Youth in Action

OUTWARD BOUND®

SAFETY HANDBOOK

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1.EQUIPMENT

1.1 UIAA and CE MARKS

UIAA and CE marks assure that the mountaineering item on which they are carried is in compliance with legislation.

UIAA markings mean that an item has been approved for use in mountaineering by the International Mountaineering and Climbing Federation UIAA. The UIAA (Union Internationale des Associations d'Alpinisme) is a worldwide organization that plays an important role in regulating safety standards for equipment used in climbing. Formed in 1932 in Chamonix, France, the UIAA Safety Commission develops and maintains safety standards for climbing equipment.

The **CE marking** is a mandatory European marking to indicate conformity with the essential health and safety requirements set out in European Directives. It consists of the CE-Logo and, if applicable, the four digit identification number of the notified body involved in the conformity assessment procedure. The CE marking is the manufacturer's declaration that the product meets the requirements of the applicable EC directives.

1.2 Ropes

Construction

Climbing ropes are typically of kern mantle construction, consisting of a core (kern) of long twisted fibers and an outer sheath (mantle) of tightly woven colored fibers. The core provides about 80% of the tensile strength, while the sheath is a durable layer that protects the core and gives the rope desirable handling characteristics.

Types

- **Dynamic:** the rope is designed to stretch at a designated percentage given a static Load of a designated weight (i.e. 6.5% stretch on static load of 80 kg) in order to minimize and absorb some of the impact of a fall. These ropes are used in any/all lead climbing, as belaying ropes. When a climber falls, the

rope stretches, reducing the maximum force experienced by the climber, their belayer, and equipment. This is the standard in rock climbing. These ropes can be used for rappelling, top-roping and hauling gear like the static rope, but these practices will cause them to wear out faster.

- **Static/ low elongation ropes:** these ropes are the opposite of dynamic ropes stretch much less and are usually used in anchoring systems. They are also used for abseiling (rappelling) and as fixed ropes climbed with ascenders, top-roping, hauling gear or in rescue and caving applications, however should NEVER be used for lead climbing.

Characteristics

Length: 60 meter ropes have become the standard for most climbers. A longer, 70m rope allows extending pitches, but it will also weigh more and take up more room in the pack.

Diameter: climbing ropes are categorized into **three types** based on their diameter and intended use. The category of a rope can be identified by looking at the symbol marked on the tape at either end.

1. **Single ropes** are generally between 9.5mm and 11mm in width and vary greatly in length, although the climbing standard seems to be the 10.5mmx50m. They are intended to be used individually for all around climbing and top-roping. Their relatively large diameter makes them more durable. They stand up to more abrasion and are able to withstand more test falls. The thicker ropes in this category (above 10mm) are good for high-abrasion situations (top-roping). The thinner diameter ropes (10mm and under) will suit alpine climbs, hard red points, and long pitches.
2. **Half or Double ropes** are two separate ropes of the same size that are designed to be clipped into protection alternately, one line at a time, to keep the ropes running straight to limit rope drag over bulges, overhangs, and traverses, and to minimize impact force. These ropes are considerably thicker than the Twin ropes, usually about 8.8mm, so that they can hold a fall should the other fail. Because they're always used in pairs, half ropes offer climbers many advantages over single ropes such as allowing the leader to clip into protection independently which places far less force on questionable gear; providing more safety for the second in the event of a fall on long traverses; and, they provide the security of an extra rope in case the rope becomes cut from rock fall, sharp edges, or ice tools.
3. **Twin ropes** are two separate ropes of the same size that are designed to be clipped together through each piece of gear. These ropes are primarily used in ultra-long rock, ice, mixed routes and expeditions that require light-weight gear. The essential feature is that their thin diameter (7.5-8mm) makes them almost as light as a single line, but offers full rope length rappels and high safety margins. They require accurate management and organization to prevent twisting and tangling, and record much higher impact forces than single or half ropes.

Standard tests

The International Union of Alpine Associates (UIAA) tests and certifies dynamic climbing ropes using standardized tests. CE certified ropes use virtually the same testing standards.

- **Falls:** fall ratings are governed by the UIAA who issues standards that ropes must meet to become "CE" certified. Fall ratings measure the number of falls that a rope is rated to safely take. While the UIAA standard

for falls is 5 falls for single and half (double), and 12 falls for twin ropes, it's likely to often see ropes that advertise much higher fall ratings. These numbers are given by the manufacturer, but are still only tested to the UIAA standard. It's important to keep a log of falls in order to track the wear on the rope.
Single ropes are tested by dropping an 80kg mass attached to a measured section of rope repeatedly until it snaps. The rating indicates the number of falls the rope withstood. Ropes that cannot withstand at least five falls are not approved. Half-ropes are tested with a 55kg mass. The fall rating indicates the number of falls withstood by a single rope strand. Twin ropes are tested with 80kg dropped on two strands.

- **Elongation:** the tests measure the dynamic elongation (stretch), of a climbing rope under a dynamic load. Currently, the maximum allowable stretch on the first drop of the test, using a single rope is 40% with an 80kg load. A rope with greater dynamic elongation will have lower impact forces. But a climbing rope with lots of stretch can be difficult, if not potentially dangerous to use on a top-roped climb.

Climbing rope care

Cleaning

- It's best to wash a climbing rope by hand in cool water with a mild chemical-free soap.
- Rinse it well, and spread it out to air-dry, but avoid putting it in direct sunlight.
- You can also use specialized cleaning products like rope brushes.
- Don't wash a rope in a machine with an agitator, as it can easily be stretched and damaged.
- Don't dry it in a dryer, in direct sunlight, or above a heat source.
- Some substances, such as salt and tree pitch, can be removed with a mild soap, but will probably require several washings.

Storing

Ropes must be stored in a dry place at room temperature. Keep it away from dirt, chemicals, acids and alkali compounds, and sunlight – these degrade nylon. Beware also oxidizing agents (found in concrete), bleaching compounds, and climbers who smoke carelessly.

Care

- Use a rope bag to keep it clean. Dirt contains tiny, sharp micro crystals that can cause internal damage you can't detect.
- Don't step on it. This can work the sharp dirt particles through the sheath and into the core.
- Inspect it after every use and retire it when it's been damaged by rock fall, crampons, sharp edges, a severe fall, or when the mantle is badly abraded.

Lifetime

The life expectancy of a rope depends on amount of use, number of falls, climbing technique, type of rock, and handling. Top-roping is the hardest on a rope and can abrade a rope badly in no time. How long you use a rope is contingent on the actual wear and condition.

Rope **retirement schedule** recommended by manufactures:

- 5-7 years if used for a couple of pitches every few months.

- 2 years for normal weekend use.
- 3 months of near daily use.
- Up to 1 year of part-time use including multiple falls.
- Retire a rope that has been damaged by rock fall, crampons, or sharp rock edges. If you are certain the damage is limited to an end, you can shorten your rope by cutting off the damaged piece.
- Retire a rope immediately if it suffers a fall that approaches factor 2 (a fall that is twice the distance as the amount of rope run out from the belay).

1.3 Karabiners

The karabiner is the link between a rock climber and their protective hardware, rope, and accessories. It is a strong metal snap-link made of lightweight aluminum or hefty steel featuring a spring-loaded gate that opens inward and automatically snaps closed when released that is used to connect all the different parts of the climbing safety system together.

The materials: aluminum or steel karabiner?

Climbers use aluminum because every ounce you have to carry up the side of a mountain feels like it weighs a ton. Rescue teams and rope access technicians mostly use steel because they like the strength of steel and are not doing as much climbing as they are “hanging around” and descending.

There is a perception that aluminum karabiners will crack if dropped on a hard surface. Some manufactures did a study and determined that aluminum karabiners are not subject to stress cracking if dropped from heights of five feet or less. At heights above five feet, everything is subject to stress cracking.

Quality locking aluminum karabiners usually have strength of about 26 kN (kilo newtons). It equals to 2650 kg. Other parts of your suspension system are probably not that strong. Quality locking steel karabiners usually have strength of about 45 kN (4580 kg). If you are using your karabiner to lift a bus, you need that kind of strength.

Reminder: in case you use aluminum equipment (pulleys, jumars, gri-gri or others) it is better to link it with aluminum karabiner, because the steel karabiner will wear your equipment.

Types

- **Ovals** have both advantages and drawbacks. When loaded, the pressure is shared equally on both sides of the karabiner. Thus, the gate and pin bear 50% of the weight,

making oval karabiners weaker than their more exotically shaped comrades. However, their symmetry makes them particularly useful for aid climbing, as the karabiner doesn't shift when weighted. They are also useful for building karabiner brake rappel systems and opening bottles.

- **D and Modified D** karabiners have an asymmetrical shape that sets the rope closer to the spine. This means the solid spine bears a much greater percentage of the stress than the weaker gate and pin. The D shape provides a large gate opening for clipping the rope or hardware.
- **Pear-Shaped symmetrical** karabiners are usually larger with a very wide gate opening. This makes them an excellent choice for clipping multiple items (at belay stations for example). They are often used in conjunction with belaying because they are easy to handle, have a large internal rope capacity, and tend to stay properly oriented along the major axis.

Features

Straight Gate Karabiners are found on karabiners of all shapes and sizes. This gate is the most versatile of the bunch, and can be used anywhere unless a locker is needed.

Bent Gate Karabiners feature a bowed-in gate that creates a wider opening when depressed. They are generally attached on the rope-end of a climber's protective gear because the bowed gate and wider mouth make it quick and easy to clip the rope with one hand.

Wire Gates have a stainless steel wire that acts as both gate and spring. Wire gates can be used on either end of a runner, unless they are bent wires, which are used on the rope end of runners and draws. These karabiners tend to be lighter and easier to clip then straight or bent gates. They are also stronger when inadvertently cross-loaded. They are also less susceptible to the phenomenon of "gate flutter" which can lead to karabiner failure.

Locking Gate Karabiners have a threaded or spring-loaded sleeve on the gate that ensures the karabiner remains closed when loaded, turned, torqued. They enhance the security of karabiners under constant load and those used with a belay device or munter-hitch. Locking gates can be found on any karabiner shape, but are most often used on the large pear-shaped variety. Gate designs include screw gates that must be manually threaded, and auto-locking gates that open with a push-and turn. Both are designed to prevent accidental opening.

Nose Notch is the spot where the gate closes against the karabiner body. Some designs have a small hook or notch at the closure. The keylock or notchless nose design is smoother and less prone to snagging when clipping or unclipping webbing, gear, or ropes.

Strengths

Karabiners are listed with three unique strengths measured in kilonewtons (kN):

Closed gate (CG) strength is the most important and refers to the strength of the karabiner when the gate is closed and the forces are created at the bottom and the top of the karabiner (99.9% of the time).

Open gate (OP) strength is the reduced strength of the karabiner when the forces created on it are the same as the closed gate, but the gate is open (due to the shutter gate effect or the karabiner pressed against the rock).

Minor axis (MA) strength is when the karabiner has rotated and the forces are pressed against the gate and the spine of the karabiner.

1.4 Pulleys

Pulleys are wheel-like objects with grooves meant to hold a rope or belt. They are designed to help limit the amount of power necessary to carry out a certain task such as lifting, pulling or spinning. Pulley's for climbing activities are generally made out of Plastic, Nylon or a type of metal depending on their size, price and purpose.

A fixed pulley is a pulley that is attached to a structure, it cannot move relative to the structure. A moveable pulley is a pulley that can change position relative to the structure. Pulleys can also be combined into pulley systems. Pulley system types include the fixed, moveable/differential, compound, and the block and tackle. Moveable/differential pulley systems use two pulley wheels of different sizes connected by a single rope or cable. A pulley utilizing a fixed and moveable system is compound; the block and tackle is a type of compound pulley system.

Types

Simple pulleys

The Ultra-Light Pulley. This pulley is a simple nylon sheave that can be installed on a karabiner. Its minimum size and weight make it the lightest pulley available.

The Black Diamond Pulley. This pulley is made from heat treated aluminum and has a nylon pulley wheel that rotates on oil filled bronze bearing. The sides of the pulley swing away so it is easy to insert the rope.

The Tandem pulley is intended for moving on the textile rope or steel cable. Two sheaves prevent from twisting, thus providing smooth and more stable ride. Used mainly for moving on a zip wire (Tyrolean traverse). Suitable also for rescue, work and other activities at height. For use with static and dynamic ropes or with steel cables

Auto-Locking Pulleys

This category refers to pulleys with built in auto locking features such as the Petzl mini and Protraxion and the Kong Roll Block. These pulleys are specifically designed for hauling.

The Mini Traxion. This is a popular all purpose pulley. It has a cam with inclined teeth attached to a spring loaded catch that locks on the rope when weighted. However, due the pulley wheel being only 3/4 inches in dimension it is best suited for light loads. The breaking strain in self locking mode is 4kN. 1kN = 224 pounds so about 900 pounds when loaded. Breaking strain as a pulley is considerably higher.

Protraxion. The pro is the big brother of the mini and more suited as a pulley for big walls. Like the Mini the Pro has the same requirements when using it; a good fitting oval biner and a sling to ensure the pulley has enough freedom to realign itself to the direction of the haul line. With the Protraxion you must ALWAYS have a biner in the lower hole to ensure the pulley side walls stay in place.

Pulley efficiency is determined by 2 factors:

- sheave size (the wheel that the rope runs on): the larger the diameter, the greater the efficiency;
- bushings and bearings: self-lubricating bushings are efficient. Sealed ball bearing are very efficient and require very little maintenance.

1.5 Jumar

An ascender is a mechanical device that attach onto a climbing rope and allows a climber to ascend the rope.

A **Jumar** is one ne such device, named after the Swiss factory which developed the first tool for sale in 1958. Back in the 1970s, all ascenders used in America were simply called jumars. The device's name also leads to the term Jumaring for the process of using such a device. Other terms for this process include ascending, prusiking and jugging.

Functionality

Ascenders offer similar functionality to friction knots, but are faster and easier to use, albeit with consequences in security (as ascenders can, even with a locking karabiner, come off the rope, and fail by shredding the rope at high loads, rather than slipping and fusing as with friction knots). An ascender employs a cam which allows the device to slide freely in one direction (usually the intended direction of movement), and provide a firm grip on the rope when pulled on in the opposite direction. To prevent an ascender from accidentally coming off the rope, a locking mechanism or trigger is deployed. The ascender is first attached to the climber's harness by a piece of webbing or sling, and then is clipped onto the rope and locked. For climbing on a fixed rope attached, for example, to snow anchors on a steep slope, only one ascender is used, keeping the other hand free for holding an ice axe.

Jumaring, also referred to as jugging, is where the second climber (the one who belays the lead climber on the route) uses ascenders to climb the rope instead of climbing directly on the rock. Along with the ascenders, one or more webbing "ladders" called étriers (or aiders) are typically used to allow the climber to use their feet to step up and pull themselves up the rope.

Uses

Ascenders come in a variety of shapes and sizes and have different uses. Some ascenders are best for use on big walls, while others are used in caving, ascending frozen ropes on high mountains, or for rescue work.

Ascending is not typically performed on free climbing routes where a climber uses his or her hands and feet on the rock, climbing the features, edges, cracks, and pockets that the route provides without artificial aids. Typically, ascending is reserved for aid climbing where the climbers are climbing near-featureless faces of rock, usually with very thin cracks that a person probably could not get their fingers into to make the holds useful. Ascenders can also be used as a braking component within a rope hauling system, often used in rescue situations.

Rules for safely using ascenders

- Always tie into the end of the climbing rope.
- Always clip both ascenders into your harness using daisy chains and locking karabiners.
- Always tie knots in the rope below you as you jug upward and clip them into your harness belay loop.
- Always use locking karabiners on ascender attachment points including daisy chains.
- Always double check to make sure your ascenders are properly attached to the fixed rope, especially if you have to remove one to place it above a piece of gear on overhanging terrain.

1.6 Croll

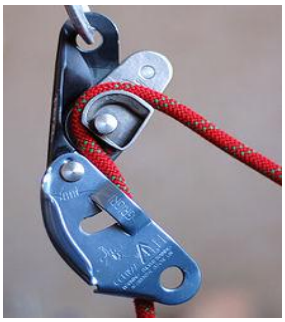
A Petzl **Croll** is an ascending device used in caving and industrial rope access made by the French company Petzl. This device appeared was developed by adapting the Jumar to the specificity of pit caving. Its name comes from the town Crolles where Petzl's company headquarters are located, but might also be a reference to the nearby cave system of the Dent de Crolles, the exploration of which triggered a lot of technical effort leading to innovation in caving equipment.

The Croll is normally used in the chest position and in conjunction with an upper ascender or Jumar. This configuration allows a climber, caver or rope access worker to rapidly ascend a rope.

The **CROLL** chest ascender is the most efficient device for fixed lines. Compact and lightweight, it does not interfere with progression. The stainless steel wear plate improves durability by reinforcing the rope friction zone.

- Used with a BASIC ascender or with an ASCENSION handled ascender for rope ascents.
- Toothed cam with self-cleaning slot optimizes performance under any conditions (e.g. frozen or dirty ropes);
- Stainless steel cam has better resistance to corrosion;
- Stainless steel wear plate for improved durability;
- Open the catch by pinching for simple, quick manipulation;
- Lower hole angled to keep the CROLL chest ascender flat;
- Upper hole for attaching a TORSE shoulder strap and keeping the ascender in position.

1.7 Gri-Gri



A **Grigri** (or GriGri, Gri-gri or Gris-gris) is an assisted braking belay device manufactured by Petzl designed to help secure rock-climbing, rappelling, and rope-acrobatic activities. Its main characteristic is a clutch that assists in braking under a shock load. The success of this device has led to grigri becoming a common name for devices of this type. In 2011 a new version, the GriGri 2 was released to replace the original which has been in production since 1991.

The Grigri works by pinching the rope when it is moving quickly (like in a fall), making it an assisted braking belay device unlike traditional belay devices such as a Sticht plate or an ATC. Internally, the rope runs along a cam, which allows the rope to pass if moving slowly, but when the rope moves quickly the cam will rotate, pinching the rope.

Advantages and disadvantages

Some climbers feel that the Grigri is only suitable for top rope climbing and not lead climbing due to the assisted braking feature, though Petzl recommends the device for use in both applications. The claim against usage for lead climbing is that since the device assists in stopping the rope, the belayer often mistakenly holds the device open while feeding rope to the leader. Another common mistake while belaying a lead climber is to hold the device open the entire time, thus defeating the assisted braking mechanism. This practice renders the device entirely useless and has been the cause of many accidents. Users can and should learn how to feed rope without holding the device open. Petzl has released information on how rope should be fed through in a lead climb, including how to let slack out quickly so that the climber can clip a quickdraw on a sport route.

When used correctly, the Grigri's camming mechanism can assist in holding a climber that is working a route, or hanging on the rope while trying to figure out a climb. For lead climbing, a Grigri is more difficult to use correctly than an ATC; for top-rope climbing the grigri can be difficult to lower the climber with. When belaying, the same technique for "taking in" that is used with an ATC or similar device is used. However while paying slack out into the system if the device is held open (with one technique being referred to as "the thumb") and the climber falls, unless the belayer lets go of the gri gri and continues to hold the brake rope the device will not lock and the climber will hit the ground.

The Grigri is heavier and more expensive than other belay devices. Many climbers aim to reduce, as much as possible, the weight they carry on climbs. However, there are applications where only an assisted brake belay device will work. The Grigri has a lower limit for the rope size for which the cam will engage. This makes it unusable with many of today's skinny ropes - like those used in many alpine applications.

1.8 ATC

An **ATC** or Air Traffic Controller is a type of belay and rappel device manufactured by Black Diamond Equipment and markets as one the best designed belay tubes.

The **belay tube** is the most popular and common belay/rappel device used today. They're generally light, compact, and easy to use. They also accommodate either one or two ropes of varying diameters. The tube operates like the plate, except the length of tube allows the belayer to easily and smoothly control the friction of the rope as it passes through the device. Tube devices, with twin holes, are also superior to plates for rappelling since they allow precise control of your descent speed. Lightweight climbers often find it difficult to rappel with tube devices, having to feed the rope through it until their body weight is able to do the job. These devices are suitable for all types of climbing.

1.9 Slings

A **sling** or a runner is an item of climbing equipment consisting of a tied or sewn loop of webbing. These can be wrapped around sections of rock, hitched to other pieces of equipment, or tied directly to a tensioned line using a Prusik style knot. They may be used as anchors, to extend an anchor to reduce rope drag, in anchor equalization, or to climb a rope.

Slings come both sewn to length and assembled from loose webbing knotted as desired. Common sewn lengths include:

- 10 centimeters (3.9 in);
- 30 centimeters (12 in);
- 60 centimeters (24 in);
- 120 centimeters (47 in);
- 240 centimeters (94 in).

They are available in widths of 6–20 millimeters (0.24–0.79 in).

Webbing for slings, also known as tape, is sold off the reel, cut to length with a hot knife to prevent fraying, and tied as desired with a water knot.

Sewn slings have a rated breaking strength of at least 22 kilonewtons (2200 kg). Short sewn slings are a component of quickdraws, sometimes known as dogbones.

Materials

Ttraditionally, slings have been made of nylon. Increasingly, ultra high molecular weight polyethylene sold under the brand names Dyneema, Dynex and Spectra is used. These have much lower melting points than nylon, making them a potentially poor choice where high rope friction may occur. However

this specialty polyethylene is lighter, smaller, and absorbs less water than nylon, and therefore has become popular.

Types

- **Express or quickdraw sling**: these are small slings with a stitched mid-section and karabiner openings at each end of the sling. The sling is used to connect two karabiners together. The karabiners are placed in opposite openings. The result is called a quickdraw, which is used to attach a climbing rope to a piece of gear and the rock, allowing it to run more freely than if the rope was clipped to a single karabiner. The sling is sometimes called a dogbone.
- **Sling A sling** is simply a length of webbing with its ends either tied or sewn together, creating a closed loop. Slings are versatile and used for many different climbing applications.
- **Belay Slings:** this sling has extra stitched loops which can be used to connect two fixed points at an anchor to a climber or the climbing safety system. The belay sling helps create an equalized anchor. They are, however, not often used in the United States since most climbers prefer to tie into anchors with a knot like a figure-8-on-a-bight in the climbing rope.
- **Daisy Chain:** a daisy chain is a sling that has several extra loops stitched into it, allowing a climber to clip into anchors or equipment at various points on the sling.
- **Shock Absorber:** these are specialized slings that are stitched with seams of different strengths. Shock absorber slings are used on routes where the possibility of large falls and the resulting loads can stress and threaten the load capacity of a climbing anchor like a nut, cam, bolt, or an anchor system. Using a shock absorber allows the fall factor to be reduced up to 30% when the individual seams break under a load. Shock absorber slings are sometimes called Screamers for gear made by Yates Climbing Equipment.
- **Gear sling** is a loop of webbing used to organize or carry equipment. These can be custom items meant only to carry light gear, fully load-bearing manufactured gear racks capable of doubling for a sling, or simply a regular sling used to rack gear.

1.10 Helmets

The **helmet** is a specially designed climbing head cover made of hard resistant plastic that protects a climber's head from falling rocks and cranial injuries as a result of climbing falls. Helmets should always be worn when climbing and belaying. It's wise to wear a helmet that is specifically designed for climbing, rather than a bicycling helmet.

Sizes vary in climbing helmets, due to the adjustability of many styles. Straps adjust the fit on the go, which can be massively beneficial as changes in temperature cause swelling and expansion. Sizes usually come measured in inches, anywhere from 48 cm to 61 cm for adults.

Fit and measuring

- Measuring can be done with a tape measure, or simply by securing on the helmet and tilting your head. It shouldn't move, wobble or be able to be pushed off with ease when the straps are secured.
- Check the adjustability and make sure the fit allows you to move your head freely without the helmet wobbling. Buckle the chin strap so it is snug enough for a strong hold, without being too tight. Make sure the straps aren't slack.
- Check the foam casing feels soft to touch and is secure within the outer shell.
- You need your helmet to be comfortable, safely fitted, and secure. Most climbing helmets come in sizes S - XL based on the cm measuring system, and these vary from brand to brand.
- Dials on the side that tighten are common, and some helmets will also incorporate toggles, and other features that allow you to adjust the shape of your helmet.
- The fit should be CENTRAL! The right helmet shouldn't obscure your vision, but to have the right level of protection, you may well be able to see it on your forehead if you have a look upwards. Don't overcompensate and push your helmet too far back, your forehead needs just as much protection as the back of your head. Similarly, ensure a snug fit that doesn't go too far and leave you with a throbbing headache.
- The right fit should ensure no excess pressure at the temples, without being visibly loose. Suspension - each climbing helmet has an inbuilt system that keeps the roof of the helmet elevated from your own head. This prevents heat buildup, and is where the technical ability of the helmet lies. Whilst many think the helmet's outer face that you can tap on is the protection, this is usually made of plastic.

How to wear a helmet correctly

Don't let the helmet tilt to the side (fig. 1) or off to the back (fig. 2). Make sure it is secured squarely on top of your head (fig. 3).

Types

Suspension helmet: this durable, traditional lid offers a solid outer shell supported by an interior webbing suspension system—much like a construction hard hat. Energy is absorbed primarily by elastic deformation; that is, the shell deforms on impact and will normally return to its original shape afterward. This absorbs the energy of a vertical impact, such as a falling rock. Suspension models offer great durability but are relatively heavy.

Foam helmet: this lighter-weight style features a crown of polystyrene or polypropylene foam protected by a thinner shell. Energy is absorbed by plastic deformation; that is, the crown deforms permanently on impact as the foam is crushed. This disperses the energy of a vertical impact and the frontal, side and rearward impacts more common with a falling climber. Durability varies according to shell thickness, which can range

from thin plastic sheeting to a semi-rigid shell. Foam helmets are often lighter and more popular, but a bit less durable in the long run due to their thinner shells.

Helmet Care

To maximize a helmet's lifespan, do these checks each time before you store it:

- Test that the chin buckle is in good working order.
- Check the webbing (near the ears). Is it in good shape and free from frays and tears?
- Make sure the foam casing is secure inside the helmet's shell.

Stow your helmet inside a climbing bag to protect it from banging against hard surfaces, which makes it vulnerable to chipping and cracking.

Helmet Retirement

Climbing helmets have a limited lifespan. In the best case scenario, one should be retired no later than 10 years after the date of manufacture. This date is stamped on some brands. Even with UV inhibitors, the plastic materials in the helmets are vulnerable to ultraviolet radiation from sunlight, which causes them to weaken. Frequent climbers will want to cut this lifespan time in half or more.

You should also retire a helmet anytime it's been dented, cracked or damaged—including the straps. But helmets can be damaged and still not show obvious wear and tear. Keep this advice in mind: Any time you take a hard hit and you think to yourself, "I would have been seriously messed up if not for my helmet," then it's time to get a new one.

1.11 Harness

A **climbing harness** is an item of climbing equipment for rock-climbing, abseiling, or other activities requiring the use of ropes to provide access or safety such as industrial rope access, working at heights, etc. A harness secures a person to a rope or an anchor point.

In its simplest form, a harness can be made from a length of rope or nylon webbing tied round the waist. More sophisticated harnesses exist in many patterns, designed to give greater comfort and security, and more options for carrying equipment. Among the most popular hand tied harnesses are the Swiss seat and Studebaker Wrap.

While harnesses can be improvised, it is more common to use harnesses commercially produced which often include padding and amenities such as gear loops. Most commercial climbing harnesses meet the guidelines and manufacturing standards of organizations such as the International Union of Alpine Associates (UIAA) or European Committee for Standardization.

Types

- **A sit harness (Type C sit harness)** consists of a waist belt and two leg loops which are normally connected in the front of the hips through a permanent webbing loop called a belay loop. These are the most commonly used harnesses for recreational activities such as abseiling and rock climbing, as they afford a wide range of movement while still maintaining a high level of safety. Ensuring the harness fits correctly is key to avoiding pain in the upper thigh area caused by the leg loops being too tight around the upper legs and groin area, while at the same time ensuring that a climber flipped over in a fall does not slip out.
- **A chest harness** is worn around the shoulders, usually with a sit harness so as to provide an additional attachment point. This attachment point allows for better balance in some situations such as when carrying a heavy pack (as the centre of mass is below the connection to the rope) and when the person in the harness may be unable to maintain an upright position (due to injury or other influences).
- **A full-body harness** is the combination of a sit harness and a chest harness which are permanently or semi-permanently connected to each other. This kind of harness normally offers a wide range of attachment points. It is most commonly used in industrial/rescue situations, and also commonly used by small children instead of a sit string harness.
- **Sport or gym harnesses**: stripped down for fast, ultra light travel, whether indoors in the gym or on outdoor sport routes. Typical features:
- **Traditional harnesses**: traditional climbing usually requires much more gear than sport climbing, so a traditional harness maximizes space while being relatively light and comfortable.
- **Ice and mixed harnesses**: similar to traditional harnesses but designed to cope with winter conditions.
- **Alpine/mountaineering harnesses**: these offer all–season versatility. Lightweight, adjustable leg loops for easy on and off.
- **Specialized harnesses**: canyoneering, competition, Big wall and Full body/rescue harnesses.

Anatomy of a climbing harness

Pictures from YatesGear.com of Shield Harness

Harness Standards

Harnesses, like most climbing gear, are engineered for safety. The forces required to break the harness would far exceed the force required to do internal bodily harm.

All harnesses must be submitted for stringent testing to satisfy the International Union of Alpine Associates *(UIAA 105)* or the European Committee for Standardization (EN 1277). Both of these are independent testing groups that help ensure quality standards among a variety of products.

Harnesses are categorized and defined by their shape and use. On a Type C sit harness, the belay loop is tested to 15kN (1500 kg). A full–body harness that is child–specific is considered a Type B small–body harness and is designed for weights ≤ 40 Kg (≤ 88 lbs.). A Type B small–body harness' tie–in points must be rated to a minimum of 10kN (1000 kg).

Harness lifetime

A harness that is well worn is not necessarily unsafe, but excessive fraying and discoloration of the webbing are signs to retire the harness. Some harnesses have orange wear-mark indicators stitched beneath tie-in points and the belay loop to visually help show when the harness needs to be retired.

All harnesses' structural materials degrade over time, so to ensure your safety, retire any harness that is more than 7 years old, even if it has been properly stored and/or never used.

For climbing professionals such as mountain guides, or those climbing full-time, it is recommended to retire the harness after 1 year. In the event of a major fall or impact, retire the harness immediately.

Harness cleaning

When the harness gets dirty, try simple rinsing first. If this does not remove the dirt particles, you may hand wash a harness in warm water with a mild soap (never use bleach), then rinse. Allow it to air dry away from direct sunlight.

Harness Transport and Storage

Transport a harness in its supplied bag and always keep it away from sharp objects, ice screws, crampons, direct sunlight, corrosive substances (e.g., battery acids, gasoline, solvents, and bleach) or any other potentially damaging objects. If your harness did not come with a bag, a stuff sack can be a cheap and simple solution.

Store your harness in a dry, dark place that is free of any contaminants. If the harness becomes wet, air-dry it before storing.

2.TREE CLIMBING, ABSEILING, BELAYING

2.1 Tree climbing

What and why?

High rope elements need to be set up at least 4 meters high, with the belaying system at 7.5 meters. This is why it is very important to know how to climb the trees to be able to set up the system and to get back down in the best and risk free conditions.

Tree selection

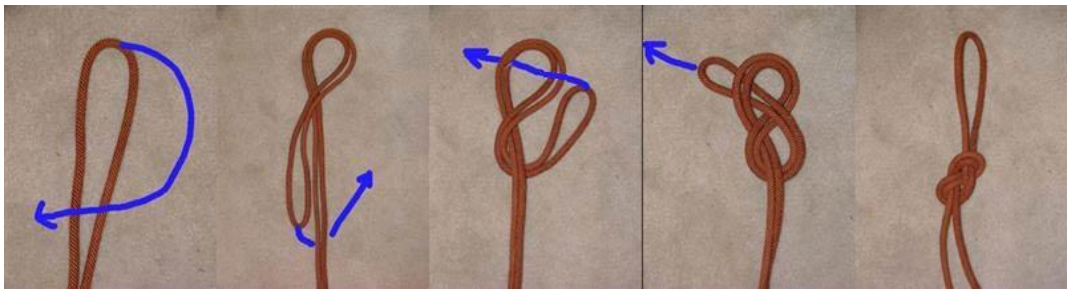
It is very important to check the trees you choose to climb before you start climbing them or use them for any rope course element.

So, make sure that:

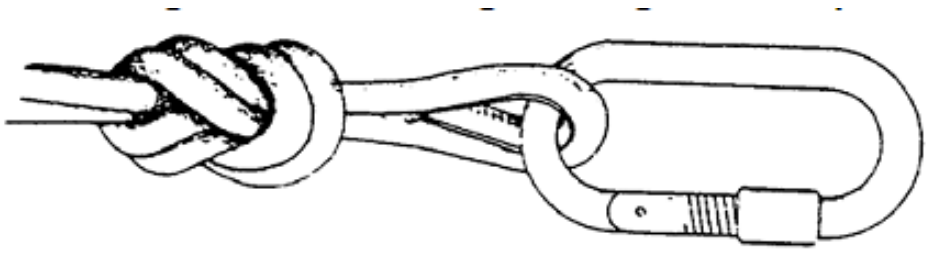
- The tree you chose is big enough to support the tension you put on it. The diameter of the tree must be at least 25 cm to be safe to build rope course elements on it.
- The tree is healthy. It is very important to make sure the tree you chose is not rotten or diseased, so it doesn't break while you use it. Always check for withered branches, they may be a sign the tree isn't healthy.
- The tree is safe from external hazards. For example don't climb a tree exposed to power lines and always check for active animal or bird nests as well as hornets, bees, wasps.

Knots:

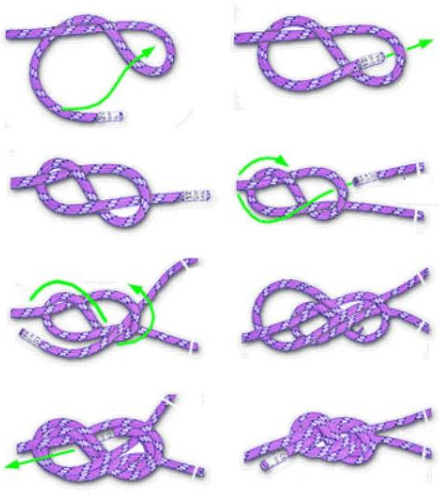
Double eight knot



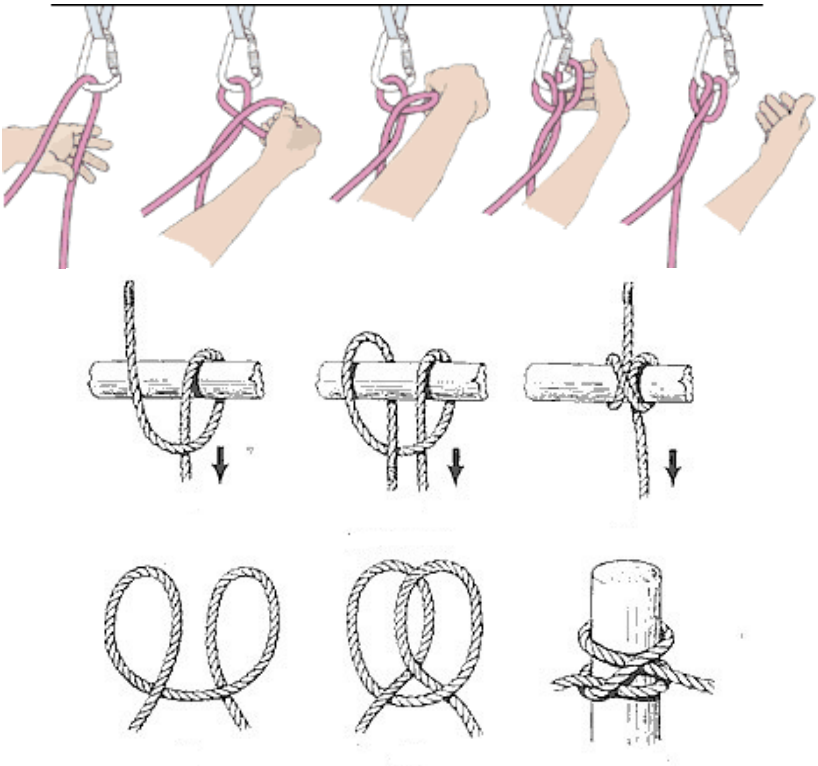
At this point, the knot must be arranged, so none of the ropes cross over another one.



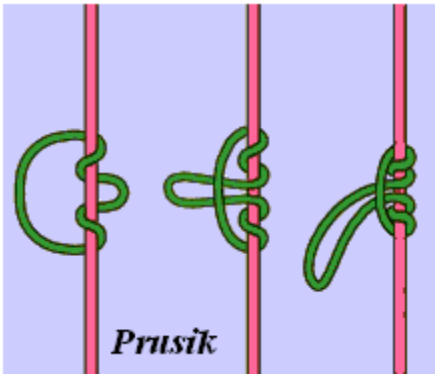
Followed eight knot

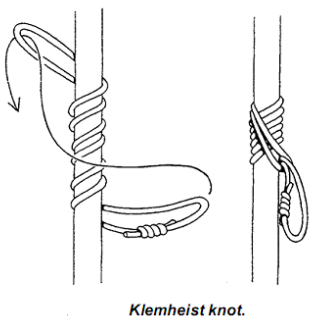


Clove hitch



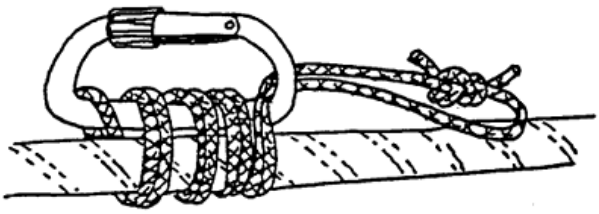
Blocking knots





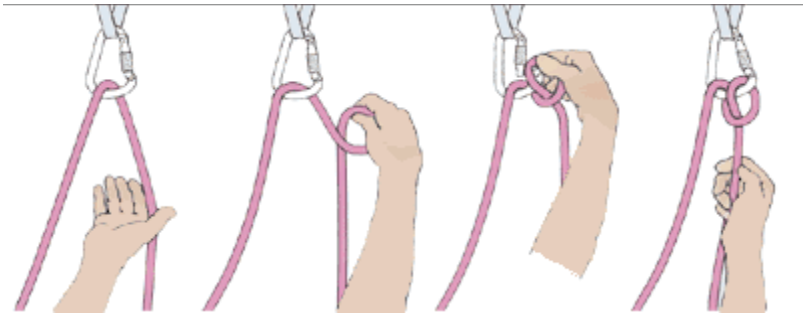
Klemheist knot.

French Prusik.



Bachmann knot.

Italian hitch



How to climb a tree:

Case 1: if you don't have any anchors or service ropes put on

What do you need:

- 2 small ropes
- 1 Aluminum Karabiner
- Harness
- Helmet

CAUTION! You will also need abseiling equipment and the equipment to make the anchor point once you reached the desired hight.

Step 1: Take a small rope and tie its ends together with a followed eight knot. Do the same with the other small rope.

Step 2: Install the system on the tree as shown in the picture. You will use the higher rope as an self-anchoring point and the lower rope as a pedal.

Step 3: Put a karabiner through the higher rope and connect it to your harness.

Step 4: Step into the pedal and push yourself up straight

Step 5: Lift the self-anchoring rope as high as you can

Step 6: Sit in the harness and lift the pedal as high as you can

Step 7: Repeat the method until you get as high as you want to install the anchor point or to tie up the rope

Instead of the 2 small ropes you can use two slings, following the same steps (from 2 to 7)

Case 2: if you already have a rope installed on the tree:

What do you need:

- Harness
- Helmet
- Ascender (or ascending system)
- Pedal
- Sling
- 4 Aluminum Karabiner
- Belaying device (or other gear or system that can replace it)

CAUTION! You will also need abseiling equipment, so don't forget to take it up with you.

There are many techniques you can use to climb up a rope, using different ascending equipment or systems. The most common is the one using the typical ascender (Jumar) taking the following steps:

Step 1: Install the ascender on the rope

Step 2: Connect the pedal to the ascender using an aluminum karabiner

Step 3: Put a sling through the loop of the harness and connect it to the ascender with an aluminum karabiner.

Step 4: Install the belaying device on the rope and connect it to your harness with an aluminum karabiner. Even though the best device you can use is the ID, you can also use a GriGri, a Crawl or a Minitraxion.

Step 5: Put your foot in the pedal and lift the ascender as high as you can reach.

Step 6: Step into the pedal and push yourself up straight

Step 7: Pull the rope so that the belaying device reaches your level again

Step 8: Sit in the harness and repeat the last 3 steps until you reach the hight you need.

Step 9: When reaching the top (the anchoring point) attach the sling you have connected to your harness to the karabiner at the anchoring point.

You can replace the Jumar with a Tibloc or a Prusik knot. Also, instead of the GriGri you can use a Minitraxion or a Prusik knot. In these cases it is very important to be careful when installing the abseiling system, as those equipments cannot be used in abseiling.

2.2 Abseiling

What and why?

Abseiling, or rappelling, is the controlled descend down a rock, a tree etc, using a rope. We use abseiling techniques to come down the trees in the best and risk free conditions, once our work there is done.

What do you need?

- Harness
- Helmet
- Rope
- Descender
- String
- Sling
- 2 Aluminum Karabiners
- Steel Karabiner, for equiment collecting stage

Descenders

There are different types of descenders that can be used in abseiling.

- Auto blocking descenders: stop, gri gri, id
- Manual descenders: ATC, Eight figure
- Friction knots: Italian hitch

Manual descenders **must** be used together with a blocking knot for safety (Prusik).

Regardless of the abseiling device used, there is a way to abseil correctly. Being able to abseil does not mean doing it correctly, you may just have been lucky not to hurt yourself. This is why it is very important to know the abseiling techniques.

Techniques

- **Position**

The correct body position is very important during abseiling.

To get in the correct position, sit in the harness like in a chair. The upper body must slightly be leaned backward, feet flat on the wall or

on the tree, legs straight and at least shoulders width apart to avoid losing balance.

- **Hands**

Breakhand: One of the hands must be the “breakhand”. Usually for right-handed, the breaking hand is the right one. This must hold the rope behind the back, thigh level, positioned with the thumb up. This hand controls the feed of the standing end of the rope during abseiling.

The other hand: Controls the abseiling device. In case of the Gri Gri, for example, this hand uses the handle to unlock the cam. In case of descending with a manual descender, the other hand actions the blocking knot.



How to abseil?

One of the main rules you have to know about abseiling is that you always have to tie a knot at the end of the rope, at least 1 meter above the end.

Case 1. You climbed the tree to make an anchor point

You first climbed the tree this time. You made the anchor point or the clove hitch on the tree. You are anchored on the tree with a sling or a small rope. How do you come down?

Step 1: Take out your abseiling device and install it on the rope. Connect it to your harness and secure the karabiner. If you are using a manual descender, also make the blocking knot and connect it to your harness with a karabiner. Secure this karabiner too.

Step 2: Sit in the harness so that your main anchoring point is the abseiling device you are using.

Step 3: Release the other anchoring point (in this case, the sling or the rope on the tree) and collect this equipment.

Step 4: Get into the correct position, and abseil down.

Case 2: You already have a rope set up on the tree

You climb using an Ascending device. You get to the top.

Step 1: Connect a sling to your harness. Connect the other end to a karabiner and anchor yourself to the top. This way you are anchored in two points.

Step 2: Take off your ascending device.

Step 3: Install the descender (if necessary).

Step 4: Sit in the harness so that your main anchoring point is the abseiling device you are using.

Step 5: Release the second anchoring point (in this case the sling).

Step 6: Get into the correct position and abseil down.

Case 3: Collecting the equipment

You climb up the tree using the ascender on the rope. You finished your work and you have to collect the equipment. Still you have to find a way to abseil down.

In this case you can use a system called the Petzl knot. The Petzl knot is a system made out of a steel karabiner and the rope you use for abseiling. The particularity of this system is that by pulling from one end of the rope, it blocks, making it safe to abseil on and pulling the other end opens the knot for collecting the equipment.

Step 1: Climb the tree and anchor yourself with a sling or a small rope to the tree above the anchor you have to take down.

Step 2: Take down the equipment.

Step 3: Take a steel karabiner and tie the rope with a clove hitch on it.

Step 4: Surround the tree with the rope and then clip it into the karabiner. **Caution! The lock of the karabiner must be facing the sky.**

Step 5: Connect the abseiling device on the **life end** of the rope **(the end without a clove hitch)**.

Step 6: Disconnect the point you are anchored in (the sling) so that you remain anchored in the abseiling device

Step 7: Get into the correct position and abseil down.

Step 8: From the ground, pull the death end of the rope (the one with the clove hitch) and take the rope down.

2.3 Belaying

What and why?

Belaying is the technique for holding the rope for a climber so that they are safe if they fall.

What do you need?

The most important thing a climber needs is a partner – the belayer - to assist him during the climb. It is recommended that the belayer is also assisted by a team of two other people – one that anchors the belayer and the other one that collects the rope.

The belayer needs:

- Harness
- Helmet
- Belaying device
- Aluminum Karabiner

The climber is tied to the rope using a followed eight knot or a double eight knot connected to the harness with an aluminum karabiner. For safety measures, the double eight can be seconded by another double eight knot connected to the chest harness of the climber also with an aluminum karabiner.

Belaying devices or knots:

- Auto blocking belaying devices: gri gri, id
- Manual belaying devices: ATC, Eight figure
- Friction knots: Italian hitch

How to belay a climber

Regardless of the belaying device used, there are certain steps and positions to belay. One of the most important rules of belaying is **"never let go of the rope"**. The belayer must always have at least one hand on the rope in order to make the ascension safe for the climber.

If the climber is moving up:

Step 1: Pull the rope out of the belaying device with your right hand (left handed people use their left hand)

Step 2: Place your left hand on the rope higher above the right hand (right hand over the left hand for left handed people).

Step 3: Remove your right hand from the rope and place it above your left hand. (left hand above right hand, for left handed people)

If the climber is coming down:

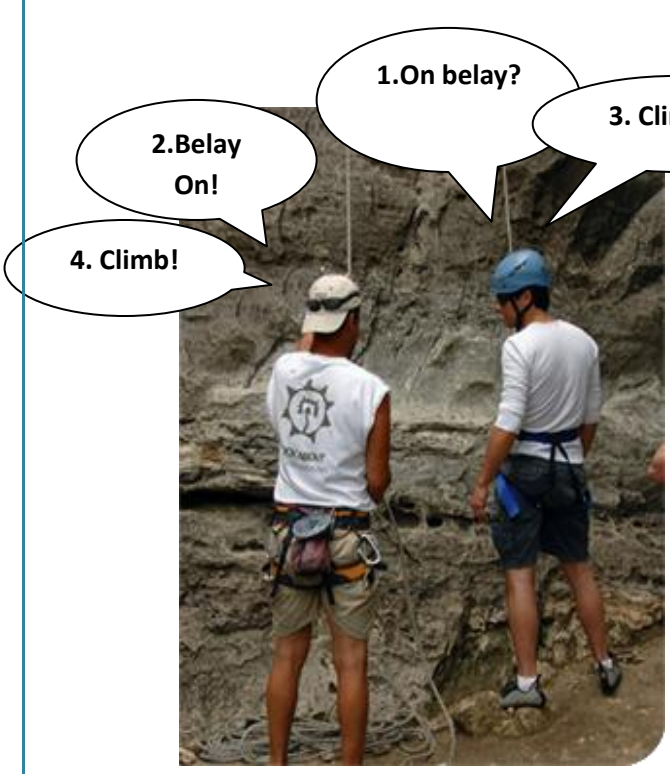
- auto-blocking belaying device: left hand on the handle of the device to unlock the cam and right hand placed at thigh level slowly letting the rope flow.
- Manual belaying device: both hands hold the rope at thigh level slowly letting the rope flow.

!Caution! It is not recommended to use the eight figure device as it damages the rope.

The Italian Hitch knot blocks when the end of the rope is paralel with the climber's rope.

Communication between the climber and the belayer

Communication between partners is very important for a safe climbing session. Partners must always check each other's equipment and the knots before starting a climb. Also, climbers should wait for verbal confirmation from the belayer that he is ready to begin. He should as well signal when he is ready to come down and wait for the confirmation from the belayer before sitting in the harness.



3. LOW AND HIGH ROPES

3.1 Experience and Philosophy

A ropes course is designed to be challenging and risk provoking in a safe and well-monitored environment and also is a series of problem-solving events that must be negotiated in order to physically move from one spot to the next. The events are largely constructed of ladders and ropes and vary in height from one foot to forty feet off the ground.

The Ropes Course is a tool which impels its participants into challenging, high-stress situations in order that they may confront aspects of themselves that they may not have cared to deal with or possibly known before (i.e., fear, trust, confusion, anger, etc.). Consequently, there is great potential for feelings of accomplishment and improved confidence. The method is cooperation rather than competition. Success comes from the simple act of trying rather than beating an opponent. Our course benefits may include: higher confidence, improved group cohesion, better communication skills, higher levels of interpersonal trust, and a greater willingness to take calculated risks.

Goals

1. To increase **mutual support** within a group;
    a. By offering respect for effort, not "success".
    b. By enhancing group communication skills.
    c. By developing trusting relationships and attitudes among group members.
2. To increase **confidence** in each individual's God-given abilities;
    a. By encouraging risk-taking and reducing the fear of failure.
    b. By enhancing leadership skills.
    c. By basing acceptance on empathy and love, not on competence.
3. To increase **problem-solving abilities**;
    a. By encouraging creative thinking and decision-making.
    b. By developing decision-making abilities that take into account the needs and goals of the group rather than just the individual.
    c. By debriefing and offering life applications to the activities.
4. To develop an increased **joy in cooperative group activities**;
    a. By emphasizing learning through active, playful participation.
    b. By adding adventure and excitement to participation.
    c. By utilizing teamwork and cooperation rather than competition.

3.2 Construction

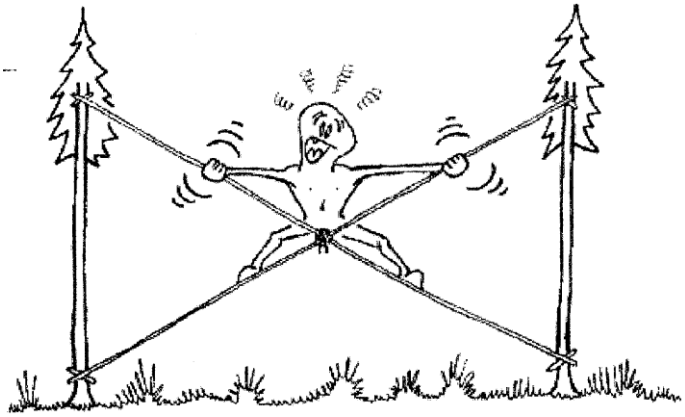
All equipment used in the construction of the course bears a safe working load and tensile strength sufficient for operating procedures.

All belay line cable systems have an independent back-up system equal to the strength of the primary system.

"Element" is the term used in reference to some of the specific events that make up the Ropes Course. These elements require trained spotting and belaying. Each element represents a unique problem for the participant to solve on an individual or group basis. The height of each element varies greatly with a subsequent variance in technical and mechanical set-up due to increased risk factor. On one element a participant may be inches off the ground while another, 40 feet off the ground. Consequently, a categorization process, based on safety procedures and approaches, has been established qualifying the elements as either a "Low Element" or a "High Element".

Low Elements

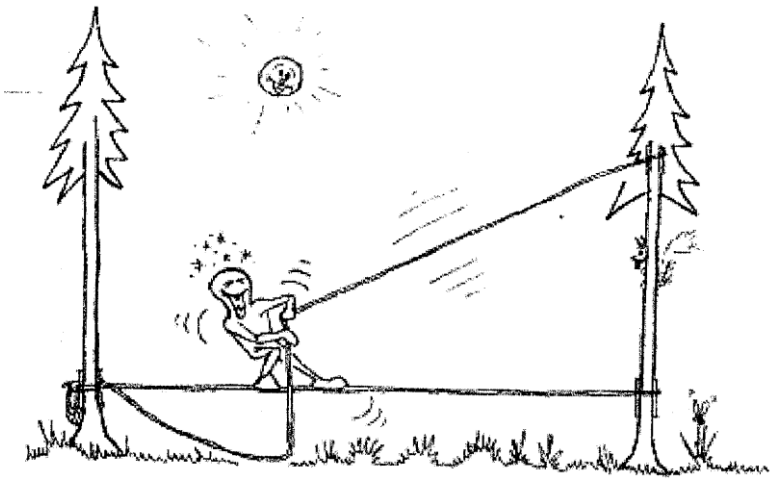
Criss Cross - Two-foot cables are suspended approximately one foot off the ground between trees, crisscrossing in the middle, producing an X shape. The objective is to walk the cables from one end to the other.



Triangle Traverse - Two cables are suspended approximately one foot off the ground between three trees in the shape of a V. A rope may be suspended from one of the trees to form a support. Participants must traverse all three wires using only the support rope.

Commitment Bridge - Two cables are suspended approximately one foot from the ground between three trees in the shape of a V. Two participants of comparable height and weight negotiate the element. The two participants are instructed to climb onto the cables at the narrow end of the V and clasp each other's palms (interlocking fingers are not allowed). Balancing against each other, the participants sidestep toward the wide end of the V as far as they can go.

Tension Traverse - a cable is suspended approximately one foot from the ground between two trees. Hand ropes may be set up for balancing purposes. The objective is to walk the cable from one end to the other.



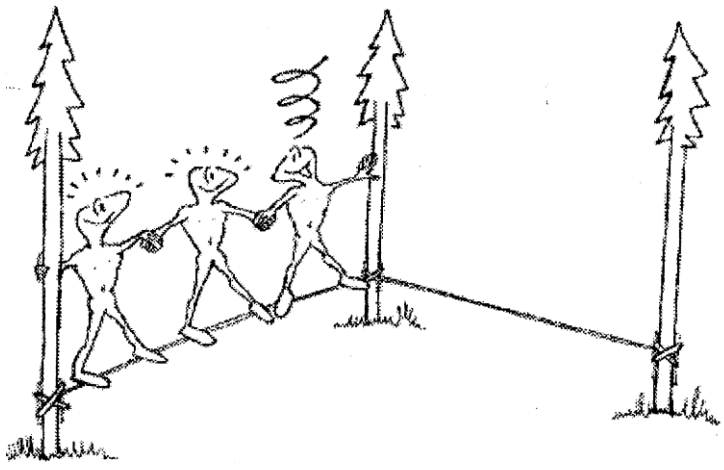
Initiatives

"Initiative" is the term used in reference to the specific events that together with the Low and High Elements complete the Ropes Course. Each initiative is a challenge requiring group ownership, cooperation, and high-level problem solving skills.

Trolleys - Participants are situated in a single line fashion with one foot one each of a 4x4 board. Rope handles are attached to the boards and situated so that each participant holds a rope in each hand. The objective is for entire group to combine efforts in walking the "trolleys" through a designated course.

Mountain Games - Three platforms are set up at varying distances from each other in a triangle shape. Participants must get from one platform to the next, using two boards of different lengths without touching the ground and without the boards touching the ground. All participants must stay on the platforms at all times as well.

Mohawk Walk - A single line series of cables with swinging 4x4 varying in length are strung between two trees approximately one foot off the ground. The objective is for the entire group to traverse the four lengths of cable and the 4x4 without touching the ground. No direct means of support are available to the participant except themselves.



Nitro Crossing - a thick, knotted, swinging rope is suspended between two trees. Two parallel boundary lines are designated so that the rope hangs directly in the middle. The objective is for the entire group to swing one at a time from one boundary to the next without touching the ground between.

Spider's Web - An arrangement of rope or cord is fixed between two trees passing over itself in a symmetrical fashion forming a "web-like" configuration. In observing the web, an obvious number of holes or spaces are evident. The objective is for each participant—one at a time—to pass through an opening in the web, attempting to reach the other side. Participants may not touch the web and once one of the openings is used, it may not be used again.

Log Jam - An arrangement of logs are hung between two parallel lengths of cable in such a way that they are moveable. The objective is for the group to make their way from one end to the other by sliding the mobile logs and without touching the ground.

Spotting – Low Elements

The commonality of Low Elements is that the participants are relatively close to the ground with safety controls monitored and provided by other participants who use a technique called "spotting".

1. Maintain an active position, ready to move at any time.
2. Anticipate the possibility of a fall.
3. Stay close to the participant, but do not interfere or assist in their movement.
4. Small or weak people should not spot larger participants unless they are part of a larger group of spotters.
5. Do not allow your attention to be diverted by anything while spotting. Always keep your eyes on the participant.
6. Know the initiatives or Low Elements you are spotting and the possibilities for accidents.
7. Keep hands up and fingers together while spotting.
8. Keep eyes on participants at **ALL** times.
9. Upper body support is first priority to protect head, neck and back injuries.
10. Pre-defined communication will be used between participant and spotter(s).

A series of explanations, discussions, and exercises will be used to teach and test spotting. When all spotting exercises have been passed, Low Elements begin.

Spotting activities should start out with participants pairing up and practicing falling back into their partner's hands. The spotter should maintain an active stance, with fingers up and together and eyes on the participant at all times. The participant falling should initiate a verbal contract with the spotter both to begin and end the fall. Partners should switch positions after the first participant has "fallen" a few times.

Another spotting activity is the **willow in the wind**. Participants stand in a circle with someone in the middle acting as the willow tree. The person in the middle protects chest area by crossing arms in front of chest and initiates a verbal contract, and begins the fall. As the participant falls in any direction, spotters should be ready to catch the participant and bring him/her back to a standing position.

The gauntlet - spotters line up in two lines facing inward. A participant walks through the line as if he/she were to be walking on a cable. The participant will fall in either direction and spotters must make sure they are ready for the participant.

The final activity that can be done is the **trust wave**. Spotters again line up in the same zipper spot formation. A participant will run/walk through the line. Just before the participant reaches the spotters arms, the spotters should raise their arms and let the participant past without hitting them in the face (like doing the wave).

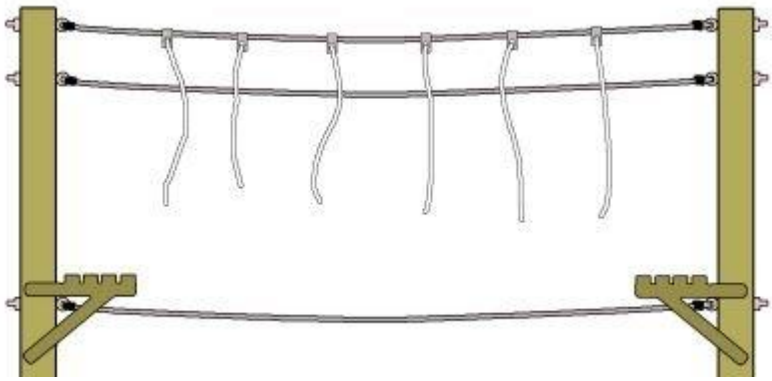
High Elements

The Wall - Participants climb from the bottom of the wall to the top using foot/hand holds in various positions.

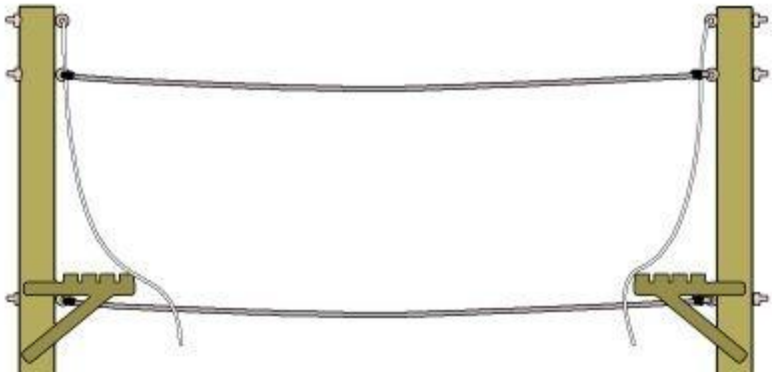
Pamper Pole - In this element, a trapeze bar is suspended between two poles approximately thirty feet off the ground. The objective in negotiating this element is for a single participant to climb a solitary pole, stand upon it and jump off toward the bar.

Zip Line - Participant is belayed in normal dynamic fashion to a platform where an Instructor is stationed. (*Instructor may allow participant to climb up to platform while on static belay instead of dynamic belay if the participant has successfully been taught and tested on the use of lobster claws). The participant is then transferred to the Zip pulley. When clearance is given, the participant rides the pulley down the Zip cable. A ground crew assists the participant in dismounting the Zip system by use of a stepladder.

Multi-vine - a foot cable is suspended between two poles with a series of ropes attached to an overhead cable at increasingly greater distances from each other. The participant traverses the cable from one pole to the other using only the dangling ropes for balance.

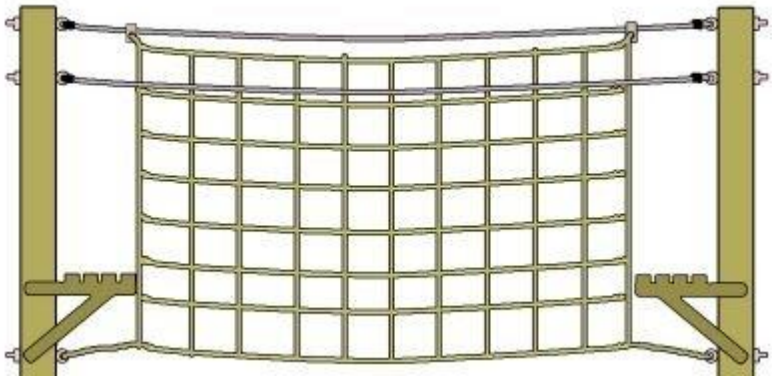


Ship's Crossing - a foot cable is suspended between two poles with two ropes also attached to the poles. These ropes cross in the middle to form an X. The objective is to cross the cable using only the extra ropes for support.



Vertical Playpen - Various elements are combined to form the playpen. (Rope ladder, free-swinging pole with staples, series of wooded logs connected by cable). The objective is to climb as high up the playpen as possible.

Cargo Net - a giant cargo net is fastened to one side of the climbing tower. The objective is to climb as high up the net as possible.



Catwalk - A log or pole is fastened between two fixed poles. The objective is for one participant to walk from one end of the pole to the other without holding on to any supports.

Belaying – High Elements

The commonality of all High Elements is that the participant is too high off the ground for safety control measures to be provided through the spotting technique. Rather, safety control is ensured through a system called “Belaying”.

Belay - All participants engaged in climbing activities on the High Elements of the Ropes Course will have their safety ensured through the process of belay. Similarly, any participants on elements will be “on belay”. For set-up and take down of High Elements and Zip Line—a **static belay** device will be in use. This will appear as a double rope device, anchored by karabiners to the seat harness of the climber on one end and to a belay cable, telephone pole or secure peg on the other.

Dynamic belay systems will be used by participants on all other high climbing events, and when climbing onto the Zip Line platform. A dynamic system uses a long belay rope, with one end secured to the seat harness of the climber and the other end secured to the belayer with a friction device.

Belay communication

The belay process consists of communication between climber and belayer, which indicates that the belayer is ready to assume responsibility for the safety of the climber. It is imperative that belayer also communicate with climber before releasing belay. All participants must be taught and use communication procedures.

When working on a series of two or more High Elements, it will be necessary for the climber to switch from one belay system to another before proceeding. This may be accomplished by an additional Instructor who receives the climber at change points, secures him into a second belay system before releasing him from the first, or be careful step-by-step instructions to the climber form the belayer on the ground which safely guides him through the change process. In this instance, demonstrations of the technique while still on the ground are indicated. Regardless of method, ongoing use of the commitment signals between climber and belayer must occur.

4. RISK MANAGEMENT

4.1 Risk assessment

Risk management is the identification of *hazard*, assessment, and prioritization of *risks* followed by coordinated application of resources to minimize, monitor, and control the probability and/or impact of unfortunate events.

A **hazard** is any source of potential damage, harm or adverse effects on something or someone under certain conditions during the process of setting or use of ropes elements. It is a POSSIBILITY of something causing harm.

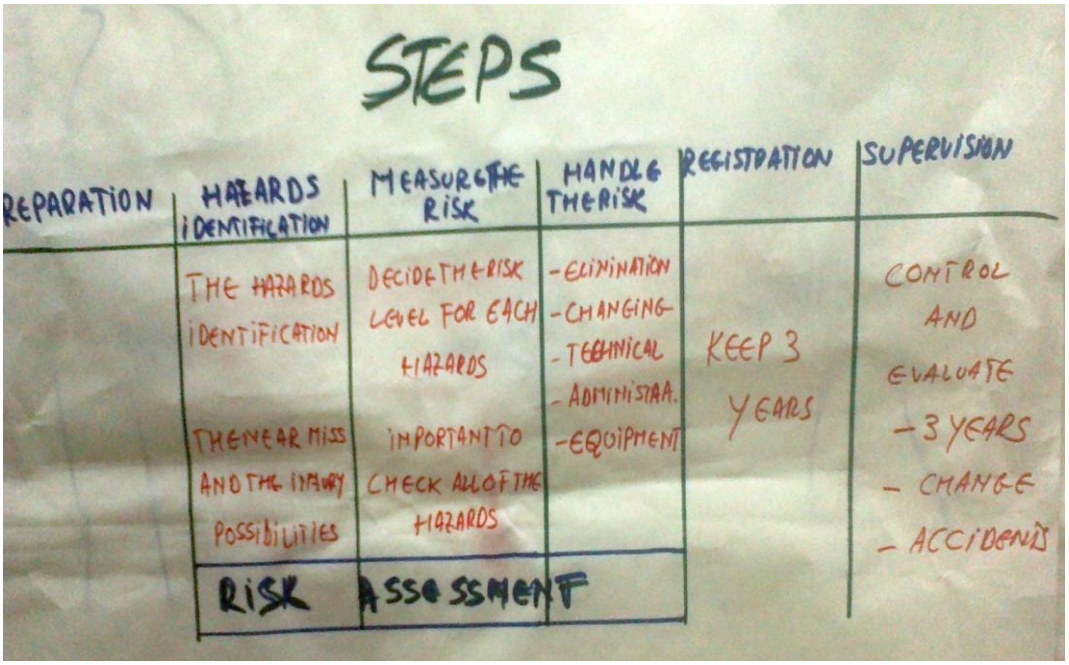
A **risk** is the chance that the damage or harm will actually occur.

Example: *Standing on the edge of a tall building is a HAZARD stepping of the edge is a RISK.*

When the trainer plans ropes elements the following must be considered and checked to identify hazards:

- **E**nvironment
- **A**ctivity
- **P**articipants
- **I**nstructor

The steps of the process:

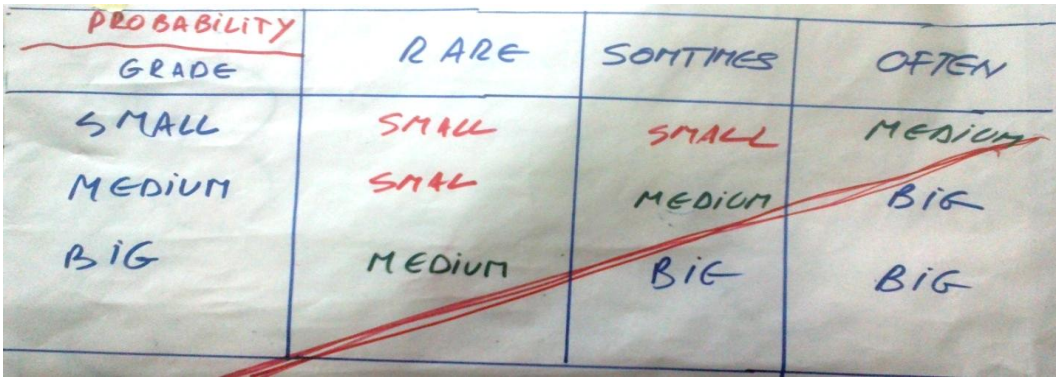


Risk assessment is the process where you:

- **identify hazards,**
- **analyze or evaluate the risk associated with that hazard, and**
- **determine appropriate ways to eliminate or control the hazard.**

The aim is: always find the convenient level of challenge with minimum level of risks. Evaluate the probability and the grade/level of the risks.

NEVER USE AN ACTIVITY/ELEMENT IF THE RISK IS MORE THEN MEDIUM!!!



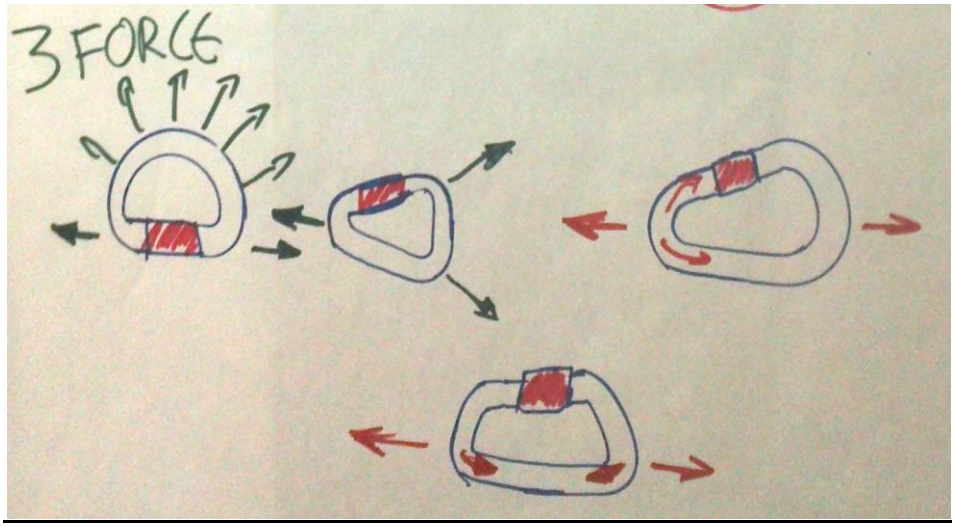
4.2 Forces

Definition: *A* **force** *is a push or pull upon an object resulting from the object's interaction with another object.*

When you set up a rope course or an element, you have to know some general information about the forces and angles, there are some limits you shouldn't cross when using your equipment, as well, cause of the safety reasons.

You have to be aware about your **equipment** (which type of karabiners is good for what, which direction of force). Here are some examples:

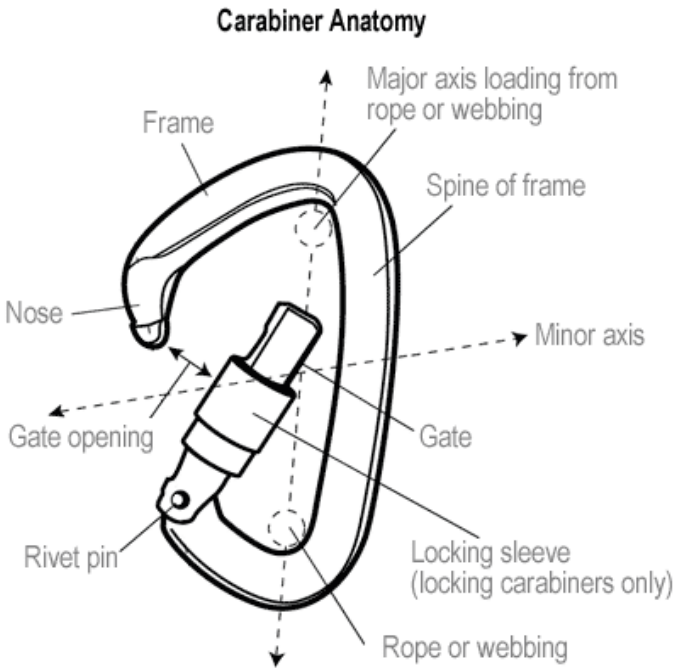
3 types of karabiners: 1. **Oval** – shape 2. **"D"** – shape 3. **Asymmetrical "D"** shape



Karabiner Strength

Karabiners are designed to be loaded along their long ("major") axis with their gates closed. When loaded correctly, all of the certified karabiners are built strong enough to handle the loads found in normal climbing situations.

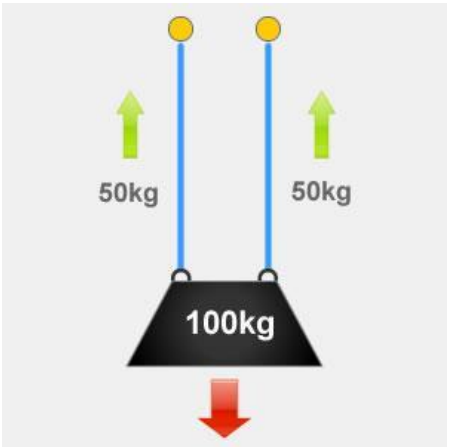
Unfortunately, karabiners can fail at loads well below their rated strength when they're used incorrectly or if they're loaded with their gates open.[1]



Forces in the rope elements

The short scientific information about forces will help you to select the right equipment and trees for your rope elements.

When you set up your element, and your belaying system, you have to know, how much force pulls the trees, when somebody is hanging in the belaying ropes. Knowing the load on the rope, the capacity of the rope, and by calculating the created **tension** we can evaluate the level of the risk.



Tension is the general name for a force that a rope exerts when it is pulled on.

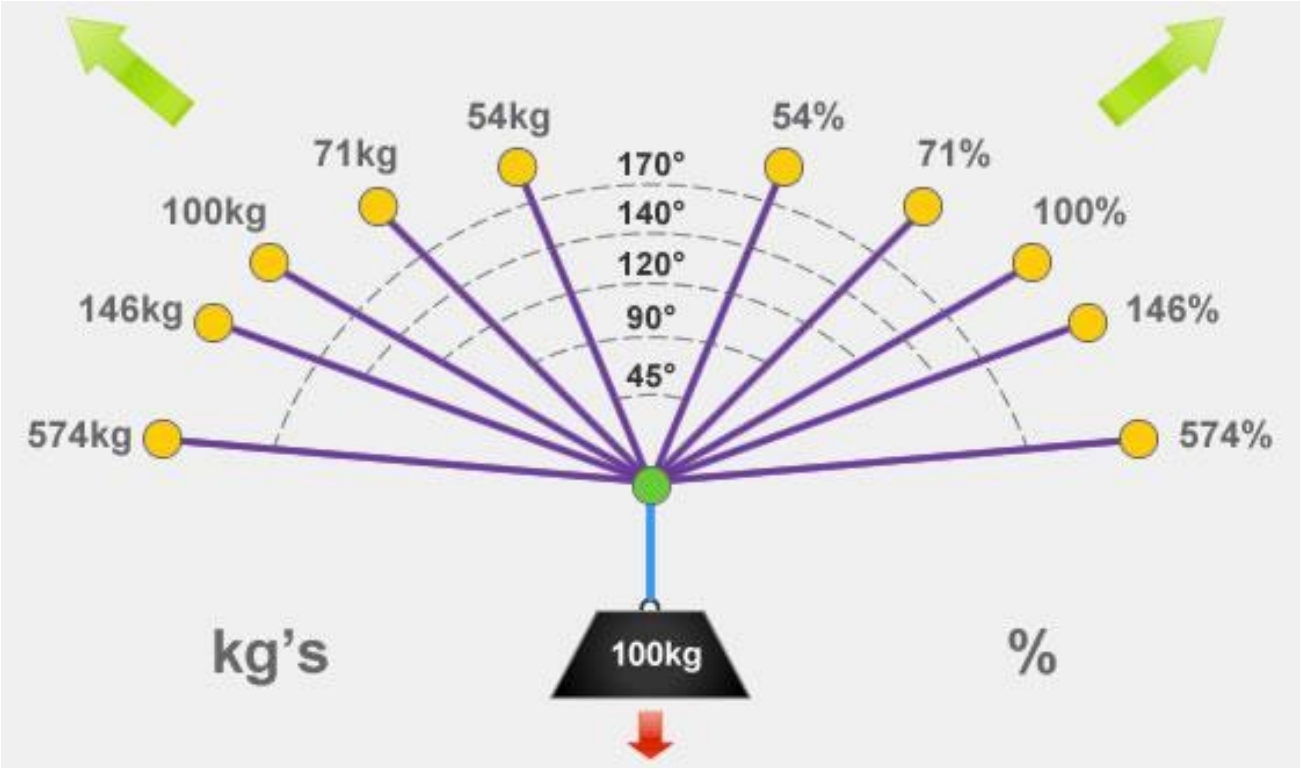
Depending on the deflection of the rope and the angle formed (in the middle) when you hang a load on it we can calculate the percentage of the tension that is created at both ends attached to the tree.

To start with the basics, if we imagine a load of 100kg suspended equally from two slings then each sling would equally share half of the loads weight.

In the situation illustrated to the right, the weight of the load = 100kg. The load is supported by two slings of equal configuration with no internal angle, so 100kg / 2 = 50kg. This means that each sling and anchor point is being subject to 50kg or 50% of the loads weight.[2]

[1] http://www.rei.com/learn/expert-advice/carabiners.html
[2] http://www.ropebook.com/information/vector-forces#sthash.QyTdFzDn.dpuf

Find below the chart of angles and forces:

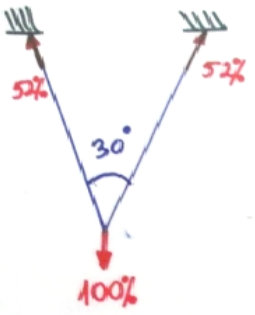


On the figures the 100%(in the middle) means always the weight of the participant. The red arrowheads means the forces and show the direction of the forces.

Remember the rule:

The increasing of the angle leads to increasing of the forces that affect the rope and other equipment, the trees, and anchor points.

Case 1

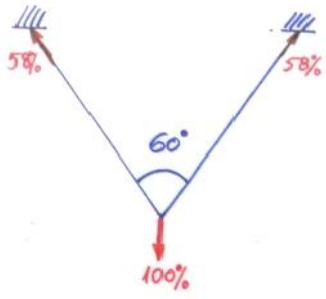


The angle is equal 30°

The weight is 100 kg

The force on each part of the rope (anchor points) is 52 kg

Case 2



The angle is equal 60°

The weight is 100 kg

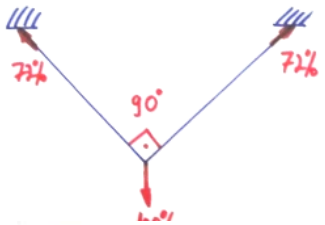
The force on each part of the rope (anchor points) is 58 kg

Case 3

The angle is equal 90°

The weight is 100 kg

The force on each part of the rope (anchor points) is 72 kg

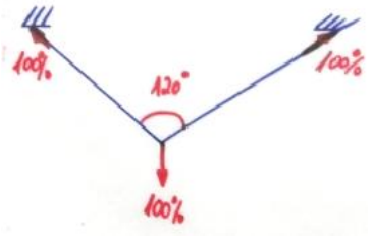


Case 4

The angle is equal 120°

The weight is 100 kg

The force on each part of the rope (anchor points) is 100 kg

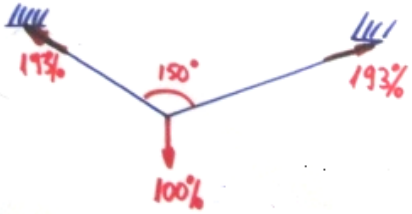


Case 5

The angle is equal 150°

The weight is 100 kg

The force on each part of the rope (anchor points) is 193 kg



Case 6

The angle is equal 165°

The weight is 100 kg

The force on each part of the rope (anchor points) is 383 kg

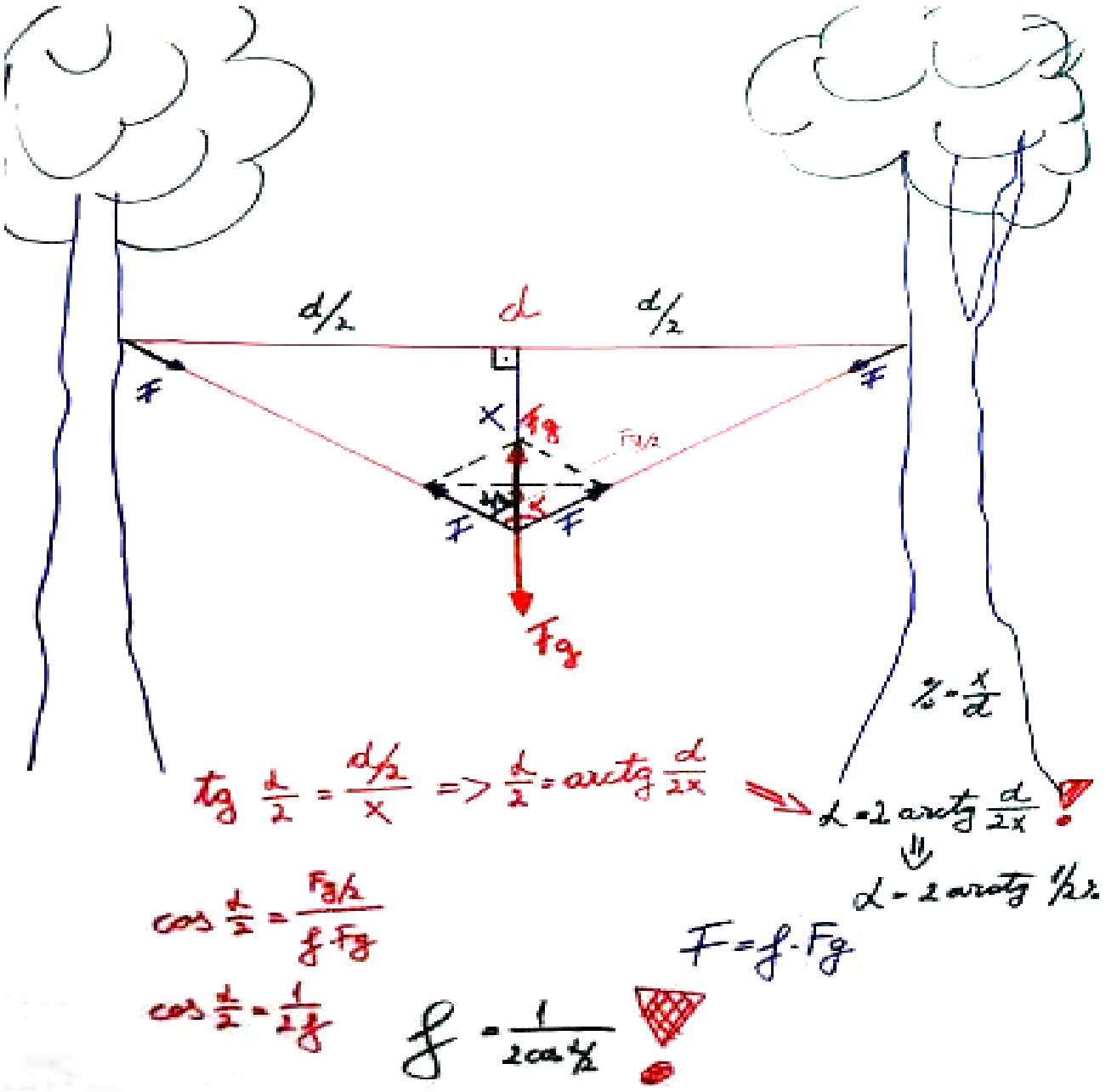
Case 7

The angle is equal 177°

The weight is 100 kg

The force on each part of the rope (anchor points) is 1200 kg.

Here is a scheme and the **formulas**, how can you count the degree of the forces and the tension on the rope.



5.EXPEDITION

5.1 Practicalities of an Expedition

Generalities

What is an expedition?

A journey or a trip undertaken by a group of people with a definite objective.

Your trip is going to involve some physical challenge, so here are some notes to help you prepare.

First some general notes, and then a section relevant to your particular challenge.

Everyone will have a different level of fitness and experience and will meet different challenges during the expedition, but feeling healthy and prepared will mean you'll find the experience more enjoyable and rewarding.

Structure

What to expect?

Here are some common things that crop up on most expeditions. Also consult the specific notes for your trip, and consider how prepared you think you are:

- **The first couple of days can be very tiring.** What with the long journey, jet lag, the excitement, and the change of environment, people often find the first few days challenging. Starting confident and rested will help you get over this initial hurdle.
- **Extremes of temperature.** Feeling used to physical exercise whilst hot, and knowing how to manage your hydration, should be part of your training. Conversely, you may need to be confident you are used to the cold and know how to keep comfortably warm.

- **Long days.** There might be days where you are on the go for 10 hours, so knowing you can comfortably be out and about for that long, is important. Could you get up and do it again the next day?

- **Varied terrain.** Remember this can be on rough terrain. Loose rocks, potholes, sand or mud make things much harder. You'll need to train on all kinds of surfaces to be fully prepared for what lies ahead.
- **Bursts of intense activity.** Sometimes there will be steep and tough bits that really test you, so you need to be used to this, and knowing that if you just keep going that bit longer you will get a rest!
- **At least a bit of pain.** Be it blisters, sore muscles, sore joints etc, this is normal. If you have done some good training you will be familiar with this and it won't feel so bad if it happens on the expedition.
- **Life in a tent.** Enjoying living from a tent takes a certain frame of mind! Why not get some practice with your sleeping bag and a tent before the expedition?

Before thinking of going on an expedition, be sure that your health condition is all right. You can find this out by having a regular health control.

Planning

The first thing to do when planning an expedition is to come up with a **mission statement**. Use a **map to plan your route** to and from your destination! Work out how far your team will travel each day and plan where you will camp each night. Plan at least one alternative route both there and back in case you come across any obstacles in your journey.

Decide on a start date and an end date for your expedition! Investigate the type of weather you can expect in the area at that time of year, as this will affect the clothing and camping equipment you will need to take.

What type of ground will you be covering? Is the terrain flat or mountainous? Do you need to take ropes and climbing gear, or would it be wiser to take cross-country skis?

Are there any natural sources of food or water along your planned route? How many days will you need to travel before you reach them? This will affect your calculations of how many days' food and drink rations you need to carry at the beginning of your journey. Remember that a lot of water is not potable(safe to drink) so

you may have to take water purification equipment, Iodine crystals whilst not the nicest tasting, is one of the quickest, easiest and lightest per liter of water purified.

Are there any deadly creatures you should watch out for along the way, such as snakes or poisonous spiders? This will influence the medical supplies you pack.

Make a list of everything that could go wrong on the expedition! What if someone gets sick from food poisoning or breaks a leg? Make a list of the supplies and equipment you'll need to deal with each situation.

Assign each member of your team an essential duty! These duties might include map reading, shelter building, monitoring rations, fetching water, cooking, gathering wood and building fires, keeping the camp clean, and watching out for dangerous animals.

Use all the information you have gathered to write up a trip plan! Give a copy of the plan to everyone who will be going on the expedition. Leave a copy with someone who is not. This person can alert the authorities if you don't return on time.

While having a MAIN PLAN, it is always useful to envisage any unexpected turns in the expedition and draft one-two secondary plans. This may save time in harsh conditions when decisions are expected to be taken fast.

Preparing

First of all you must check the equipment list to have everything you need.

What to carry in your rucksack?

The ideal expedition rucksack should be big enough to stash all your essentials, from snacks to sleeping bags, with just enough extra room to add in extras without weighing you down.

- Rucksack Liner
- Sleeping Mat
- Sleeping Bag (type is dependent on destination)
- Waterproof Bag (for storage)
- Sleeping Bag Liner (optional - dependant on temperature)
- Survival Bag
- Personal First Aid Kit
- Watch
- Whistle
- Map and compass
- Map case
- Small quantity of money (optional)

- Notebook & pen/pencil
- Torch
- Spare Batteries for Torch (optional)
- Emergency Food Rations
- Water Bottle (1 - 2 L)
- Small Pocket Knife

Hygene/Spares:

- Small Wash Kit
- Small Towel
- Spare Underwear
- Spare Walking Socks
- Spare Sock Liners (optional)
- Spare T-shirt
- Spare Midlayer top
- Spare Walking Trousers (Not Denim)
- Spare Pair of Trainers (depending on conditions)
- Gaiters (optional)
- Waterproof Over-trousers

What group equipment do you need?

- Tent (Your layer against the elements, for your expedition into the wilderness, your tent needs to be protective yet not too restrictive and lightweight enough to carry in your backpack for the whole duration of your expedition)
- Camping Stove(s)
- Camping Stove Fuel (liquid or gas)
- Cooking pots and pans
- Cleaning equipment (scourers, tea towels etc.)
- Food (small and lightweight)
- Rubbish Bags

What to wear while walking?

- **Baselayer top or T-shirt** - This should be synthetic (able to wick away sweat and to dry off quickly)
- **Midlayer top or fleece** (Something light, ideally with a full length zip for venting)
- **Walking Trousers (Zip off) or Shorts** - dependent on seasons. The only rule- no denim! This will get wet quickly and dry off extremely slowly.)
- **Walking Boots** (Ensure these are correctly laced and have been 'broken in - worn a few times- if possible)
- **Walking Socks** designed for long walks.
- **Waterproof Jacket** (depending on conditions) - Get a lightweight one you can roll into your bag, and look for good levels of 'breathability' so it won't leave you overheating
- **Waterproof Overtrousers** (depending on conditions)- You can put these on over your walking trousers in muddy or torrential conditions.

- **Hat** (depending on conditions) - Woollen is ideal in the cold but waterproof hats can be an excellent choice. For summer, choose a peaked variety.
- **Gloves** (depending on conditions) - Look for waterproof or water resistant gloves with a thermal lining.
- **50-65L Rucksack** –with a good air comfort system is large enough for all your gear, plus food.

How to pack my backpack?

The Bottom of the Pack:

Virtually all backpacks have large openings at the top and are known as (ta-da!) *top-loading* packs. A seldom-seen alternative is a *panel-loading* pack which uses a zippered sidewall flap.

Most backpackers shove their sleeping bag into the bottom of the pack. On some packs, there is a zippered opening at the bottom of the backpack, known as the sleeping bag compartment, for this purpose.

The bottom of the pack is also a good place for other items you won't need until you make camp at night: long underwear being used as sleepwear, for example; a pillowcase; maybe a sleeping pad, if it's the kind that rolls up into a tiny shape.

Any other needed-only-at-night items can go down low *except* a headlamp or flashlight. Always have your light source in a readily accessible space.

In the bear country? Try to keep your sleeping bag separated from anything that can transmit a fragrance. Bears can't distinguish between food and nonfood aromas, so toothpaste or sunscreen can attract their interest as well as tea bags or jerky.

The Pack's Core

- Your heaviest items should be placed 1) on top of your sleeping bag and 2) close to your spine. Usually these items will be:
- Your food stash, either in a couple of stuff sacks or in a bear canister.
- Your water supply, either in a hydration reservoir or bottles.
- Your *cook kit* and *stove* might also go here, though both could be wedged into the periphery of the load if small and light enough.
- Carrying a hydration reservoir? Most new packs include a reservoir sleeve. This is a slot that holds a reservoir close to your back and parallel to your spine. It's easier to insert the reservoir while the pack is still mostly empty, so that leaves you 2 choices:
- If you prefer efficiency, insert it at home. You'll have a loaded pack ready to go as soon as you reach the trailhead.
- If you want the coldest water possible, carry the reservoir in a cooler and load it and your other middle- and upper-pack contents at the trailhead.

- Heavier items should be centered in your pack—not too high, not too low. The goal is to create a predictable, comfortable center of gravity. Heavy items too low cause a pack to feel saggy. Too high and the load might feel tippy.

The Periphery

Wrap softer, lower-weight items around the weightier items to prevent heavier pieces from shifting. What items are these? Your tent body, rain-fly, an insulation layer and a rain jacket. These items can help stabilize the core and fill empty spaces.

Stash frequently used items within easy reach. This includes your map, compass, GPS, sunscreen, sunglasses, headlamp, bug spray, first-aid kit, snacks, rain gear, pack-cover, toilet paper and sanitation trowel. Place them in the pack's top pocket or other external pocket, if one exists. Some packs even offer tiny pockets on the hip-belt.

If carrying liquid fuel, make sure your fuel bottle cap is on tightly. Pack the bottle upright and place it below your food in case of a spill.

Other Tips

- Fill up empty spaces. For example, put utensils, a cup or a small item of clothing inside your cooking pots. Fill up your bear canister.
- Split the weight of large communal items (e.g., tent) with others in your group. You carry the main body, for example, and your friend can carry the poles and rainfly.
- Tighten all compression straps to limit load-shifting.

The Desired Result

Ideally, a well-loaded pack will:

- Feel balanced when resting on your hips.
- Feel cohesive, a whole unit, with nothing shifting or swaying inside.
- Feel stable and predictable as you walk, at one with your upper body.

Food and cooking

Eat well !!!

Food and drink are vital elements during the expedition. Good food will fuel, maintain, and repair your body. Also an usual healthy alimentation gives you a headstart for an expedition.

Fresh, everyday food has all the nutrients and energy you need for a good balanced diet. Here’s a rule of thumb:

- Carbohydrates (60%) are fuel for your muscles. Eat plenty of pasta, beans rice, whole grains, fruit and vegetables. Sugar is not as valuable and can leave you feeling deflated and low on energy.
- Proteins (20%) are used to repair your muscles. They can be a good source of vitamins and minerals which will help your immune system and keep colds at bay. Good sources of protein are fish, fresh green leafy vegetables, and red meat.
- Fats (20%) are important to help the body repair itself and store certain vitamins. Oily fish are good sources of fat, as are seeds such as sesame and sunflower.
- As you increase the duration of your expedition, you will need to ensure that you eat well, both before and after it.

- Eat or drink carbohydrate rich food during the hour following a long session of effort to experience the benefits, as this is when your muscles are ready and able to be refueled.
- For outings of over two hours, try to eat as you go. Try bananas, cereal bars or dried fruit.
- Avoid having a large meal before making effort as this can lead to stomach upsets.

Drink enough!!!

It is highly important to drink water before, during and after the hiking sessions of the expedition. If you don't give your body all the water it needs, it quickly stops working properly.

Some main points to remember to make sure you are suitably hydrated:

- Don't wait until you feel thirsty as by then you are on your way to dehydration.
- Carry your liquid in a camelback or platypus it's a good place to put the weight, and you can keep sipping without interrupting your rhythm.
- Limit sports drinks to 1 liter for every 2 liters of water consumed.
- Eat foods containing sodium as these can help your body absorb the water it needs.
- Avoid diuretics - **especially alcohol**

Cooking:

After a day of adventure, orienteering, or just trying to navigate your way around a tricky mountainside, your cook set will be the piece of gear you look forward to the most. These pieces of cooking equipment should be designed for expeditions to pack down light, whilst still offering plenty of options when it comes to meal making.

- Knife, Fork, Spoon (or KFS Set)
- Plate/Bowl/Mug
- Box of Matches (in sealed container)

Target group

Every expedition has one leader. His main role is to be the connection between all the participants. He must know all the important info about each and every member (health condition, personality, addictions, and conflict matters). He is the one that forms the group in the first place. The target group members should be comfortable with each other, and to be able to socialize and work as a team and most important to be helpful with the person in need next to them. Assigning task/s for each member is mandatory for the success of the expedition. As it was mentioned before a positive approach is essential before leaving on an expedition. Positive thinking is the correct way of holding control in panic situations, and can lead you to the best decisions under stress.

A group after a successful expedition is more united than at the beginning.

The main purpose

Although it seems that the main purpose of an expedition is the geographical target objective/s, in fact things are a bit more than this. The expedition is a challenge, often spiced with adventurous episodes, or funny ones, but nevertheless also with exhausting ones, with losing temper and other sort of negative reactions of a body and mind pushed toward their limit.

The main purpose in this case starts to get a shape. A fine word for defining it can be fulfillment, accomplishment, achievement, realization and the list goes on. It is no secret that each expedition is a life journey full of things to learn from. Nobody can say that after experiencing something your knowledge luggage isn't a bit heavier. This reaches us to the conclusion that learning by experience is no failure. The more you experience, the more you learn. The more you learn, the more you can improve yourself. The main purpose of an expedition is to improve yourself on all backgrounds (socially, physically, mentally, spiritually, etc.)

5.2 Expedition as a training tool

Expedition is a very powerful tool in Outdoor education as it naturally includes a variety of adventurous challenges. Most of expeditions are learning outside comfort zone. Using the real world is the way learning has happened for 99.9% of human existence. Only in the last hundred years has mankind put it into a little box called a classroom.

Since it is education outside the classroom, there are a number of obstacles in the way. One of these obstacles is risk aversion amongst teachers, parents and others, raising reluctance to such diverse and physical tasks.

Another obstacle is the perceived high cost of facilitating outdoor learning through an expedition. However, the process is more effective when adults focus on what children need to be able to **do** rather than what children need to **have**. An approach that considers **experiences** rather than equipment places children at the centre of learning and ensures that individual children's learning and developmental needs are taken account of and met effectively.

What Can Young People Learn on Expedition?

According to Greenaway (1998) model adapted from the one originally developed by Giges & Rosenfeld (1976) *"personal growth can be viewed as making new connections in any of several directions:*

- upward to achieve one's full potential
- outward to make contact and encounter others
- inward to increase our awareness of who we are, and what
- we want, need, sense, feel, think, and do
- downward to touch earth, to be grounded, and to connect"

It can be visualized in a following way:

Upwards – Realizing Potential

- **Confidence**

An increase in personal confidence
is perhaps the best-known outcome of youth expeditions, and the one which will spring most readily to mind for participants, parents and providers.

The expedition experience is a series of freely chosen hardships, and it is the overcoming these hardships which produces an increase in confidence. There is very good evidence that the expedition

experience makes young people believe that they are better able to cope with adversity.

Confidence is closely related to a number of other outcomes which merit a separate discussion: self-reliance; ambition; resilience and overcoming challenges.

- **Physical and Social Resilience**

After an increase in confidence, an increase in resilience is the most widely discussed expedition outcome. This outcome is essentially the 'character-building' of which the first youth expedition programs were so fond. It is widely accepted that short-term expedition experiences can produce a long-term personality change.

One aspect of resilience is the ability to tolerate physical hardship, for example constant cold or physical challenges such as long treks or rationed food intakes. Another equally important aspect may be termed 'social resilience'. Expeditions typically involve living and working with strangers, and participants learn how to manage relationships with people that they would not normally associate with - either because of personality differences or other barriers such as social class or access to education. Moreover, there is evidence that expedition friendships often take on a meaningful quality quite different to those developed within normal social structures.

- **Self-reliance / Overcoming Challenges**

There is significant self-reported positive response to statements such as *"I can deal with whatever comes in the future"*. There is also increase in self-reliance to the degree of the participants' involvement in the practical operation of the expedition. Participants develop in practice problem-solving skills, and increase the ability to set and achieve goals, manage time and solve problems efficiently.

Overall, there is good evidence for the claim that expeditions increase young peoples' ability to address and tackle problems.

Outwards – Learning about Others

- **Sociability**

It encompasses personal emotions (feelings about others) and practical social skills (behavior towards others). There are often 'emotive' difficulties involved in the post-expedition period as relationships with old friends adjust (typically towards a positive conclusion) and new friendships with other expedition participants grow in significance.

One surprising feature here is the very limited focus on leadership. Leadership skills are often promoted as one of the key learning outcomes in youth expeditions, but there is in fact little evidence to suggest that this is something which young people learn.

Inwards – Learning about Self

- **Emotional Stability**

This means that participants are: relatively free from worry and anxiety; have ability to control emotions; are highly motivated, academically talented, have an adventurous spirit and are enthused to take on such a challenge.

Emotional stability is linked to confidence and resilience.

- **Reflection**

Both during and after the expedition, participants tend to increase their ability to reflect 'inwardly'. That is to say, they are able to think and talk about moral and metaphysical questions. What comes across strongly is participants' ability to turn this critical lens inwards during moments of calm and physical stillness during the expedition.

Downwards – Learning about Environment

- **Environmental Awareness**

There is appreciation of the natural environment, understood as a relationship between self and environment akin to relationships between self and others.

Secondly, environmental awareness also develops in a political or social sense, whereby participants from developed countries become more aware of their comparatively privileged position in the world. In one study, 94% of expedition participants reported that their understanding of other cultures had increased as a result of their experiences.

Ethical Considerations in expedition

Psychological Considerations

Expeditions present a number of complex and varied challenges that inevitably evoke a range of psychological responses. The responses to such experiences occur not only during expeditions, but also afterward, when participants return to their home community. It is helpful to consider three psychological areas:

1. Learning in a safe (physical and emotional) environment. To this end, planning prior to an expedition, including reviewing applications and holding interviews, gaining medical information, writing clear marketing material, and conducting thorough training weekends are crucial in minimizing psychological difficulties that may arise.
2. Changes or examination of values during the expedition experience and post-expedition adjustment. For many young people, going on an expedition for the first time can be life changing; it is often the first visit to a far-off place, to the wilderness, and of experiencing cultures very different from their own. As such, returning to everyday life (school, home, college, employment) is often rather awkward. Indeed, it is common for people to report difficulties sleeping inside, making decisions about what to eat, amazement at the number of people they meet, and missing the intimacy of the relationships experienced on the expedition.
3. Managing threats to the learning environment. When people experience some of the challenges outlined above, such as adjustment problems (to and from the expedition), illness/accidents, crises (emotional and otherwise), it is vital that leaders have the skills to recognize them, decide on a course of action, manage and remedy them, and keep them from occurring again—unless these problems are deemed to be desirable (rarely the case).

Some countries, such as UK, have special regulations for expeditions that involve participants under the age of 18 years old.

Accessibility

There are inequalities between different people's access to resources in society. These resources might be things such as food, education, medical help, and property. Historically, the world of educational expeditions has been dominated by affluent white people.

The period from the mid-1970s to the mid-1990s saw the British overseas youth expedition transform from a product exclusively for the socioeconomically privileged to one catering to a much larger range of children of varying social backgrounds and academic abilities.

Beyond financial matters, it is quite likely that in social networks characterized by chronic low income, young people are not interested in going on an expedition, as there is little history of any family member or friend so doing. Equally, teenagers attending an independent school with a strong tradition of going on an expedition may feel stigmatized if they do not take a given expedition opportunity. It is conceivable to suggest that by choosing to participate in an expedition, they are merely "going with the flow" and following dominant social forces.

The implication for practitioners in all countries and cultures is that if the outcomes of an expedition are desirable for all young people—as a means to increase overall personal growth and well-being—then surely these kinds of experiences ought to be available to all, irrespective of financial power, physical ability, sex, gender, religion, or ethnicity.

Cultural Sensitivity and Environmental Responsibility

Participants have to show appropriate cultural sensitivity when travelling in developing nations. Participants who do not cover themselves suitably and wear short and sleeveless tops in Muslim countries are an obvious example.

Environmental aspect: flying a group of young people across the world just for an expedition is questionable. In our times air travel is widely accepted as a contributor to global climate change. Still so many operators and participants are convinced that they must visit lands far away, despite sometimes knowing little of their homeland. There is a movement toward expeditions that take place in the neighbourhoods in which young people live and go to school.

How Can Providers and Leaders Make it Happen?

Learning outcomes across expeditions are highly specific and individualized. It is difficult to set a formula for a 'successful' expedition. Nevertheless there are general patterns of design and execution which can help providers to implement successful expeditions:

- **Independence**

The expedition must be conducted within a safety framework which is acceptable to all stakeholders, and the surest way to achieve this is to have experienced leaders making all the decisions. There is a clear educational argument against this didactic approach - to adopt it removes all opportunity for participants to experience genuine decision-making, that act in which the group's values are projected onto world, and in which learning with real consequences takes place.

The expedition as a learning opportunity may be entirely undermined by setting up contrived or artificial 'scenarios' where the real consequences are somehow mitigated or controlled. Genuine interaction with the environment is most valued by participants.

- **Group Isolation and Self-sufficiency**

The specific type of expedition activity is of little importance in itself, what really matters is that the expedition is self-sufficient and in a remote area. It is under these conditions that 'expedition behavior' develops, and that the personal & social development outcomes are achieved. The self-sufficient & isolated expedition group is a necessary condition of the learning outcomes.

- **Person-centered Leadership**

Expedition leaders must prioritize the development of participants over other objectives. This must be true at the planning, delivery and post-expedition phases. This can be contrasted with an expedition which is purely focused on the physical outcome (e.g reaching a particular destination), and with a 'personal development' expedition in which the learning is the sole and explicit purpose. A difficult compromise must be found - the expedition must be 'genuine' in order to engage the participants, whilst at the same time the leaders must develop an environment in which personal development is a valued and conscious goal for all taking part.

- **Positive Responses to Stress**

Participants who adopt avoidance of stress or resignation strategies tend to exhibit less positive personality change. It follows that it is the responsibility of expedition leaders to promote those responses to stress which are more likely to lead to personal development. The most positive response is in Cooperative Interdependence, which means that one is linked with others in a way that one cannot succeed unless they do. This accords with outcomes such as increased sociability and ability to reflect.

- **Physically Demanding Activity**

This simple expedition process may well be one of the most important. A self-sufficient and self-propelled expedition must include a deal of physical hardship. Physical challenge process is important for the outcomes of resilience, confidence and self-reliance.

6.OUTDOOR EXPERIENTIAL EDUCATION

6.1 Outdoor education and theories

Outdoor education aims:

Group development

- Support, encouragement, Trust
- Motivation
- Communication
- Decision making
- Group dynamics

Personal development:

1,2,3,4 from group development plus: Trust; Tolerance; Self esteem; Self concept; Discipline; Assertiveness; Practical thinking; Abstract thinking; Leadership; Compassion

Skills Development:

Quality; Risk management; Negotiation; Planning; Project management; Values clarification; Time management; Problem solving; Teamwork; Effective teams; Competivity; Creativity; Environmental awareness; Foreign language

Possible activities in Outdoor education:

- Expedition (water, ski, bike, raft, ship, walking)
- Ropes course (low and high ropes course)
- Ice breakers
- Problem solving exercises
- Trust activities
- Debriefings
- Projects (social, environmental)
- Climbing, abseiling
- Mountaineering
- Complex outdoor problem solving exercises (raft building, rope bridge building, bridge building)
- Tyrolean traverse/Zip line
- River crossing

Outdoor Education and Adventure Based Learning

What is experiential education? “Learning by doing with reflection”.

Experiential Learning Theory:

"Tend to be holistic in nature, incorporating cognition and behavior with conscious perceptions and reflections on experience." (Priest & Gass, 1997)

What I hear - I forget - Behavior & Cognitive models

What I see – I remember - Behavior & Cognitive models

What I do -I learn - Experiential Learning model

Assumptions in Experiential Learning:

- Based on the belief that people learn best through direct and purposeful interaction with their learning experiences. (Priest & Gass 1997)
- The best way to learn about making a book shelf is to build one. Reading a book can help, but can't authenticate the experience.
- Learning experiences are realistic
- Learning experiences are physically active
- Learning experiences are meaningful
- Learners must accept responsibility for their own actions
- Learning comes through guided reflection on their experiences. Without reflection, the experience loses much of its value.

Outdoor education process

PARTICIPANT
is placed into
UNIQUE PHYSICAL ENVIRONMENT
(contrast)
and into
UNIQUE SOCIAL ENVIRONMENT
is then given
PROBLEM SOLVING TASKS; CHALLENGES
(organized, concrete, incremental, manageable; drawing on mental, physical, emotional resources)
which leads to
STRESS/ANXIETY
(possibilities: succumbing, coping, thriving)
to which she adapt by
MASTERY/COMPETENCY
(because he:1) is motivated; 2) Is alert in a new environment; 3) Has group and instructional support; 4) Is presented problems which are structured to facilitate mastery) which
ALTERS SELF-CONCEPT
(increased self-awareness, increased self-confidence, increased acceptance of others)

(It should be remembered that the last point above is not a result you can guarantee students, but rather a goal to pursue with the appropriate program)

Challenge by Choice

"It is important to be able to say at the end of our activity today that you have challenged yourself in at least one way." Rohnke, *1984*

Challenge by choice strives to empower participants by pro-actively informing them that they, not you as the outdoor leader, control a major part of determining the degree of challenge, risk, and competence with which they will engage in the adventure experience. This policy is more than simply not forcing people to be involved. The purpose of advising participants in this way is not to lead them to withdraw from the experience, but to provide them with the opportunities to challenge themselves in the manner they wish, in the amount they would like, and with the type of support they want.

Participants may select levels of involvement, including, but not limited to, full or partial participation or observation in physical, social, and emotional events.

Since, however, non-participation makes learning impossible due to the absence of a common experience, you should encourage participants to engage, but at whatever levels they desire.

Schoel, Prouty, and Radcliff (1988) describe the challenge by choice concept as offering participants:

- a chance to try a potentially difficult or frightening challenge in an atmosphere of support and caring,
- the opportunity to 'back off" when performance pressures or self-doubt become too strong, knowing that an opportunity for a future attempt will always be available,
- a chance to try difficult tasks, recognizing that the attempt is more significant than performance results, and
- respect for individual ideas and choices

The challenge by choice concept also extends to participation in debriefings: participants have the right to pass at any point in a discussion.

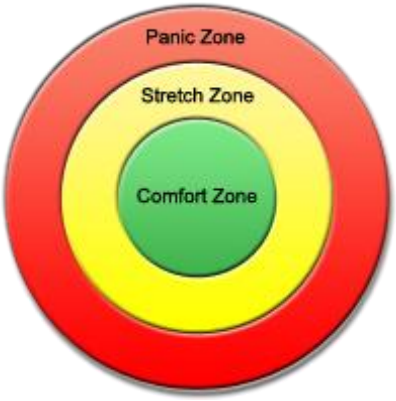
Comfort Zone

This model looks at how we respond to unfamiliar situations.

Comfort Zone: where we are most comfortable, the familiar environment of our daily lives

Stretch Zone: a high support and high challenge environment. It may be uncomfortable, but not so much so as to be unsafe, emotionally, physically, mentally, or socially. Learning about self, others, and interaction with the environment occurs here.

Panic Zone: The circumstances or situation causes stress and fear. No learning occurs here.



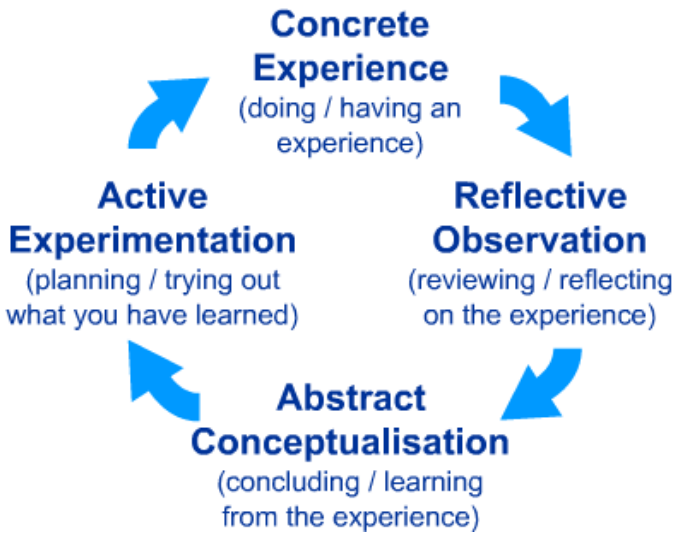
Stretch zone increases or decreases depending upon many factors which include:

- Environment

- People involved
- Feelings on a particular day
- How people speak and interact with us
- Whether we trust those who are helping us
- Whether we trust the equipment we are using

Experiential learning cycle

Dewey (1938), Kolb (1984)



6.2 Debriefing

Planning a debrief

Having aims for your debrief will help to **keep focused**.

By asking yourself the following questions:

1. What are the most important questions to which I want participants to respond?
2. At what level are these questions?
3. What questions should I use to lay the foundation for the important questions to be more easily answered?

Depth of experience: main caution on the depth of the psychological content we expose. If you are not trained to facilitate experiences therapeutically, you should be aiming to remain here and now. So in the focus of the debriefing are the facts of the activity, the affect/effect of them and the possible future consequences. Motto: *„only pull apart what you can put back together".*

When to debrief? The evaluation is effective if it's done as soon as possible after the experience is completed.

Where to debrief: debrief in approximately to the location of the experience. The closer you are, the more participants will be able to visualize and recall the events.

Structuring a debrief: What? So what? Now what?

Borton, 197; Outward Bound plus model

What?

The first stage is to look back over the events. This involves the recall of facts in an objective way. It is usually more effective to concentrate on the positive to begin with so that the group will become more comfortable talking about their feelings.

„recount the main events leading to the end of the project"
„what was the best/worst/more interesting/most involved moment?"
„what were the stages you went through in managing this event?"

So what?

Once the facts are discussed the next stage is to find out what people think or feel about them. This stage is in the NOW. It involves ideas and opinions. People are able to build on the events described to grasp some meaning to them.

„what kind of communication helped/hindered?"
„how did your risk taking change throughout the session?"
"what could have increased this level of support you received?"

Now what?

This stage looks into the future. It is about change and development and is focused on action.

„what will you do differently next time?"
„what will you do the same?"
„how will you tackle this next time?"

Debrief Suggestions

- **Color**: Choose a color that describes your experiences and explain why.
- **One Word**: Use one word to describe your day and explain why you would choose that one word.
- **In the Hat:** Write how you feel/ a problem/ a fear on a piece of paper. All the papers are put in a hat and are pulled out one by one. The entire group can either discuss them, or a single person can discuss what is written (not their own piece of paper). This brings different ideas to problems and can offer solutions.
- **Awards:** Give each participant an award for their achievement - they can be humorous/ serious or both.
- **Plays/Skits/Songs/Poems:** Dramatic productions are good for younger groups, they can often re-act their experience more effectively than they can describe it verbally.
- **Draw:** Draw a picture describing your day or an experience. Present it to the group.

- **List**: The individual can list 2 or 3 things they can improve on to increase group efficiency. List 2 or 3 things the group can improve on.
- **Image of Nature**: Find something from the environment that represents how they feel. This will get them more aware of the natural environment and how they view it.

6.3 Feedback

Constructive feedback

Bishop and Taylor, 1991

- **Give positive feedback before negative.** Most people respond to praise, encouragement and recognition, preface negative with a positive statement and is more likely to be favorably received. For example „I'm very pleased with the way you've settled in, you're really popular with the clients, I do feel though, that you need to take more care with your paper work…"
- **Encourage**. If you like something about a person, or feel they have done something particularly well, recognize this, give positive feedback, encourage them to build on their strength.
- **Be specific.** Avoid general comments such as „that was good". Instead say what was good. Try to comment on observable behavior. Avoid commenting on something a person can do nothing about, on their apparent motives or shortcomings.
- **Concentrate on what can be changed.** Direct feedback only toward things that an individual can do something about.
- **Give details.** Detailed feedback gives more opportunity for learning. For example „the way you phrased that question was helpful to the client because it gave him the opportunity to explain".
- **Allow the other person to accept or reject your feedback.** You cannot impose beliefs, opinions or attitudes on others. At best, demands for change are met with individual resistance. Skillful feedback offers the person information about themselves which they can consider and from which they can learn. Whether or not your feedback is acted upon is a matter for their decision.
- **Offer alternatives.** Turn negative information into positive suggestion. For example: „it would save time if you collated all the information first, rather then…"
- **Describe rather than judge.** If you evaluate, do so by referring to criteria which you saw or heard and the effect it had on you. This will be far more useful than offering value judgment such as "that was awful„, or „that was really great" type comments. For example: „the way you listened to my problem, the way you sat forward; your facial expressions; your obvious concern, made me feel important and valued as a person".
- **Take responsibility for feedback.** Avoid „you are…" statements which suggest universally agreed opinions of the other person. Open with „I think…" or „I believe…" or „It's my opinion…"
- **Ask whether or not they agree with your feedback.** Give the other person a chance to think about and discuss the feedback in your presence. They are unlikely to act upon feedback with which they disagree.
- **Ask if they have ever been told something similar before.** If they have, your feedback will reinforce the fact that some kind of change is needed (or if positive feedback, self-confidence will be enhanced by your reinforcement). If they have not, it will at least establish that the issue is between just the two of you.
- **Ask them to suggest alternative forms of behavior**, etc. the most positive step towards setting a clear objective about change and, secondly, to reach their own conclusions about how things could be done differently.

- Ask them to **specify what they intend to do differently**, when they will put into practice and how they can find out it has been effective.
- Ask them to **consider the consequences** of not acting upon negative feedback.

6.4 Processing the experience

6 generations of facilitation

There are potentially six generations of facilitation, but do we use them all in our work? If we are to create a useful learning and development environment, which are the most appropriate?

I. **Letting the experience speak for itself.**
II. **Speaking of the experience**
III. **Debriefing the experience**
IV. **Frontloading the experience**
V. **Framing the experience**
VI. **Indirectly Frontloading – re-framing and double binds.**

Framing: the process of relating something to the very day lives of the students.

Front loading: the process of getting the students to think about certain elements/aspects of the process before the task begins.

Double binds: the process of getting the group to agree to look at an outcome either in a positive or negative situation before the task starts. In a way front loading but getting agreement on the review material whatever the outcome.

Re-framing: the process of framing the outcome to everyday life situations of the students.

7.SOURCES

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- http://www.youtube.com/watch?v=VF-8QksiU7c (hazard vs risk)

Have a safe and successful outdoor experience!!! ☺