properly. Packs vary from company to company, so check the manufacturer’s instructions for both fitting and load-
The idea behind an external frame pack is to have the frame transfer most of the weight to your legs through the hip belt. Therefore, when fitting a pack, the place to start is with the hip belt. Here are some general fitting guidelines:

- Put on the pack and adjust the hip belt to fit your hips; the top of the belt should be at or just slightly below the top of your pelvis, which you should be able to feel with your fingertips.
- With the hip belt on and properly positioned, tighten the shoulder straps and note their position. The straps should come off the frame about even with the top of your shoulders. If the straps drop down, the pack is too small, and too much weight will be pulled onto your shoulders. If the straps go up, the pack is too large, and too little weight will go onto your shoulders. Some packs will allow you to adjust the point at which the shoulder straps attach to the frame to fine-tune your fit for height and/or width. Be sure the width of the straps is positioned so that they neither pinch your neck nor slip off your shoulders.

**Loading an External Frame Pack**

The major consideration in packing a pack is how best to distribute the weight. There are two basic principles: for trail hiking over generally flat ground, the weight of the pack should be high and relatively close to the body. The heavier items should sit between your shoulder blades; for consistently steep or rough terrain, carry the weight lower to give you better balance and avoid falls from having a high center of gravity. In this case, heavier things should be placed more toward the middle of your back. To achieve either arrangement, load the heavier, bulky items into the large top compartment in the position where you want most of the weight. Then fill this and the remaining compartments with lighter items (see diagrams, facing page). Tents and tarps can be lashed to the extender bars at the top of the pack and sleeping bags can usually be lashed to the frame at the bottom of the pack. In either case, the horizontal weight distribution should be balanced so that the left side of the pack is in balance with the right. A woman’s center of gravity is generally lower than a man’s. So, for women, the heavier items should be placed close to the body but lower in the pack, as in the case for rough terrain above. Packs designed especially for women take this into account by lowering the pack bag on the frame. Load these packs as described above and then lash sleeping bags and tents or tarps to the extender bars at the top of the packs.

**INTERNAL FRAME PACKS**

**Sizing an Internal Frame Pack**

Internal frame pack systems vary, so check the manufacturer’s instructions for both fitting and loading. Here are some general fitting guidelines:

- Put on the pack and adjust the hip belt to fit your hips; the top of the belt should be at or slightly below the level of the top of your pelvis, which you should be able to feel with your fingertips.
- The frame stays or frame structure should extend 2 to 4 inches above your shoulders.
- The shoulder straps should follow the contour of your shoulders and join the pack approximately 2 inches below the top of your shoulders. The position of the shoulder harness can usually be adjusted. The lower ends of the straps should run about 5 inches below your armpits. On the shoulder straps you may find load lifters that connect to the pack at about ear level and meet the shoulder straps in front of your collarbone. These help pull the top of the pack into your shoulders.
- The sternum strap should cross your chest below your collarbone. If the frame stays are shaped correctly and the pack is properly fitted, you can adjust the load lifters and other fine-tuning straps to make the pack hug your back. Adjustments can also be made while hiking to divert weight to other muscle groups, thus making hiking less tiring.

**Loading an Internal Frame Pack**

Your gear will help form the structure of support for an internal frame pack. For easy, level hiking, a high center of gravity is best. To achieve this, load bulky, light gear (e.g., sleeping bag) low in the pack and stack heavier gear on top of it. For steeper terrain, a lower center of gravity is best because it
lessens the chance of falls from a top-heavy pack. In this case, place heavier items a little lower in the pack and closer to your back than normal. Women may prefer this arrangement under all circumstances (see page 26).

SUGGESTIONS FOR EITHER PACK TYPE

- Stuff your clothes into the pack or pack items in stuff sacks rather than fold them. This serves to fill all the available space of the pack better so that things don’t shift around and allows you to get more into the pack.
- The more common weight distribution (general trail hiking) has the lighter, bulkier items on the bottom: the sleeping bag below the pack bag and clothes stuffed into the bottom of the pack. The heavier items such as food, stove, and fuel go into the upper section or on top of the pack, with the heaviest items closest to the pack frame. A general rule is that 50 percent of the weight should be in the upper third of the pack.
- For consistently steep or rough terrain, carry the weight lower to give you better balance.
- The horizontal weight distribution should be balanced so that the left side of the pack is in balance with the right.
- Your hip belt should have enough room to allow you to loosen or tighten it for different layers of clothing beneath. If the belt is too loose, socks or shirts can be inserted between the belt and your body. This adds an extra layer of padding to the belt as well, which may increase the comfort of the fit.
- Avoid dangling things all over the outside of your pack—no one wants to listen to you clank and clang your way down the trail; also, all that junk can snag branches. If you find yourself having to tie things on all the time, your pack may be too small.
- Think about the things you will need during the day and have them relatively accessible so that it doesn’t take a complete emptying of your pack to find lunch, the first-aid kit, or your rain gear. Also, group and store items according to function. For example, keep toiletries together. Small stuff sacks help organize your gear.
- For protection from rain, line your sleeping bag stuff sack and main pack compartments with plastic garbage bags. These can be reused on subsequent trips and recycled when you are through with them. Pack rain covers are also useful.
- An old duffel bag serves as a great food compartment. It allows you to quickly find the food you are carrying and can be used as a bear bag, too (see Traveling in Bear Country, page 155).

- Fuel bottles should be placed in a leakproof bag and kept separate from any food items.

How Much Weight?
How much weight to carry depends on your size, weight, and physical condition. The general rule for a multiday backpacking trip is to carry up to 25 percent of your body weight. On longer trips, trips with more gear (like winter camping), this figure may go up. The bottom line is, don’t carry more than you can handle. Here are some things to do to make your trip as comfortable as possible.

- Try on your loaded pack at home before you leave.
- Fiddle with the pack and adjust it to the best fit (you probably won’t take the time to do this at the trailhead while your friends are waiting).
- Weigh your pack and compare that to your body weight.
- Take a good look at what you are bringing along. Prune out the nonessentials (that second book you won’t have time to get to anyway, the watermelon for Day 4).
- Look and see what other people are carrying and how the whole group can share the load in a way that makes sense for each member, given size, weight, physical condition, and experience.

Checking Your Pack Before a Trip
- Take a look at the shoulder straps, hip belt, and other compression and load-carrying straps.
- Check all pack buckles.
- Check all zippers.
- Check the pack bag itself for rips or tears.
- If the pack is an external frame pack with a pack bag mounted onto the frame, check the attachment pins (typically clevis pins and split rings).

Putting on a Heavy Pack
There are a number of methods for putting on a heavy pack.

- With the pack on the ground and the shoulder straps facing you, lift the pack up and rest it on one extended knee. Slide one arm through a shoulder strap. At this point, your shoulders will be slightly tilted, so that the shoulder strap is sliding onto your shoulder toward your neck. Lean forward slightly and rotate your body to swing the pack onto the rest of your back. Slide your other arm through the other shoulder strap. Adjust the hip belt first. The easiest way to do this is to bend over at the waist so the weight is being carried on your back rather than
your hips and the hip belt is free to be snugged up tightly. Then you can straighten up and adjust the shoulder straps. Aim for 70 to 80 percent of the weight on your hips.

- Follow the same technique with a friend to help stabilize your pack.
  This is especially helpful if you are carrying a large or very heavy pack.
- Lift the pack up onto an object that is about waist high (rock, log). Stabilize the pack and slip your arms through both shoulder straps. Pull on the pack and tighten the hip belt.

I don’t recommend putting your pack on while sitting down and then trying to stand up. This puts too much strain on your lower back. This method should be used only if you have two friends who can pull you up.

**SLEEPING EQUIPMENT**

**SLEEPING BAGS**

When selecting a sleeping bag, you need to consider a number of factors. Unlike clothing layers, a sleeping bag doesn’t offer much in the way of ventilation to control your body temperature. As a result, you might have more than one bag: a summer-rated bag for hot summer conditions, a three-season bag for spring and fall, and a winter bag for serious cold-weather conditions.

**Sleeping Bag Temperature Ratings**

Sleeping bags come with temperature ratings to give you a general idea of how cold it can get and if the bag will still provide adequate insulation to keep you warm. Remember, some people sleep “colder” than others, so you may need a bag with more or less insulation to be comfortable at a particular temperature. Also, ratings differ from manufacturer to manufacturer. To calculate the temperature rating you will need, look at the lowest normal temperature for the trip location and season you are going, and then subtract 10° or 15° F (5° or 12° C) from that temperature. This gives you a margin of safety in case the temperature is colder than expected. Here are some general guidelines for sleeping bag ratings:

<table>
<thead>
<tr>
<th>Season</th>
<th>Temperature Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Summer</td>
<td>40 to 60°F (4 to 16°C)</td>
</tr>
<tr>
<td>Three season</td>
<td>20 to 40°F (−6 to 4°C)</td>
</tr>
<tr>
<td>Cold weather</td>
<td>0 to 20°F (−17 to −6°C)</td>
</tr>
<tr>
<td>Winter</td>
<td>−30 to −6°F (−34 to −17°C)</td>
</tr>
</tbody>
</table>

For example, if the usual nighttime temperature is 50°F (10°C), bring a bag that goes to 35°F (2°C).

**Sleeping Bag Styles**

The following are three general styles for sleeping bags:

- **Rectangular** Simple rectangular bag typically without a hood.
- **Mummy** A form-fitting bag with a hood. The bag tapers in width from the shoulders to the legs, with little room. This tight fit means that there is less convective heat loss in the bag, making for a warmer bag.
- **Modified Mummy** A form-fitting bag with a hood. The bag tapers in width from the shoulders to the legs, but is wider in the torso region to provide more room.

**Sleeping Bag Fit**

Fit is as important in a sleeping bag as it is in clothing. In sleeping bags, you want the bag to snugly conform to your body. If the bag is too big, you will have large spaces for convection currents and you will be cold. You might need to wear clothing layers to help fill up the space. If the bag is too tight, the insulation may actually be compressed, decreasing its effectiveness. How comfortable you feel in the bag can also affect your night’s sleep—some people feel confined in a snug sleeping bag and need more “wiggle room” than others.

**Specific Features to Look for**

- A hood allows you to insulate your head to prevent heat loss.
- The draft tube is an insulated tube that runs along the zipper line and prevents cold spots at the zipper.
- A draft collar provides a closure at the neck area to reduce the bellows action of heat leaving the bag.
- Well-designed zippers allow you to open and close your bag easily from the inside.

**TRICKS OF THE TRAIL**

**Drying Things Off.** You can dry out damp (but not soaking wet) items by placing them in your sleeping bag alongside your body. My feet always get cold, so I change into dry socks just before I get into my bag. This makes my toes much happier. I take the damp socks from the day’s hike and lay them in the bag along my thighs. The next morning they are dry and I stow them in my pack for the following day.
14. PackAdjustments

I. GOAL: To have participants fit and properly adjust their internal or external frame packs to an acceptable level of comfort while on the trail.

II. OBJECTIVES:
   A. Participants will be able to identify and describe the function of each of the major component parts of a pack's suspension system.
   B. Participants will be able to fit a pack to themselves and assist in properly fitting packs to others.
   C. Participants will be able to adjust their packs for stability and comfort while on the trail.

III. CONTENT:
   A. Components of a backpack suspension system
      1. The external frame pack
         a. The frame
            (1) Description
            Usually made of welded tubular aluminum, although occasionally made of "high tech" plastics.
            (2) Purpose
            (a) It is designed to hold a heavy load with sufficient stability and rigidity, allowing the packer to walk in safety and comfort.
            (b) The rigidity of the frame allows the weight of the load to be distributed evenly to the body of the packer through the suspension system.
   b. Waist belt
      (1) Description
      (a) A heavily padded, and usually contoured, wrap-around belt located at the bottom of the pack frame.
      (b) The belt is usually attached to the frame with nylon webbing straps, clevis pins, or cinch belts.
      (c) The waist belt usually comes in various sizes (e.g., small, medium, or large) and is usually equipped with an adjustable length of nylon webbing which can accommodate a variety of waist sizes.
      (d) The waist belt has a quick-release buckle of hardened plastic or metal.
      (2) Purpose
      This belt fits snugly around the waist of the packer so that the padded portion of the belt rests squarely on the hips. This transfers the weight of the load to the pelvic girdle and onto the thighs of the packer. The pelvis and legs are the strongest parts of the body and best designed to carry weight.
   c. Waist belt stabilizers
      (1) Description
      If included on the pack, these are located on the outer circumference of the waist belt near each of the hips.
      (2) Purpose
      (a) These short lengths of nylon webbing and buckles connect the rear of the waist belt directly to the bottom of the pack frame.
      (b) When tightened, these two stabilizers pull the pack frame toward the packer's hips, creating a more snug fit while walking.
   d. Shoulder pads
      (1) Description
      These heavily-cushioned nylon pads are attached to a cross bar on the upper third
of the pack frame and to the base of the pack frame by adjustable webbing straps.

(2) Purpose
(a) When properly fitted over the packer’s shoulders, these pads assist in carrying some of the pack’s weight.
(b) More importantly, they help stabilize the pack by drawing the frame and load close to the back so that most of the weight will ride directly on the pelvis.

e. Shoulder pad stabilizers
(1) Description
These nylon webbing and buckle assemblies connect each of the shoulder pads to a cross bar on the upper third of the pack. When these straps are pulled tight, the pack frame is brought snug against the upper back and shoulder area of the packer.

(2) Purpose
When tightened, these straps help minimize some of the rocking and swaying of the pack frame when walking.

f. Mesh back band
(1) Description
This wide nylon mesh band is drawn tightly across the two vertical legs of the external frame.

(2) Purpose
(a) When properly taut, this back band presses against the shoulder blades and prevents the packer’s back from coming in contact with any of the metal tubing of the pack frame.
(b) On some packs, this band creates enough space to allow for some air circulation between the pack and the person wearing the pack.

g. Cross-chest sternum strap
(1) Description
This nylon webbing with a quick-release buckle is attached to the front and middle of each of the shoulder pads.

(2) Purpose
(a) When this strap is drawn across the chest and pulled tight, the two shoulder pads are pulled toward the packer’s sternum.
(b) This keeps the shoulder pads securely in place, increases comfort, and helps reduce some of the side to side rocking motion common to many external frame packs.

2. The internal frame pack

a. The frame
(1) Description
(a) As the name suggests, the frame of the internal frame pack is not visible because it is contained inside the pack itself.
(b) Depending on the specific design of the pack, the metal staves that give the pack its rigidity are usually located in concealed pouches within the wall of the pack bag which is closest to the packer’s back.

(2) Purpose
(a) An internal frame pack is more flexible, rides closer to the body, and is more responsive to the packer’s subtle turns and shifts than an external frame pack.
(b) The absence of a frame makes this pack preferable in heavy brush where it is less likely to catch or snag on branches.

b. The suspension system
Description
(1) Most internal frame packs have suspension systems made up of basically the same components as those of better external frame packs (i.e., waist belt, waist belt stabilizers, shoulder pads, etc.).

(2) Internal frame packs usually have fairly sophisticated adjustments for properly fitting the torso length of the packer. Each
model's apparatus must be understood and adjusted to ensure a proper fit.

(3) For a proper fit, the staves should be removed from their pouches, bent to conform to the curves of the packer's back, and then returned to their pouches.

(4) Trace a line from the top of the pelvis around to the spine. The bottom of the stave should be approximately 4 inches below this line when measured against the packer's spine.

B. Fitting the Pack

Ideally, packs should contain at least 30-35 pounds (14-16 kg.) of equally distributed weight when being fitted to the packer.

1. Fitting the waist
   a. Loosen the waist belt stabilizers so that the waist belt is free to wrap around the waist and conform to the packer's body.
   b. Adjust the waist buckle so that when joined, it is located just below the belly button.
   c. Suck in the stomach and pull the waist belt tight. The top of the waist belt should be about 1" above the pelvic crest.
   d. Pull the waist belt stabilizers tight. The bottom section of the pack should feel comfortably secure against the hips.

2. Fitting the torso
   a. The pack suspension system and frame must fit properly between the base of the neck and the shelf that is formed by the small of the back and buttocks. This distance between the shoulders and the lower back is known as torso length.
   b. After fitting the waist belt to the hips, check the nylon mesh back band of the pack.
      (1) The middle of the back band should pass squarely across the points of both shoulder blades. This should keep the packer's back off the frame of an external frame pack or maximize comfort of an internal frame pack.
      (2) Adjust if necessary.

   c. Tighten the shoulder pads.
      (1) The top portion of the shoulder pads should curve slightly over the shoulder of the packer and then attach to the pack.
      (2) For a proper fit, the load stabilizer should attach to the shoulder pad between the collar bone and the ridge of muscle along the top of the shoulder. (See Figure 14-1).
      (3) If the shoulder pad/load stabilizer is not fitted properly, adjust the shoulder harness where it attaches to the pack, either up or down, until it fits as described above.

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Figure 14-1  Pack Adjustments

d. If fitted properly, the shoulders should feel as if they are stabilizing the movement of the load without accepting a great deal of the weight of the pack.
e. Once the shoulder pads conform to the torso
length, check the shoulder pad stabilizer straps.
(1) The stabilizer strap should angle up and
away from the clavicle and attach to the
pack at an angle of approximately 45° (see
Figure 14-1).
(2) When pulled tight, this strap should draw
the top half of the pack load snug against
the shoulders, thus placing the weight
more directly over the hips.

C. Adjusting the Pack on the Trail
1. While walking, packers should constantly be
adjusting the waist belt, the shoulder pads, and the
stabilizers to improve the level of comfort.
2. Should the hips get tired or sore, loosen the waist
belt to allow the shoulders to carry more of the
weight.
3. Should the shoulders become sore, tighten the waist
belt and loosen the shoulder pads so that all weight
is transferred to the pelvis. By alternating the
loosening of each shoulder strap, one shoulder can
rest and then the other.

IV. INSTRUCTIONAL STRATEGIES & MATERIALS:
A. Timing
This class is usually conducted very early in the
backpacking portion of the course.

B. Strategies
1. The sections about components (A.) and pack fitting
(B.) can be taught as a lecture/demonstration and be
incorporated into the "Pack Packing" lesson.
2. Pack adjustments are usually taught using teachable
moments on the trail as problems naturally arise.
3. Rest stops are a particularly good time to introduce
pack adjustment terminology and make suggestions
for fine tuning a pack for proper fit.

C. Materials
1. External frame pack
2. A packed internal frame pack

15. Pack Packing

I. GOAL: To have participants pack a neat, well-balanced, and
systematically organized backpack which is
comfortable to wear and efficient to use while
traveling in the backcountry.

II. OBJECTIVES:
A. Participants will understand and be able to describe the
major considerations in packing a pack for wilderness travel.
B. Participants will demonstrate an ability to pack items for
accessibility on the trail.
C. Participants will demonstrate an ability to pack a well-
balanced pack that is safe for travel over a variety of
different terrains.
D. Participants will understand and be able to explain the
reasons for distributing weight in the pack.
E. Participants will develop a system of pack organization
which allows for efficient packing and inventory of gear.

III. CONTENT:
C.B.S. = Conveniently Balanced System
This abbreviation can be used to remind participants of the
basic considerations in efficient backpacking.
A. Convenience
A pack which is organized so that it permits access to its
most-needed contents greatly enhances the packer's
efficient use of time and energy.
1. The itinerary for the day should be considered when
organizing the pack.
   a. Arrangement of equipment on and in the pack
should reflect the probability of that
equipment's use during the day.
   b. External pack pockets should hold items that
will be used most frequently during the day.
Such items include water bottle, matches, toilet paper, trail snacks, foot care kit, sunglasses, bug repellent, camera, etc.

2. Equipment that may be needed in an emergency should be easily accessible. Such items might include first aid kit, repair kit, water purification system, rain fly, etc.
   a. The location of these items should be known to all members of the group.
   b. Keys to the emergency evacuation vehicle should be packed in a safe location that is known to all, or hidden at the vehicle.
   c. In cold or wet weather, rain gear and extra insulating clothing should be packed near the top of the pack or in a sheltered external pocket so they can be reached during rest breaks.

3. Items not usually needed until arrival at the campsite should be packed inside the pack bag. Such items might include extra clothes, stove, pots and pans, food bags, flashlight, personal toilet kit, tent, etc.

4. Items of gear requiring special protection should be packed inside waterproof or water repellent stuffsacks.
   a. Extra clothing should be stuffed into waterproof, coated nylon or plastic sacks and packed near the bottom of the pack.
   b. Cameras and eyeglasses should be packed in cases and stored in the pack when not in use.
   c. Sleeping bags and sleeping pads should be stuffed inside a waterproof sack and packed in the bottom of the pack.

B. Balance
A well-balanced pack with properly distributed weight adds to the safety and comfort of the packer.

1. Weight distribution and comfort
   a. Heavy loads are must comfortably carried when the weight is placed directly in line with the largest and strongest bones and muscles of the body (i.e., the pelvic girdle and upper thigh bones and the muscles of the thighs and buttocks).

   (1) The heaviest part of the pack should be centered as close to the body and as near to the top of the spinal column/base of the neck area as possible. The load should be centered between the shoulder blades.

   (2) When packing the pack, the heaviest single item of equipment (e.g., tent or food) should be packed in or on the top half of the pack and as close to the packer’s back as possible.

   b. Heavy loads are most comfortably carried when they are balanced left to right, top to bottom, and front to back.

(1) **Balance left to right**
Items of similar weight should be packed on opposite sides of the pack so that neither side of the body is uncomfortably overburdened. For example, if a fuel bottle is packed in the upper left external pocket, a water bottle can be packed in the upper right external pocket.

(2) **Balance top to bottom**
Heavy weights near the top of the pack should be counter-balanced by weight near the bottom of the pack or frame. For example, a tent that is lashed on the top of an extended pack frame could be counter-balanced by a sleeping bag and pad attached to the bottom of the frame.

   a. Heavy items should not be placed so high on the pack frame that they tip the packer forward.

   b. Sleeping bag stuff sacks on the bottom of the frame should not be so overloaded that they pull the packer backward.

(3) **Balance front to back**
Heavier items should be placed as close as possible to the packer’s back to minimize pulling the packer backwards.
2. Weight distribution and safety
   a. Terrain should influence the way that weight is distributed in the pack.
      (1) Flat, easily-traveled terrain: for maximum comfort, pack the heaviest weight high
           and close to the shoulders.
      (2) Rough terrain, steep inclines, dead falls: the pack weight should be distributed
           slightly lower toward the middle of the back, allowing for greater balance and
           mobility while twisting or turning.
      (3) Boulder hopping, river crossing, traversing: the weight of the pack should be very low on
           the back to lower the body’s center of gravity and maximize balance. Some comfort may be
           sacrificed with the weight in this position.
   b. Items that should be isolated from food and clothing, such as fuel bottles and stoves, should
      be packed in the outside pockets of the pack.

C. System
   A pack that is organized with an efficient and consistent system speeds the process of daily packing and aids in
   maintaining an accurate inventory of equipment.
   1. A personal “system” of pack organization allows the packer to load the pack easily, locate individual
      equipment quickly, and keep track of gear.
   2. Some individual items can be grouped together and packed in separate stuff sacks.
      a. Toilet kit: toothbrush, toothpaste, comb, hand cream, etc.
      b. Clothes bag: socks, underwear, bandanas, etc.
      c. Food bag: rations, bear rope, spice kit, etc.
      d. Personal repair kit: pack parts, nylon cord, wire, small tools, etc.
      e. Ditty bag: flashlight, extra batteries, shoelaces, cards, etc.

3. Packers should strive to keep their packs streamlined and neat.
   a. All equipment should be placed either inside the pack bag, in pockets, or securely lashed to
      the pack frame. No odds and ends should protrude from the pack to catch on branches, poking
      other hikers, or wriggle free.
   b. Soft items like clothing should be stuffed between rigid equipment in the pack. This
      maximizes the efficient use of space and minimizes rattling, squeaking, or shifting of contents
      while walking.
   c. Sleeping bag stuff sacks and tents should be tightly and very securely lashed to the pack
      frame. Nylon webbing with appropriate buckles works well for this. A close fit is particularly
      useful for securing sleeping bag straps to the pack frame.
   d. Tent poles, ice axes, etc., should be lashed or strapped along the vertical line of the pack or
      horizontally so equipment does not extend beyond the width of the packer’s body. If the
      packer can fit through a gap between trees or rock, the pack should follow easily.
   e. All extra lengths of pack cord, webbing, or stuff sack drawstrings should be doubled up, tied
      off, and tucked in so they don’t hang loosely from the pack and catch on branches, etc.

4. Once a system has been developed that suits a packer’s needs, it should be used consistently. Most
   items in the pack should be packed the same way and in the same place. An efficient system will even
   allow for small adjustments due to itinerary or terrain.

IV. INSTRUCTIONAL STRATEGIES & MATERIALS:

A. Timing
   Pack packing is usually taught very early in the course, preferably before the first full day on the trail.

B. Strategies
   1. This lesson may be taught as a lecture/demonstration in which the instructors display all of their own
      gear, describe their own system, and pack their pack
while explaining the reasons for what they are doing. Immediately after the class, participants should pack their own gear.

2. A second method of teaching this lesson may be used with more experienced packers. After being on the trail for one or two days, have one or two group members lay out their gear and explain their ideas about packing. Participants may discuss the pros and cons of various approaches and arrive at many of the same understandings that would come through a more direct approach.

3. For younger participants, a discussion may be initiated by using a very poorly packed pack as the focus for a contest (e.g., “Find 10 things wrong with this pack”). Use the ensuing discussion to highlight the main points of packing theory.

4. Younger participants can also be taught by having them pack by “rooms” of the “house.” For example, they can pack the “kitchen,” which would include pots, pans, food, stove, utensils, etc.

5. Use teachable moments to point out positive and negative qualities of various packing strategies used by members of the group. With younger participants, a “Pack-of-the-Day” prize may be awarded to encourage the proper technique.

C. **Materials**

A backpack and all of its contents. If the group is using internal and external packs, it is best to demonstrate with both.

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**16. Personal Hygiene**

*by Mary Vance*

I. **GOAL:** To have participants be aware of personal hygiene from both a social and safety perspective.

II. **OBJECTIVES:**

A. Participants will be able to explain the part that personal hygiene plays in the success of a backcountry trip.

B. Participants will be able to understand and practice the techniques that prevent potential health or personal problems.

III. **CONTENT:**

A. **Importance of Personal Hygiene**

1. Personal cleanliness contributes to positive expedition behavior.
   a. It shows consideration for tentmates and other group members.
   b. It helps to raise spirits and contributes to a feeling of overall well-being.

2. It contributes to the positive role model image that leaders should maintain.

B. **Bathing and Washing**

1. Bathe and wash clothes as regularly as possible. The proper techniques are covered in the “Bathing and Washing” lesson.

2. Spot washing can be done when time or weather conditions are not conducive to bathing.

3. Major areas for spot bathing include armpits, crotch, feet, hands, teeth, and hair.
USING A BACKPACK

Outcome

- Students will learn how to load, care for, put on, adjust, and take off a backpack.

Teaching Outline

I. Packing a backpack.
   A. Describe a backpack to students first so they understand the basic parts and what each does.
   B. Cover care of the backpack. Have students do preliminary sized before packing. Check over the backpack for problems.
   C. Discuss the two primary elements to backpack packing: accessibility and load carrying.
   D. Items needed during the day should be accessible: foul weather gear, gorp, water, sun screen, bug juice. Items no needed during the day go deeper.
   E. Heavy items should be packed high (but not over your head) and close to the back. Weight should be lower for cross country travel to lower one's center of gravity.
   F. Contamination: Pack fuel away from food and ropes.
   G. Craftsmanship: Fill all small air pockets in the backpack for efficiency (extra clothes are good stuffers). Fill items like pots and helmets with extra gear too. Eliminate gear tied on the outside except for ice axes and sleeping pads. Everything will fit inside.

II. Lifting and adjusting a backpack.
   A. Discuss the proper way to lift and set down a backpack. Demonstrate.
   B. Describe and demonstrate sequence for putting on a backpack: loosen straps, wide stance, knees bent, lift backpack to thigh, put one arm through shoulder strap, control backpack, put other arm through, close waist belt and tighten, adjust shoulder straps.
   C. Make it socially acceptable to ask for help. Have a spotter assist with lifting, stabilizing, and helping with adjustments. Have students work in pairs or threesomes.
   D. To take the backpack off, reverse the above process and gently lower backpack to the ground.
   E. Have a fitting clinic so that all students know how to adjust their backpacks and start with them properly adjusted. Stress proper fitting and packing. Backpack makers and styles vary through the school. Get to know the backpacks your students will use. Carrying a backpack does not have to be constantly painful.