

# TOPPING OUT

A BSA Climbing/Rappelling Manual



BOY SCOUTS OF AMERICA®

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# Introduction

Young people today seek challenges. Climbing and rappelling offer them worthy opportunities to learn new skills, test themselves, and have a terrific time. It's hard to top the satisfaction of climbing a rock face and rappelling down a steep pitch. The introduction of the Climbing merit badge in the spring of 1997 spurred interest in these activities throughout the Boy Scouts of America. The proliferation of climbing areas in Scout camps and the development of artificial walls and alpine gyms across the United States have made the chance to climb and rappel available to Scouts almost everywhere.

*Topping Out* details the Boy Scouts of America's recommended procedure for conducting climbing and rappelling activities at district and council sites such as summer camps, and at council high-adventure bases. In addition to explaining appropriate equipment and techniques, this manual describes the qualifications and training of the directors and instructors who conduct BSA climbing/rappelling programs at the district and council levels. It also lays out a sample daylong program. (Readers should be aware that this manual provides an orientation only, and by itself does not constitute training in how to climb or rappel.)

There is inherent risk in climbing and rappelling. With proper leadership and adherence to high standards, however, the risk is minimized. Many factors play roles in the BSA's history of safely operating climbing/rappelling activities. Among the most important are these.

- The BSA limits district and council activities to *bouldering*, *top-roping*, and *belayed rappelling*. The National Project COPE and Climbing/Rappelling Standards (No. 430-008) apply to district and council activities. Units that elect to participate in snow and ice climbing and lead climbing without a top-rope belay should receive training from a nationally recognized organization that trains climbing instructors.
- BSA units that want to conduct their own bouldering, climbing, rappelling, or other related climbing activities should follow the guidelines put forth in *Climb On Safely*.

ALTHOUGH THE BSA HAS AN  
EXCELLENT SAFETY RECORD,  
THERE IS INHERENT RISK IN  
CLIMBING AND RAPPELLING.  
TO MANAGE THAT RISK,  
SCOUTING USES THE  
PROCEDURES SET FORTH  
IN TWO CLOSELY RELATED  
PUBLICATIONS—CLIMB ON  
SAFELY (FOR UNITS) AND  
THIS *TOPPING OUT: A BSA  
CLIMBING/RAPPELLING MANUAL*  
(FOR DISTRICTS AND COUNCILS).

### CLIMB ON SAFELY: THE EIGHT POINTS

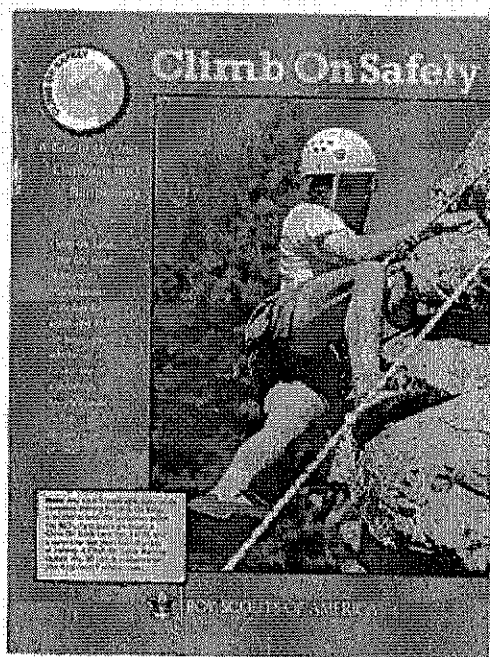
- 1 Qualified Supervision
- 2 Qualified Instructors
- 3 Physical Fitness
- 4 Safe Area
- 5 Equipment
- 6 Planning
- 7 Environmental Conditions
- 8 Discipline

### Climb On Safely and Topping Out

To better assure the safety of participants and to standardize the qualifications expected of adults leading climbing and rappelling activities, the Boy Scouts of America has developed *Climb On Safely* as its recommended procedure for Scouting units conducting BSA climbing and rappelling activities at a natural site or a specifically designed facility such as a climbing wall or tower. Patterned after the successes of the BSA's Safe Swim Defense plan and Safety Afloat, *Climb On Safely* establishes the guidelines by which BSA unit climbing and rappelling activities are to be directed, and lays out the standards for equipment, sites, methods, supervision, and safety.

By comparison, the BSA's *Topping Out* manual addresses the needs of district, council, and unit climbing and rappelling activities. It is the BSA's most comprehensive publication on relevant aspects of climbing and rappelling. The manual may be a valuable resource for unit leaders in complying with *Climb On Safely* guidelines.

This manual is not intended to address every climbing/rappelling situation. For climbing and rappelling, the recommended reference is the seventh edition of *Mountaineering: The Freedom of the Hills*, edited by Don Graydon and Kurt Hanson. For caving, the recommended reference is *On Rope*, by Bruce Smith and Allen Padgett.



*Climb On Safely* establishes the guidelines for effectively and safely managing BSA unit climbing and rappelling activities.

# Chapter 1

## Standards and Inspections

The National Council of the Boy Scouts of America has developed the standards and inspection procedures detailed in this chapter to help ensure the highest degree of health and safety for participants and staff members engaged in climbing and rappelling activities conducted by BSA districts and councils.

### Frequency of Inspections

- National standards are revised annually, and the frequency and type of inspections must follow the current climbing national standards.
- All council or district climbing/rappelling activities—whether or not they are a part of a district activity, a summer camp, or a council high-adventure operation—must follow these standards and will be inspected accordingly.
- Climbing/rappelling activities may be inspected at times other than scheduled national resident-camp visitations.

### THE COPE/CLIMBING

VISITATION TEAM IS EMPOWERED  
TO INSPECT THE FACILITIES  
AND ACTIVITIES OF CLIMBING  
AND RAPPELLING PROGRAMS AND  
OF PROJECT COPE COURSES.

# Chapter 2

## Safety and Leadership

High-adventure activities such as climbing and rappelling involve an element of risk. Because hazardous elements cannot be completely eliminated, the directors and instructors of BSA climbing/rappelling programs must take positive steps to manage that risk. The process includes

- Identifying the true nature of the risks at any given moment,
- Understanding ways participants can minimize or avoid those dangers, and
- Knowing when risk reaches a level at which activities should be postponed, halted, or canceled.

Climbers, rappellers, directors, and instructors manage risk by identifying its causes and tailoring their behavior to minimize the danger. Some risk is inherent in everything we do. As children, we are taught to look both ways (for automobiles) before crossing the street. In climbing and rappelling, checking knots, belays, solid anchor systems, and other methods are used to provide for safety.

### LEAD CLIMBING

*Lead climbing* is beyond the scope of the BSA director/instructor training. In lead climbing, climbers are tied to belay ropes that extend below them. As they climb, they insert chocks or other mountaineering hardware into cracks in the rock, then use carabiners to attach the rope to establish points of protection. Lead climbing requires extensive training and experience. A lead climber is exposed to the risk of falling a considerable distance (as much as 25 feet), so lead climbing may be practiced during BSA council and district activities only if participants are protected with a top-rope belay.

Experienced climbers know that static ropes must never be used to belay lead climbers. A static rope will cause a falling lead climber to absorb instantly the full force of the tumble, greatly increasing the chances of injury and the failure of anchors or other system components.

## Identifying Hazards

Possible hazards commonly associated with climbing and rappelling include the following.

### Potential Environmental Hazards

- Rain, wind, heat, cold
- Poor condition of the rock face or artificial structure upon which climbing/rappelling will be practiced
- Failure of equipment or anchoring points
- Animals and insects

### Potential Human Hazards

- Participants physically or mentally unprepared for the challenge
- Faulty judgment, improper training, or ignorance on the part of participants, directors, or instructors
- Unreasonable expectations by participants, directors, instructors, parents, group leaders, and/or others

When human hazards and environmental hazards overlap, they compound one another and increase the likelihood that an accident will occur. Such an "accident equation" might look like this:

Subjective		Objective		
Human Hazards	+	Environmental Hazards	=	Accident Potential
Lack of knowledge		Inclement weather		
Poor physical fitness		Damaged equipment		
Emotional distress		Animals and insects		
		Loose rock		

However, when people combine the right attitude and awareness with proper action, the result is a "safety equation" that looks like this:

Attitude	+	Awareness	+	Action	=	Safety
Positive		Knowing what can go wrong		Planning		
Caring		Supervising activities		Training		
Safety first		Teaching others		Intervention		

## Responding to Risks

Most climbing accidents result from a combination of circumstances rather than a single factor or event. A director, instructor, or group of participants making one error in judgment may commit other errors as well. The probability of an accident increases as the number of safe alternatives decreases.



### Breaking the Chain of Poor Judgment

A key to safety in the field is breaking the chain of poor judgment. The following steps can be helpful in viewing a situation from a fresh—often safer—perspective.

- ❶ Be willing to recognize your own poor judgment.
- ❷ Be aware that a moderate level of stress may sharpen your thinking and judgment.
- ❸ Use problem-solving strengths that optimize choices.
- ❹ Be alert for “groups” of poor judgments, one building on top of another.
- ❺ To help avoid repeating errors, review your original poor judgment as soon as you have “broken the chain.”

### Accident Prevention

Everyone shares the responsibility for safety—directors, instructors, group leaders, and participants—in climbing and rappelling activities. Help prevent accidents by making sure that

- Everyone takes ownership in having a safe experience.
- Everyone knows and follows the rules.
- Everyone completes a safety orientation or training for each stage of an activity.
- Hazards are discussed and ways of managing them are understood.

### Personal Gear Checklist

Preparing for a climbing/rappelling activity begins well before people arrive at a program area. Their comfort and their ability to take care of themselves depend in part on what they carry with them. Each participant and instructor should be advised ahead of time to bring the following items.

- ☐ Clothing, including rain gear, appropriate for weather conditions. It is generally a good idea for beginning climbers to wear trousers to help avoid scrapes and abrasions. (See *Passport to High Adventure*, No. 34245.)
- ☐ At least two 2-quart containers of water (much more in hot weather or at elevation)

Depending upon the duration of the proposed program and upon conditions specific to the site, the following items may also be required.

- ☐ Lunch and/or trail snacks
- ☐ Sun protection, including a broad-brimmed hat, sunglasses, and sunscreen
- ☐ Insect repellent

Everything can easily be stowed in a day pack. Participants may use their own climbing harnesses, helmets, and shoes if they are inspected and approved by a climbing director or lead instructor.

MANY SAFETY ISSUES THAT APPLY TO OTHER OUTDOOR SCOUTING ACTIVITIES ALSO PERTAIN WHEN SCOUTS ARE CLIMBING AND RAPPELLING. DRINK ENOUGH WATER. WATCH OUT FOR POISONOUS PLANTS, BITING INSECTS, AND SNAKES. DRESS FOR THE CONDITIONS—WARM CLOTHING IN COOL WEATHER, LIGHT CLOTHING IF THE DAY IS HOT. KEEP A CLOSE EYE ON THE WEATHER AND BE READY TO LEAVE IF THE SKIES TURN STORMY OR THERE IS LIGHTNING IN THE AREA.

## **Instructors and Supervision**

During BSA climbing and rappelling activities, instructors are the first line of defense against accidents. They will make dozens of decisions throughout the course of a day that may have significant consequences for participants and for themselves. They are often charged with setting up anchors, ropes, and belays; with assessing the needs and abilities of participants; with teaching basic climbing, rappelling, and belaying skills; and with providing participants with thoughtful support, encouragement, and guidance. Through it all, instructors must manage a day's climbing and rappelling in ways that keep events running smoothly, without compromising safety.

Unit leaders should be trained in the principles of Climb On Safely. Councils should comply with the current Project COPE and Climbing/Rappelling National Standards, No. 430-008. A qualified climbing instructor is essential for any BSA climbing/rappelling activity.

### **Who's Who in BSA Climbing/Rappelling Programs**

#### **BSA Council Climbing Chairman**

Councils may have separate climbing and Project COPE committees or they may combine the two. The chairman of a standalone committee must possess a valid National Camping School certificate of training for the respective committee. If the committees are combined, there must be both a COPE director and a climbing director on the committee, and one of them must be the chairman. The chairman is responsible for the overall operation of the council's climbing and rappelling program, serves on the council camping committee, and manages the council's climbing staff to provide guidance to all district and council climbing events. The chairman also coordinates all council inspections, maintenance, and record-keeping tasks.

#### **BSA Climbing Director**

The director has ultimate responsibility and final approval for all that occurs at a council or district climbing/rappelling site. This person must be at least 21 years of age, have extensive training and experience in climbing and rappelling, have successfully completed a Climbing section of BSA National Camping School within the last five years, and be recognized by the local council as a mature leader and skilled teacher. The certificate of training issued to climbing directors is in effect for five camping seasons. The director need not be on-site for climbing/rappelling activities to proceed as long as a lead instructor is present.

#### **BSA Climbing Lead Instructor**

A climbing instructor 21 years of age or older who supervises the climbing/rappelling site in the director's absence is referred to as a lead instructor.

#### **BSA Climbing Instructors**

Instructors operate with the supervision of a climbing director or lead instructor. They often manage the day-to-day activities of a climbing/rappelling program. Instructors must be at least 18 years of age. They are proficient in teaching the techniques of climbing, rappelling, and belaying, and have completed a three-day instructor training course. The certificate of training issued to climbing instructors is in effect for two years.

#### **Climbing Instructors-in-Training (IITs)**

Instructors-in-training must be at least 16 years of age and may have completed a three-day instructor training course.

For a full list of requirements for directors, instructors, and instructors-in-training, and for information on instructor training courses, see chapter 13, "Staffing and Instructor Training."

### **Maintaining High Instructor Standards**

A climbing director should ensure that candidates seeking positions as instructors are mature, responsible, and able to lead. An instructor's prior experience in Scouting and willingness to be accountable in other areas of life should give some indication as to how the individual might respond to duties as an instructor.

Districts and councils should make every effort to provide instructors who have been thoroughly trained. The three-day course described in chapter 13 of this manual can establish a good foundation of information and a thorough grounding in the methods and standards of BSA climbing and rappelling.

Beyond that, directors should take advantage of opportunities to observe instructors in action, and then to meet with each instructor to review individual performance. In many cases, a director can simply reinforce all that an instructor is doing correctly and provide praise for a job well done. The director may sometimes be able to help an instructor fine-tune certain teaching techniques or ways of interacting with participants, or can suggest alternative methods of dealing with ropes, hardware, and other technical aspects of the program.

### **Exercising Good Judgment With Instructors**

On rare occasions, a director may determine that an instructor is not acting in a manner fully in keeping with the precepts of BSA climbing and rappelling. It might be a matter of insufficient technical skill, an inability to relate well with participants, a desire to show off at the expense of others, or an unwillingness to comply with the standards of safe climbing and rappelling.

Whatever the cause for concern, the director must deal with the situation immediately, basing a response upon the particulars of each case. Certainly it is appropriate for a director and another adult member of the district, council, or council high-adventure base to speak with the instructor in order to better understand the issues. However, a director who has concerns about an instructor's ability to manage climbing and rappelling activities should remove that instructor from the program pending further discussions and a plan for added training, greater supervision by more experienced instructors, or the decision that the person should no longer instruct.

Removing an instructor from a program can be distressing for a director, especially if friendships are involved or the absence of the instructor will limit the program that can be offered by the rest of a climbing/rappelling staff. However, directors must be objective when making decisions about who will be given responsibility for the safety of young people climbing and rappelling. No director would allow a program to continue knowing that a rope was badly frayed or an anchor was suspect.

Instructors are every bit as vital to the safety of participants as are ropes and hardware. Directors should never allow a program to proceed unless they have full confidence in the instructors they have put in charge.

### **Physical Fitness**

Climbing and rappelling can be most fully enjoyed by youth and adults who are in good physical condition. Flexibility, strength, and endurance are all important. Those planning to take part in climbing and rappelling should get in condition through regular exercise and good health habits. The minimum evidence of a person's fitness for any climbing or rappelling activity is Parts A and C of the current BSA Annual Health and Medical Record, No. 34605, plus screening by a licensed health-care practitioner.

Directors and instructors should always be ready to adapt their teaching methods, group supervision, and experiential opportunities to anticipate potential risks associated with the health conditions of individuals under their direction. Anyone with a health condition that could significantly impair



safety may be required to undergo a further examination by a physician before being allowed to take part in climbing and rappelling activities. The BSA climbing director should also ensure that all instructors are informed about medical conditions that may affect the behavior, safety, or experience of any participant.

### **Be Prepared**

Know what to do in the event of an accident by having a written emergency response plan. (For details on developing such a plan, see chapter 12, "Incident Resolution, First Aid, and Emergency Response.")

### **Rules of Safety**

All participants and group leaders must follow safety guidelines presented by BSA climbing directors and instructors. Among those rules are the following.

#### **General Safety**

- Whenever participants are climbing or rappelling, there must be a suitable first-aid kit on-site and a means of emergency communications (radio, portable telephone, etc.).
- Helmets that are UIAA- or CEN-approved must be worn during climbing or rappelling activities, including while setting up and taking down anchors and ropes.
- District and council climbing and rappelling activities must operate with a BSA climbing lead instructor or director present.

#### **Clothing**

- Clothing should permit a full range of motion but must not be so baggy that it could catch on rock outcroppings or tangle in belay or rappel systems.
- Clothing should be appropriate for the weather. Layering is important for adapting to changing atmospheric conditions and for the mix of exertion and inactivity common at climbing areas.

#### **Shoes**

- Athletic shoes or light hiking boots are acceptable for most outdoor climbing/rappelling activities. Sandals and open-toe footwear are not acceptable.
- Climbing shoes can be worn in most climbing/rappelling areas, especially by more advanced participants. Special shoes may be required for wear at commercial indoor climbing gyms. (They are usually available for rental.)

#### **Hair**

Tie back long hair and tuck it under the helmet or shirt.

#### **Jewelry and Accessories**

- Remove all sharp objects (pens, combs, etc.) and any items that could fall out of pockets.
- Remove all jewelry, including necklaces, watches, bracelets, earrings, and rings.
- Remove belt buckles and scarves.

## **Safety Rules for Directors and Instructors**

- Directors and instructors must follow all safety rules expected of climbing/rappelling participants and should at all times set a good example. Make no assumptions when it comes to safety.
- Give participants a safety briefing before activities begin, and be sure everyone understands the message being conveyed.
- Keep a constant eye on environmental and area conditions.
- Inspect anchors and hardware in the belay system before beginning each belay.
- Double-check harnesses, helmets, carabiners, knots, and clothing before allowing any participant to take part in belaying, climbing, or rappelling.
- Position an instructor near each belayer to assist in case of emergency.
- Continuously supervise participants while they are engaged in rappelling, climbing, and belaying.
- Terminate climbing/rappelling activities in the event of unsafe weather, including lightning, high winds, darkness, or any other condition that may present a hazard to participants, instructors, or the director.
- In case of emergency, follow the established written emergency plan.

## **Safety While Belaying, Climbing, and Rappelling**

- Use only commercially made belay and rappel devices: a slotted plate (Sticht belay plate), a tube belay device, or a specialized belay device such as the Grigri. A Just-Right descender or Mnter hitch also are acceptable.
- Use a figure eight follow-through knot with a safety knot to tie a belay rope to a climber's or rappeller's harness.
- Rappellers may wear leather-palmed gloves that fit well so that their hands are protected and they can feel the rope.
- Participants use the correct verbal signals whenever they are climbing, rappelling, or belaying.
- Monitor each belay rope to discourage anyone from stepping on it and to keep it from tangling.
- The belayer must keep the brake hand on the belay rope throughout the time a participant is on belay.
- The use of backup belayers is recommended.

## **Safety While Bouldering**

- At least two properly trained spotters must be in position whenever a participant is bouldering.
- Anyone who climbs higher than shoulder height should have a top-rope belay.

## **Safe Supervision and Instruction**

- A BSA climbing director must be available during climbing or rappelling activities to respond to any emergencies, or must assign a qualified, responsible adult to fill that role.
- A minimum of two instructors must be on-site to supervise any climbing or rappelling activity. The ratio of participants to instructors must not exceed 6-to-1. (Note: This maximum ratio assumes that conditions are

ideal. An instructor or director may determine that activities require a higher ratio of instructors to participants if, for example, participants are especially inexperienced.)

- At least one staff member at the program site must be currently trained in first aid and cardiopulmonary resuscitation (CPR), and physically present whenever the program is in operation. Program sites located on BSA property must allow for emergency evacuation in a reasonable length of time. If emergency evacuation is more than 30 minutes by ground transportation, then a staff member trained to a minimum level of Wilderness First Aid (16 hours) must be present on the program site.
- Instructors must never leave participants unattended during climbing or rappelling activities.
- Instructors and directors are the final judges of whether safety is being jeopardized by environmental conditions, group behavior, or any other factor. Instructors and directors may suspend activities at any time to ensure that safety is not compromised.
- Participants must never be coerced or pressured into attempting any activity. Encouragement and recognition of accomplishment may be offered, but the final decision to take part in an activity is up to each participant.

### **Youth Protection in the Climbing Environment**

- ❶ As with any Scouting activity, leaders of groups engaged in climbing and rappelling should have completed BSA Youth Protection training. Each local council has materials about this important training.
- ❷ Two-deep adult leadership must be present at all times during BSA climbing/rappelling activities. (For more on two-deep leadership, see the *Scoutmaster Handbook*.)
- ❸ Participants in climbing/rappelling activities are to be paired with one another so that they can use the buddy system to help ensure their safety. Buddies offer each other encouragement and assistance; double-check their partner's harnesses, knots, and belay or rappel devices; and watch out for the best interest of others.
- ❹ Hazing, ridicule, and inappropriate teasing are prohibited. Group leaders and instructors must take strong steps to discourage these actions as soon as they appear.

### **Universal Access**

BSA policy states that access to climbing sites and facilities suitable for universal access should be provided to persons with disabilities. Adult leaders sensitive to the needs of and familiar with the condition of any individual with a disability should accompany the group.

### **Challenge by Choice**

"Challenge by choice" is a key principle of both Project COPE and BSA climbing/rappelling. Each person may choose which activities to participate in without being pressured or coerced by the group and without having to justify a choice. The group must accept each individual's choice.

Before a group participates in any climbing/rappelling activity, it is crucial that instructors give an orientation that is honest, is to the point, and encourages participants to be willing to share any concerns or needs. Such an orientation might sound something like this:

"This climbing site (or facility) offers a variety of challenges. You may participate in any or all of these challenges, or you may decide not to take part in any or all of them. The decision is yours alone.

"Climbing and rappelling can be exciting and challenging. These activities might seem frightening at first. You may be anxious about how well you will do or about what others will think of you. At times you may be outside your comfort zone. While climbing and rappelling will challenge you and encourage you to explore your abilities, you can say no to any activity at any time. No one will pressure you to do anything you do not want to do.

"Please ask yourself, 'What do I need to feel safe mentally and physically?' Before beginning any activities, we will practice how to spot and belay one another so that we can climb and rappel as safely as possible. If you have any questions about how you will be protected while climbing and rappelling, be sure to ask. By understanding the safety systems and techniques, you can better decide if you wish to participate.

"The instructors are familiar with your medical forms and have found no conditions that should limit your involvement in climbing and rappelling. However, if you have any health concerns or if there is anything we can do to further ensure your health and safety during climbing and rappelling, let an instructor know, either now or privately before the activities begin."

### **Setting Goals**

Before engaging in climbing or rappelling activities, instructors should ask each participant to decide on a level of challenge, ranging from 0 (no challenge) to 10 (highest level of challenge). Goals should be desirable (consistent with the ideals and values of the Boy Scouts of America), realistic (not too difficult or too easy), achievable (capable of being accomplished by this participant), and measurable (it can be decided whether and to what degree the goal has been met).

Sometimes the goal may be imposed by an instructor acting as a facilitator, or it may be implied by the structure of the climbing facility. In many cases it may be more effective to have each participant determine a personal goal and level of challenge. Even though some participants might not have taken part in climbing/rappelling activities before, encourage each participant to estimate what he or she can do. Before engaging in a group discussion about doing either a high-challenge or a low-challenge activity, each individual in the group should complete these sentences:

- ❶ Today I can easily \_\_\_\_\_.
- ❷ It will be a risk or challenge to \_\_\_\_\_.
- ❸ I cannot imagine doing \_\_\_\_\_.
- ❹ The support I need from each of you is \_\_\_\_\_.

These questions have no wrong answers. All participants should be valued for their individual choices. The group should not impose its goals on anyone without that person's consent.

### **Debriefing**

Debriefing following each activity can help participants and groups reinforce what they have learned and apply that knowledge to future performance. An instructor can facilitate debriefing with questions such as these.

- What was your goal for this activity?
- Who set the goal? (An individual? A leader? Part or all of the group?)
- How realistic was your goal?
- What was your plan for accomplishing the activity?



- How did you come up with the plan?
- Did everyone participate actively? Why or why not? (Participation can be in the form of belaying, spotting, rope handling, etc.)
- What did you learn from this activity?
- What would you do differently next time?
- How does what you learned in this activity apply to what you do in school or work, in your group, or in your community?

Open-ended questions rather than those answerable with a simple yes or no will help group members express their own ideas. If participants are shy about responding, the facilitator may encourage sharing ideas by telling participants: "This is what I saw and heard, and these are some of my impressions of your group climbing and rappelling. I wonder how you feel about..."

While simply completing a climbing/rappelling activity can be exciting for participants, the real benefit comes as group members reflect upon what just happened, how they responded, what went well, and how they could more effectively work together.

### Getting There Safely

The risks associated with climbing and rappelling can help a group focus on safety issues during its time at a climbing area. Just as important is traveling safely to and from the area, whether on foot or by motor vehicle. The BSA publication *Passport to High Adventure*, No. 34245, discusses issues and considerations for Scouting units traveling to and from events of all sorts.

### Leave No Trace

Always practice the principles of Leave No Trace when climbing/rappelling, especially when using a natural site. These principles frequently come into play when climbing, rappelling, or bouldering. Make sure your group is prepared to practice outdoor ethics before you go.



#### Plan Ahead and Prepare

- Find out the allowable group size specified by the land manager or owner, and stay within the prescribed limits.
- Where necessary, obtain permits and check regulations for the area.
- Take clothing appropriate for the time of year and the area. Be prepared for windy, shady, and sunny rock faces, as well as inclement weather.
- Carry small plastic bags for packing out litter and refuse.
- Take removable protection or use natural anchors whenever possible.

#### Travel and Camp on Durable Surfaces

- Drive on designated roads and use established parking areas.
- Help keep natural sites intact by staying on durable surfaces such as rock, gravel, sand, compacted soil, hard-packed snow, and previously used sites.
- Use care when accessing a climbing site to avoid trampling plants, causing erosion by ascending steep routes, and breaking limbs or shrubs. Whenever possible, use existing trails or routes.

### **Dispose of Waste Properly (Pack It In, Pack It Out)**

- Carry out food waste, scraps, and litter.
- Dig catholes at least 200 feet from trails, bases of climbs, water sources, and campsites. Dig catholes in areas exposed to the sunlight.
- Where there is no place to dig a cathole, carry out human waste in a pack-it-out kit or plastic waste-disposal bag.
- Carry a knife to remove old, unsafe slings you find.
- Avoid using chalk whenever possible, or use chalk that blends with the rock.

### **Leave What You Find**

- Stay away from petroglyphs and pictographs, and leave artifacts for others to see.
- Do not touch rock art. Federal regulations protect all archaeological sites and artifacts, and touching them tends to hasten deterioration.
- Leave antlers, fossils, and plants for others to enjoy.

### **Minimize Campfire Impacts**

- Whenever possible, use a lightweight stove instead of a fire. Warm clothes and hot food can keep you warmer than a fire.
- If a fire is necessary, use an existing fire lay.
- Use dead and downed wood that can be easily broken by hand.
- Make sure the fire is cold out before you leave.

### **Respect Wildlife**

- Stay well away from nesting sites on or near crags in the spring and early summer.
- If you encounter a nest on a climb, don't touch it. Human contact may cause adult birds to abandon the nest, eggs, or young.
- If wildlife alter their habits when you approach, you are too close. Back away slowly.
- Store food and garbage where animals cannot get it so they will not acquire bad habits.

### **Be Considerate of Other Visitors**

- Thoughtful climbers respect other visitors and give them plenty of space.
- If your intended climbing site is being used, find another site or return when that group is finished.
- Keep noise down and leave pets at home.
- Make sure the colors of your clothing blend with the environment.
- Be considerate of other climbers and respect their privacy.

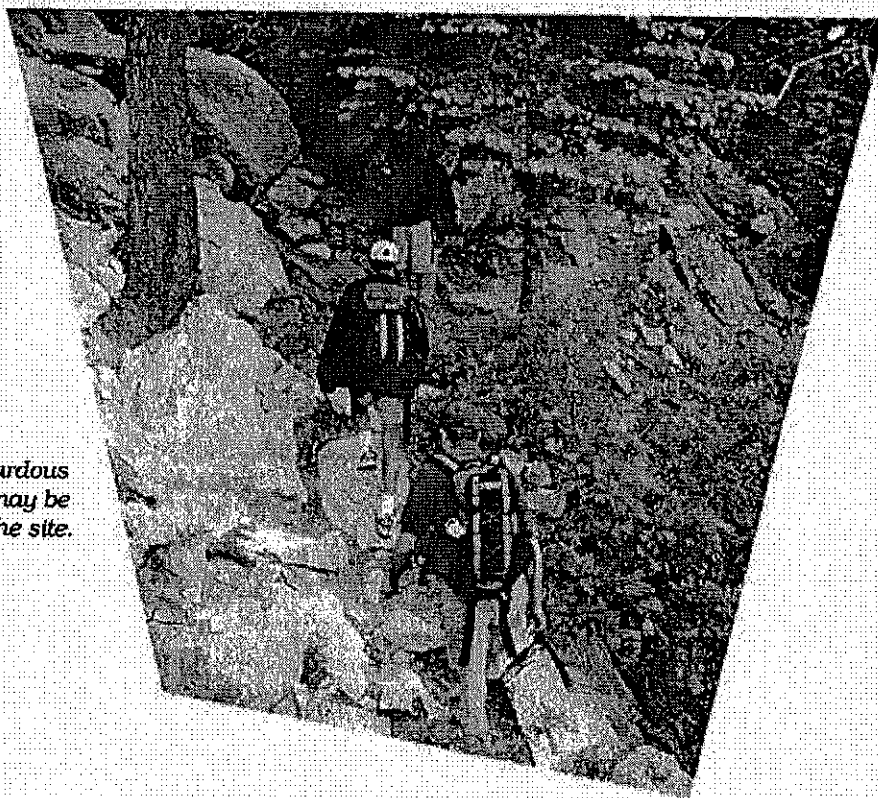
## In Conclusion

Those new to challenging activities such as climbing and rappelling may find these exercises daunting at first, and perhaps even frightening. Many participants may be anxious about how they will respond to the vertical environment and whether their safety can be assured.

An important role of instructors and directors is to provide support and information for all participants at levels appropriate to their needs. Understanding how anchors are set and belays are secured can help participants enjoy climbing and rappelling without unreasonable concern. Directors and instructors who teach the correct methods of climbing, rappelling, and belaying are helping Scouts develop technical expertise and self-confidence that will increase their sense of achievement and well-being.

Ultimately, the goal of climbing and rappelling activities is not for every person to reach the top of a climb or for everyone to rappel successfully down a face, but rather to provide participants with opportunities to explore their skills, expand their abilities, and feel an increased pride in their accomplishments. For some, that may involve simply roping up and managing to climb a few feet above the ground. For others, it can mean completing complicated routes and perhaps meeting the requirements for the Climbing merit badge.

It is up to each person to determine how far he or she is willing to go. Instructors and directors provide opportunities for Scouting youth to achieve more than they think they can; from then on, the choice to proceed is always up to the individual.



*One of the most hazardous aspects of climbing may be getting to and from the site.*

# Chapter 3

## Equipment

The gear used for climbing, rappelling, and belaying has been developed over more than 150 years of serious mountaineering. The UIAA (Union Internationale des Associations d'Alpinisme) is a group of mountain travel experts who set standards and testing procedures for climbing equipment. The European Committee for Standardization (known as the CEN) serves as a similar standard for excellence. All ropes and hardware used by Scouts or Venturers for climbing, rappelling, and belaying must be designed for climbing and/or have UIAA, CEN, or National Fire Protection Association (NFPA) approval. Almost all climbing equipment sold by reputable dealers has that approval, but insist upon seeing proof, usually in the form of a brochure accompanying a new piece of gear or the UIAA or CEN stamp somewhere on an item. Unless participants can demonstrate adequate knowledge in proper equipment use, climbing instructors should always ensure participants receive proper instruction.

### Procurement

All equipment for climbing and rappelling must be made specifically for these activities and must be acquired new from reputable suppliers.

These sources of equipment **ARE NOT ACCEPTABLE**:

- **Army surplus.** Military gear has specifications different from equipment for climbing and rappelling. The history of individual items may be unknown. **Do not use army surplus equipment.**
- **Fire and rescue equipment.** Firefighters and rescue teams sometimes give away used equipment. However, a single hard use under the extreme conditions of fire fighting or rescue operations can make an item unsafe. **Never accept this type of equipment, even if it has been used only once.**

### Visual and Formal Inspections of Gear

Determining the condition of gear to be used for BSA climbing/rappelling requires two levels of safety inspection—visual and formal. The two levels give maximum opportunities for discovering problems with gear that may have arisen since its last use and for observing any long-term wear or deterioration caused by use or exposure to stresses such as weather.

Never modify or alter a climbing harness or any other item of climbing equipment because this may render it unsafe and remove the manufacturer's warranty.

PERSONAL HELMETS,  
HARNESSES, AND SHOES  
MAY BE USED WITH  
THE APPROVAL OF THE  
CLIMBING DIRECTOR  
OR LEAD INSTRUCTOR.  
PERSONAL ROPE AND  
HARDWARE MAY NOT  
BE USED BECAUSE  
THE HISTORY OF ITS  
USE IS UNKNOWN.



### **Visual Inspection**

A climbing instructor or director must visually inspect all climbing/rappelling equipment just before it is put into use. No one may climb or rappel until every item of equipment that will be used has been found to be in satisfactory condition.

Instructors and directors conducting visual inspections should look for anything that could indicate a problem with a piece of equipment—frayed webbing or harnesses, damaged hardware, etc. Give every rope an inch-by-inch hand and eye examination. (For more on ensuring that rope is safe, see chapter 4, "Rope and Rope Handling.") Any piece of gear that arouses suspicion must be put aside pending a more thorough inspection to determine whether the item in question should be removed from the inventory for proper disposal.

### **Formal Inspection**

Equipment, facilities, staff qualifications, and training, as well as operation of the program, should be reviewed during the annual summer camp visitation. This inspection must be conducted by a trained regional climbing/rappelling inspector or Project COPE inspector. The Project COPE visitation team is empowered to inspect both climbing/rappelling and Project COPE facilities and activities. The climbing/rappelling site is also inspected annually by a climbing director and members of the council climbing committee. Climbing/rappelling program sites or facilities on council property that are not part of a summer camp operation must be inspected at least once a year by a trained climbing director or inspector from outside the BSA local council. A BSA regional visitation team submits written recommendations to the council identifying facilities, procedures, and instruction techniques that need to be changed.

In addition to examining climbing and rappelling equipment, the semiannual inspection may also consider the appropriateness and safety of the following:

- Program sites
- Program equipment
- Program administration
- Staff qualifications and training
- Participant prerequisites
- Program safety procedures
- Instruction techniques
- First-aid and emergency procedures

### **Record Keeping**

Records must be maintained on all aspects of all BSA climbing/rappelling activities. These records can provide valuable information for future program planning, for accurate management of equipment, and for assessing the appropriateness of climbing areas. Each piece of climbing equipment should be marked so that its history can be tracked, and an accurate record must be kept from the time of its procurement, through its daily use, and to its eventual retirement. The record includes a description of the piece of equipment and describes any unusual incidents in which it has been involved.

The most detailed records should be kept for ropes, helmets, and harnesses. Forms for tracking the histories of helmets, hardware, and harnesses are in this chapter. The form for documenting the history of a rope is located in chapter 4, "Rope and Rope Handling."

## HELMET AND HARDWARE RECORD

Photocopy this form and use it to maintain a record throughout the life of each helmet and hardware item used in BSA climbing/rappelling activities.

Item No. \_\_\_\_\_ Purchase date \_\_\_\_\_ Put in service (date) \_\_\_\_\_

Size \_\_\_\_\_ Color \_\_\_\_\_ Brand \_\_\_\_\_

Supplier	Material	Quantity	Unit Price	Total Price
ABC Company	Steel	1000	10.00	10000.00
DEF Company	Steel	500	10.00	5000.00
GHI Company	Steel	200	10.00	2000.00
JKL Company	Steel	100	10.00	1000.00
MNO Company	Steel	50	10.00	500.00
PQR Company	Steel	25	10.00	250.00
STU Company	Steel	12.5	10.00	125.00
VWX Company	Steel	6.25	10.00	62.50
YZA Company	Steel	3.125	10.00	31.25
BCD Company	Steel	1.5625	10.00	15.625
EFG Company	Steel	0.78125	10.00	7.8125
HIJ Company	Steel	0.390625	10.00	3.90625
KLM Company	Steel	0.1953125	10.00	1.953125
NOP Company	Steel	0.09765625	10.00	0.9765625
QRS Company	Steel	0.048828125	10.00	0.48828125
TUV Company	Steel	0.0244140625	10.00	0.244140625
WXY Company	Steel	0.01220703125	10.00	0.1220703125
ZAB Company	Steel	0.006103515625	10.00	0.06103515625
BCD Company	Steel	0.0030517578125	10.00	0.030517578125
EFG Company	Steel	0.00152587890625	10.00	0.0152587890625
HIJ Company	Steel	0.000762939453125	10.00	0.00762939453125
KLM Company	Steel	0.0003814697265625	10.00	0.003814697265625
NOP Company	Steel	0.00019073486328125	10.00	0.0019073486328125
QRS Company	Steel	9.5367431640625e-05	10.00	9.5367431640625e-05
TUV Company	Steel	4.76837158203125e-05	10.00	4.76837158203125e-05
WXY Company	Steel	2.384185791015625e-05	10.00	2.384185791015625e-05
ZAB Company	Steel	1.1920928955078125e-05	10.00	1.1920928955078125e-05
BCD Company	Steel	5.9604644775390625e-06	10.00	5.9604644775390625e-06
EFG Company	Steel	2.9802322387695312e-06	10.00	2.9802322387695312e-06
HIJ Company	Steel	1.4901161193847656e-06	10.00	1.4901161193847656e-06
KLM Company	Steel	7.450580596923828e-07	10.00	7.450580596923828e-07
NOP Company	Steel	3.725290298461914e-07	10.00	3.725290298461914e-07
QRS Company	Steel	1.862645149230957e-07	10.00	1.862645149230957e-07
TUV Company	Steel	9.313225746154785e-08	10.00	9.313225746154785e-08
WXY Company	Steel	4.656612873077392e-08	10.00	4.656612873077392e-08
ZAB Company	Steel	2.328306436538696e-08	10.00	2.328306436538696e-08
BCD Company	Steel	1.164153218269348e-08	10.00	1.164153218269348e-08
EFG Company	Steel	5.82076609134674e-09	10.00	5.82076609134674e-09
HIJ Company	Steel	2.91038304567337e-09	10.00	2.91038304567337e-09
KLM Company	Steel	1.455191522836685e-09	10.00	1.455191522836685e-09
NOP Company	Steel	7.275957614183425e-10	10.00	7.275957614183425e-10
QRS Company	Steel	3.637978807091712e-10	10.00	3.637978807091712e-10
TUV Company	Steel	1.818989403545856e-10	10.00	1.818989403545856e-10
WXY Company	Steel	9.09494701772928e-11	10.00	9.09494701772928e-11
ZAB Company	Steel	4.54747350886464e-11	10.00	4.54747350886464e-11
BCD Company	Steel	2.27373675443232e-11	10.00	2.27373675443232e-11
EFG Company	Steel	1.13686837721616e-11	10.00	1.13686837721616e-11
HIJ Company	Steel	5.6843418860808e-12	10.00	5.6843418860808e-12
KLM Company	Steel	2.8421709430404e-12	10.00	2.8421709430404e-12
NOP Company	Steel	1.4210854715202e-12	10.00	1.4210854715202e-12
QRS Company	Steel	7.105427357601e-13	10.00	7.105427357601e-13
TUV Company	Steel	3.5527136788005e-13	10.00	3.5527136788005e-13
WXY Company	Steel	1.77635683940025e-13	10.00	1.7763568394

**Date Used**

### Where Used

### Circumstances of Note

[illegible]

## HARNESS RECORD

Photocopy this form and use it to maintain a record throughout the life of each harness used in BSA climbing/rappelling activities.

Harness No. \_\_\_\_\_ Purchase date \_\_\_\_\_ Put in service (date) \_\_\_\_\_

Size \_\_\_\_\_ Color \_\_\_\_\_ Distinguishing markings \_\_\_\_\_

Brand \_\_\_\_\_ Supplier \_\_\_\_\_

[illegible]

## Hints for Marking Equipment

- **Helmets.** Write identifying numbers and the date of purchase inside with a permanent marker.
- **Hardware.** Never scratch or file marks on carabiners, belay or rappel devices, or other hardware. Instead, place colored tape on a part of the hardware that will not interfere with its function. The color can be keyed to the item's year of purchase. (Hardware can sometimes be purchased in various colors, which may aid in tracking its history.)
- **Harnesses.** Mark a number and the date of purchase on the label of each harness but not on the waist belt itself, where the ink might affect the integrity of the harness.

## Organizing Equipment Records

A useful format for keeping climbing/rappelling records is a loose-leaf binder divided into sections for various types of information. Pages can be added over time. Districts and councils may also be able to draw upon the skills of computer-literate volunteers to set up computer programs for their record keeping.

Equipment records usually have three major sections.

- The first section contains the usage records for helmets, harnesses, and ropes. It also contains information on other items in the climbing/rappelling cache—carabiners, webbing, rappel devices, etc. For each item, write down the size, type, brand name, supplier, date of original purchase or initial service, and descriptions of any significant stresses the item has sustained.
- The second section contains the outcome of each semiannual inspection, noting results, recommendations, and the verification that any recommended maintenance or replacement has been completed.
- The third section contains records relevant to participants and staff members. It is made up of rosters and dates of participation, records of accidents or close calls, medical information/informed consent forms, participant evaluations and suggestions, and staff debriefing records.

Record-keeping procedures should be reviewed by council and area inspection teams.

## Retiring Equipment

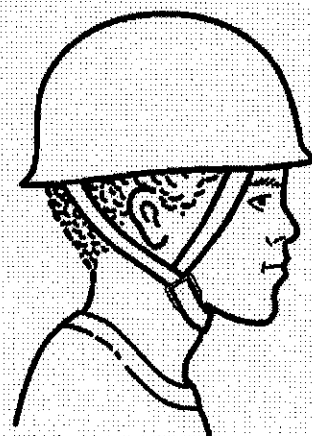
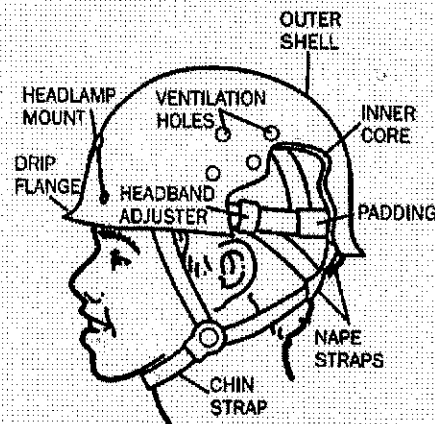
Equipment that has been damaged or has reached the end of its safe lifetime must be rendered useless by altering it in such a way that it can never be accidentally used for any climbing, rappelling, or belaying activities. Never give away retired equipment; that leaves open the possibility of its being put back into service.

- **Carabiners**—Retire by breaking off the gates to render them unusable.
- **Harnesses**—Retire by cutting apart with scissors.
- **Ropes**—Retire by cutting into 15-foot or shorter lengths.
- **Helmets**—Retire by snipping edges with a cutter, then smashing them and cutting out the webbing.

## Helmets

Every participant in any BSA climbing/rappelling activity must wear a helmet that is UIAA- or CEN-approved for climbing. Other kinds of helmets such as those intended for bicyclists, cavers, or football players are not specifically designed for climbing and are not acceptable.

FIG. 1. CLIMBING HELMET FEATURES



*The helmet should be properly fitted and adjusted.*

Climbing helmets protect heads from falling rocks and gear, and from contact with the climbing surface. Participants may complain at times that helmets feel hot or uncomfortable, but the assurance of increased safety far outweighs any minor discomfort. Instructors should see that every participant's helmet is adjusted to fit well. Never allow a helmet to be worn tipped back to expose the forehead.

When selecting helmets, consider ventilation, ease of adjustability, and color (dark colors absorb heat; light colors reflect it). A distinctive color used for the helmets of climbing instructors can help provide immediate identification.

All climbing helmets must be retired according to the manufacturer's recommendations, or sooner if one shows signs of wear or if it has sustained significant impact. Follow any additional manufacturer's guidelines for retiring helmets.

## Gloves

Some climbers and most rappellers prefer to wear gloves. If worn, gloves must be properly fitted with leather palms. Gloves help protect hands from nature's cold and friction's heat. Some gloves have reinforced palms that will provide additional protection against the heat caused by friction. The climbing director will decide the appropriate use of gloves at the site.

## Shoes

Beginners may climb and rappel in athletic shoes, lightweight hiking boots, or other fully enclosing shoes. Avoid shoes with slick soles. Sandals and thongs are not acceptable, as they provide no lateral support. Due to the risk of injury, do not let participants climb barefooted.

Serious climbers may want to purchase shoes made especially for climbing. Commercial climbing gyms often require that special climbing shoes be worn, and likely will have appropriate footwear available for rent.

The world of climbing shoes is understood by a few proficient climbers. For avid climbers, different kinds of climbing surfaces require different kinds of shoes. Fit is as important as function, and climbers usually opt for tight shoes worn without socks, sacrificing comfort to maximize the ability of their feet to "feel" holds on the rock and help maintain footholds.

Among the choices of shoes available to climbers are the following.

**Climbing Slippers.** Slippers are very thin, are often held in place by elastic tops, and are popular at indoor climbing areas. However, they provide little support, depending instead upon the muscles of a climber's feet to do most of the work. Beginners should avoid using slippers.

**Friction Shoes.** Friction shoes are highly flexible so that the sole of the shoe can smear against the rock. Smearing increases the friction between the shoe and the rock, allowing a climber to adhere better to steep pitches.

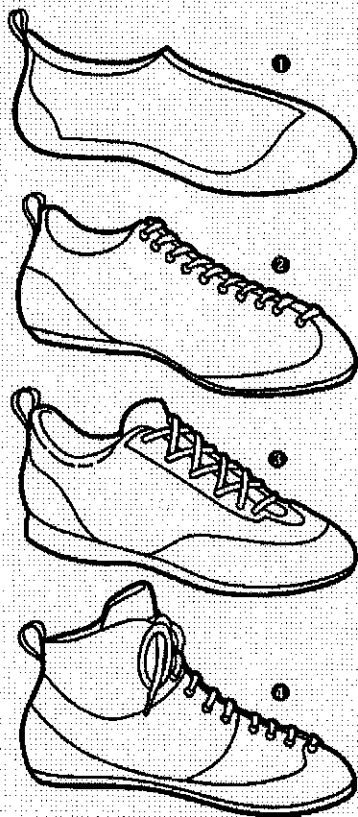
**Edging Shoes.** Good edging shoes should enable a climber to stand on a hold no wider than the thickness of a quarter. Since their feet may not have the strength required to hold their weight, beginning climbers can benefit from stiff footwear such as edging shoes.

**General-Purpose Shoes.** No shoe matches all the situations a climber may encounter, but general-purpose shoes try to offer a little of everything. The stiff sides of the soles can be used for edging, while the soles themselves work well for smearing during friction climbing.

## Tape

Many climbers use athletic tape to shield their hands from abrasions, especially if they expect to use jam holds. There are a variety of taping techniques, but the basic idea is to cover knuckles and other parts of the hand that could be injured by grinding against rough surfaces. The tape should not be applied too tightly, but should be secure enough not to come loose at inopportune moments.

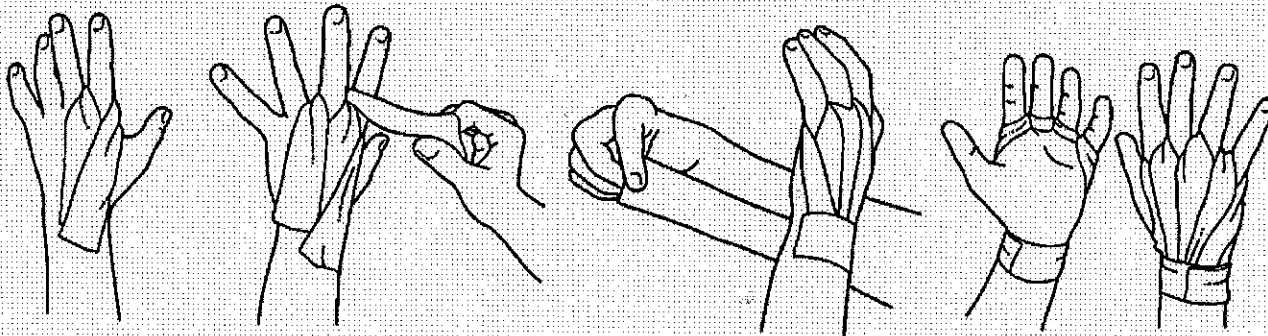
FIG. 2. ROCK SHOES



- ① Climbing slipper
- ② Friction shoe
- ③ Edging shoe
- ④ General-purpose shoe



FIG. 3. HAND TAPED FOR CLIMBING



*Back of hand and knuckles are protected; palm is mostly left open.*

### Chalk

Some climbers use gymnastic chalk (magnesium carbonate) to remove moisture or sweat from their hands and give them a more secure grip on holds. Attached to waist belts or climbing harnesses, chalk bags containing loose chalk or chalk balls (a fine mesh ball with chalk inside) are common ways of carrying chalk. (A homemade version of a chalk ball can be made from the cutoff toe of a nylon stocking.)

A drawback to chalk is that climbers using it leave traces on the holds they grip. Because it is visible on the rocks, chalk use conflicts with Leave No Trace principles. Not only does it look unnatural, it also marks the handholds of popular climbing routes and removes the challenge of guesswork for subsequent climbers. Whatever the case, climbers should always follow local regulations concerning chalk use.

### Carabiners

Carabiners are the essential connectors of belay and rappel systems. Most carabiners are made of aluminum alloy or high-grade steel. A spring-loaded gate allows a carabiner to be snapped onto a rope or piece of webbing.

Carabiners are either *locking* or *nonlocking*. They are further distinguished by their shape—oval-shaped, D-shaped, or pear-shaped.

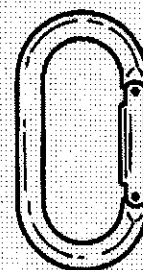
#### Locking Carabiners

Locking carabiners have mechanisms for guarding the gate when it is closed. The lock can vary from a simple threaded collar that screws down over the gate, to spring-loaded, automatic-locking devices securing the gate in such a way that there is less chance of it accidentally opening. Use locking carabiners for joining belayers to anchors and belay devices, and rappellers to rappel devices. Before anyone begins a climb, rappel, or belay, double-check to be sure that each locking carabiner is, indeed, locked.

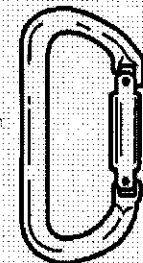
#### Double-Locking Carabiners

A double-locking carabiner requires two actions to unlock its gate. A visual and physical check is required to be sure the gate is closed.

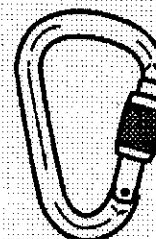
FIG. 4. CARABINERS



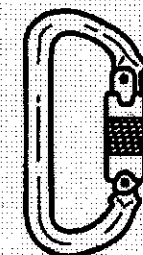
NONLOCKING OVAL



NONLOCKING D-SHAPED

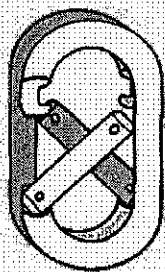


LOCKING PEAR-SHAPED



LOCKING D-SHAPED

**FIG. 8. NONLOCKING CARABINERS,  
WITH GATES REVERSED**



### **Nonlocking Carabiners**

Unlike a correctly closed locking carabiner, the gate of a nonlocking carabiner may accidentally open if it pushes against a rock, a rope, or even a climber's clothing. The dynamics of a hard fall arrested by a rope running through a carabiner can cause *gate lash*—the momentary opening of a carabiner's gate due to the gate's inertia overcoming the spring tension, or collision of the carabiner against another object, or the vibration of the rope over the carabiner.

If a load comes onto a carabiner at the instant the gate is open, carabiner failure may occur. (A carabiner with its gate open typically has less than 50 percent of its rated, gate-closed strength.) Using carabiners with locking gates or using pairs of carabiners will significantly reduce this type of carabiner failure. When two nonlocking carabiners are used together, the gates should be reversed so that when they are pressed open the gates form an X. That orientation will prevent both carabiners from being accidentally opened at the same time.

### **Bent-Gate Carabiners**

Bent-gate carabiners have a concave gate that makes them easy to clip onto ropes and slings. They are used primarily for lead climbing and sport climbing, and are not appropriate for most BSA climbing/rappelling activities.

### **BEWARE OF LOOK-ALIKES**

Be aware that some carabiner-like items are designed for uses other than climbing—key rings, accessory holders, etc. Allow no carabiners or carabiner-like items on a climbing/rappelling site except those of known history, strength, and appropriateness for use by climbers, rappellers, and belayers.

### **Carabiner Care**

Keep carabiners dry and clean, and protect them from corrosion. Do not store carabiners in humid or salty air, with damp gear or clothing, or near corrosive chemicals. Do not file carabiners for any reason. Surface burrs may be removed with 220–400 grade sandpaper, but if that does not remove a burr, retire the carabiner. The sleeves of locking carabiners can become difficult to operate due to grit or damage to threads, springs, or hinges. If a carabiner sticks, wash it in warm soapy water, rinse and dry thoroughly, then lubricate with dry graphite around the hinge area, inside the spring hole, and in the locking mechanism.

## Accessory Cord

High-strength accessory cord, 7 to 9 millimeters in diameter, may be helpful as a self-locking Prusik to provide a backup system for newly trained rappellers. A 20- to 25-foot length of 7-millimeter accessory cord can be used to tie a cordelette to equalize the load among anchor points. A short piece also may be helpful for rescues where one or both hands may be needed to assist a student or accident victim. At no time should accessory cord be used as a substitute for a climbing rope. Most accessory cord is static in that it has a minimal stretch. Accessory cord requires the same care as rope.

## Harnesses

Harnesses give climbers, rappellers, and belayers a secure way to attach themselves to ropes and belay anchors. In case of a fall, the loops and waist belt distribute a person's weight in several directions, making a harness more comfortable and much safer than a tied harness.

Climbing harnesses have evolved over the years to become as comfortable as they are safe. They are constructed of a waistband and leg loops, which absorb some of the load when a person is suspended. Many harnesses simplify belaying and rappelling by virtue of having a belay/rappel loop permanently fixed to the harness.

**Kinds of Harnesses.** Commercially made harnesses are available in a variety of designs, most notably the waist-belt/leg-loop style (sometimes called "sit" or "seat" harnesses), diaper style, chest, fully adjustable, and full body style.

### **Waist-Belt/Leg-Loop Style Harnesses (Commercially Made Harnesses)**

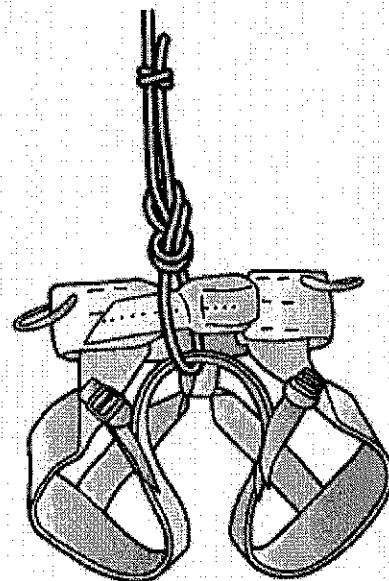
These are the most common commercially made harnesses and are often the most comfortable. A waist belt with a buckle closure and the leg loops are held together by a belay loop made of strong webbing. The leg loops may be adjustable and, like the waist belt, padded for comfort.

The belay loop serves as an attachment point for rappel and belay devices. Follow the manufacturer's recommendation for attaching to a harness.

### **Chest Harnesses**

A chest harness can provide additional support to a leg-loop harness in special situations—for example, when ascending or rappelling while wearing a pack. Chest harnesses must always be used in combination with a tied-seat harness or commercial harness.

FIG. 6. COMMERCIALY MADE HARNESS





### **Fully Adjustable Harnesses**

Adaptable to a wide range of body sizes, the fully adjustable harness is made from a single piece of webbing that wraps around the legs and continues to the waist. Leg loops must be adjusted snugly to prevent slack from migrating to the waist.

### **Full-Body Harnesses**

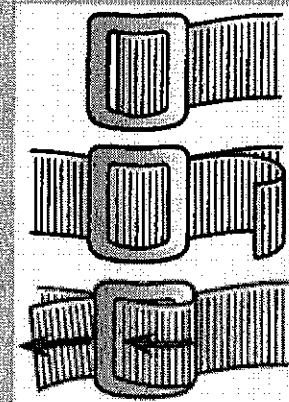
Full-body harnesses incorporate chest, back, and shoulder support. Young participants whose hips are not developed enough to hold a normal harness in place should use a full-body harness, as should any individual whose waist is too large for proper positioning of a harness waist belt.

#### **BUCKLE UP!**

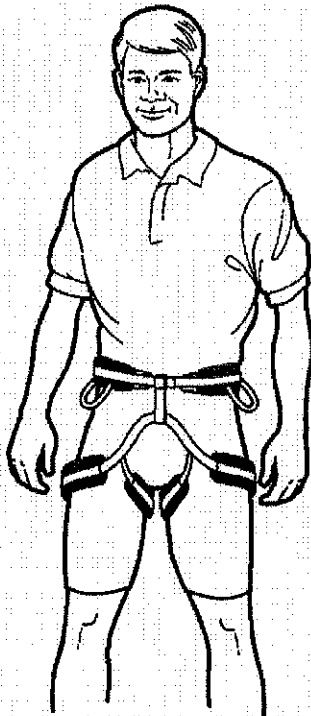
Before allowing a person to climb, rappel, or belay, double-check to be certain that the end of the harness belt has been properly secured according to the manufacturer's specifications. In most cases, that involves threading the belt back through the buckle. More than a few experienced climbers have become fatalities because they overlooked this essential safety principle.

*Secure the end of the harness belt by doubling it back through the buckle.*

**FIG. 7. BUCKLING A HARNESS**



**FIG. 8. CORRECTLY FITTED HARNESS**



### **Fitting Commercially Made Harnesses**

Even the most carefully designed and cushioned harness will not be secure if it is too big or too small, nor will it be comfortable. If a harness is too tight, it will restrict movement and can pinch. A loose harness may slip and chafe; in an inverted fall, a climber or rappeller could slide out of it.

Climbing directors and instructors should be diligent in ensuring that every participant is matched with a harness of the correct size, and that it is properly adjusted. Each participant should be trained to put on and adjust his or her own harness.

### **Fitting Waist-Belt/Leg-Loop Harnesses**

A waist-belt harness should sit snugly above the hip bones and be impossible to pull down. A harness that is too large may slide up onto the ribs, compress the diaphragm, and interfere with breathing. A harness that is too small can compress the hips and legs, reducing mobility. When in doubt, however, err on the small side. Be thorough when testing the security of harness fit. If the harness will not stay above a participant's hip bones, it may not hold that person in an inverted fall. Instead, use a full-body harness or a chest harness in combination with a seat harness.

### **Safety Concerns for Harnesses**

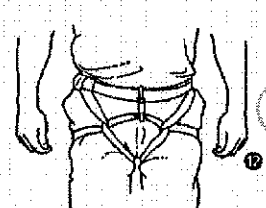
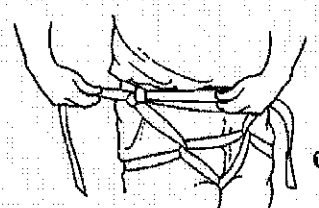
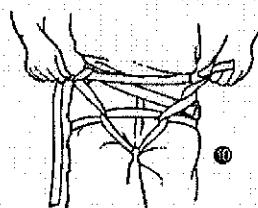
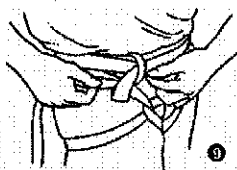
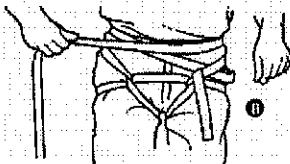
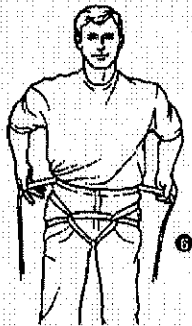
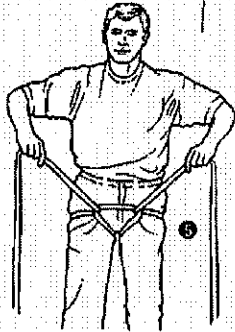
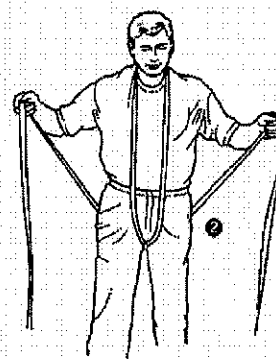
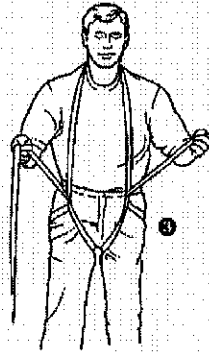
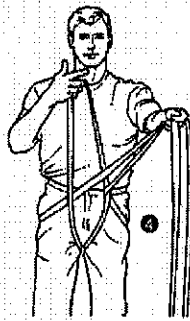
- A properly sized commercial climbing harness or a tied-seat harness made from at least 1-inch-wide webbing is required for all belayed events.
- Before use, inspect visually and by touch the condition of each harness, paying close attention to belay loops, stitching, and buckles.
- Most harnesses use buckles to secure the waist belt. Harnesses must be buckled in a specific way, a process that usually requires doubling the webbing back through a buckle and leaving a tail at least 3 inches in length. If the buckle and the harness are not correctly secured they may come apart, a potentially fatal occurrence. Review the manufacturer's recommendations and follow those instructions every time you buckle a harness.
- Pay special attention when using harnesses that include hook-and-loop fasteners. Considered by some climbers to be a convenience, a hook-and-loop fastener may increase the possibility of a participant forgetting to buckle a harness properly.
- Protect harnesses from excessive direct sunlight and heat, and from nylon-damaging substances such as acids, alkalis, sunscreen, oxidizing agents, insect repellent, dirt, and bleach.
- Shield harnesses from contact with sharp objects that could cut or abrade the material.
- Wash a dirty harness by hand in cool water with mild soap. Rinse thoroughly and allow to air-dry in a shaded area.
- All climbing harnesses must be retired according to the manufacturer's recommendations or no more than seven years from the date of purchase, or sooner if conditions warrant. Retire a harness when it shows obvious signs of wear such as fading or abrasion. Over time, the webbing will get fuzzy at the tie-in points. Although that is not a matter of great concern, be very suspicious when tie-in points are excessively worn, or if stitching is in any way damaged.
- Instruct each participant on the proper methods of fitting and buckling the harness.

For general guidelines on tying in to a harness with a belay rope, climbing rope, or rappel device, see the chapters on belaying, climbing, and rappelling in this manual. For specific instructions, refer to the manufacturer's tag sewn into the harness in question.

### **Tied Harnesses**

A 30-foot length of 1-inch webbing can be used to tie a reliable and comfortable seat harness. A tied harness, such as the Swiss seat, and the knotted leg-loop harness are commonly used in BSA climbing/rappelling activities.

FIG. 9. TYING A TIED-SEAT HARNESS



### How to Tie a Seat Harness

Tie the seat harness using a piece of webbing 24 to 30 feet long.

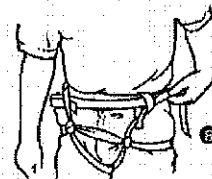
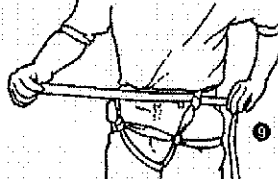
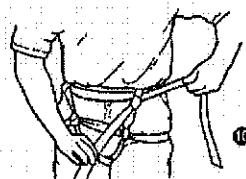
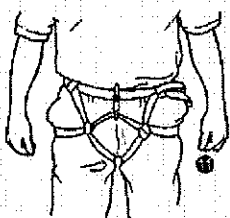
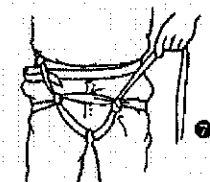
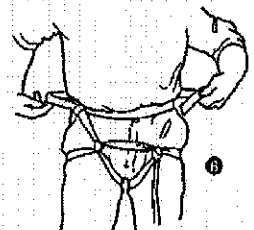
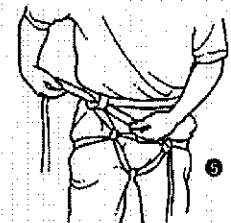
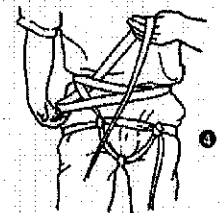
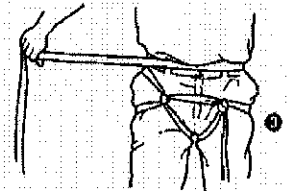
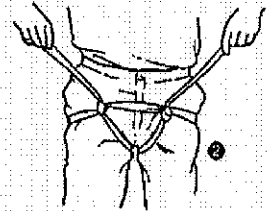
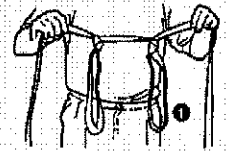
- ❶ Drape the center of the webbing behind your neck.
- ❷ Step over the ends of the webbing and bring them around the sides of your hips, taking care not to allow any portions of the webbing to twist. Pull the webbing snug.
- ❸ Pass the webbing ends behind and then through the lengths of webbing lying against your lower torso.
- ❹ Slip the webbing off your neck.
- ❺ As you pull out the slack, the bend that had been around your neck will become the horizontal band between the loops of webbing that have formed around your legs.
- ❻ Going first behind your back, wrap the remaining lengths of webbing around your waist in this fashion:
  - a. The piece originally in your right hand goes clockwise.
  - b. The piece originally in your left hand goes counterclockwise.
- ❼ Continue wrapping until only about 3 feet remains at each end of webbing. Keep the webbing flat and snug against your body.
- ❽ Tuck the end of the counterclockwise webbing beneath the sling on your left hip. (You will need it in a moment to finish tying a water knot.)
- ❾ With the end of the clockwise webbing, tie a loose overhand knot ( $\frac{1}{2}$  of a water knot) around the wraps of webbing on your right hip.
- ❿ Retrieve the other end of the webbing and use it to trace back through the loose overhand knot, thus completing a water knot.
- ⓫ Tighten the water knot. Check the harness to be sure it fits securely and that there are no unnecessary twists in the webbing. Wrap any remaining length of webbing around your waist and tuck the end under the previous wraps.
- ⓬ Use a locking carabiner to clip together all the webbing between the knots in front of your body.

### How to Tie a Knotted Leg-Loop Harness

Form the knotted leg-loop harness using a piece of webbing 24 to 30 feet long.

- 1 a. Holding one end of the webbing, measure off a length that stretches from your nose to your outstretched hand. Keep that length marked with one hand while you tie the first leg loop.
- b. Form the first leg loop. Just beyond the measured piece, wrap the webbing around your thigh to size it to your leg. Add another 4 to 6 inches to allow for a knot, and form a leg loop with an overhand-on-a-bight knot.
- c. Move about 6 inches further along the webbing and repeat step 1b to form a second leg loop.
- 2 With the shorter, measured piece of webbing on your left side, put on the leg loops as you would a pair of pants. Pull the loops all the way to your crotch with the knots toward the front. For the sake of comfort, be sure there are no twists in the webbing. Each loop must be snug, but not tight enough to restrict circulation. You should be able to easily slip two fingers between a leg loop and your leg.
- 3 Let the shorter, measured piece of webbing hang down on your left side. Bring the longer piece of webbing clockwise, behind your back, and wrap it several times around your waist. Bring the end of it across your belly to your right side.
- 4 Tuck the webbing end up and behind the wraps of webbing on your right hip, leaving enough slack to form a bend.
- 5 Pass the webbing end through the bend to form an overhand knot. Work any slack out of the webbing so that the harness fits snugly around your waist and the overhand knot is secure.
- 6 Wrap the remainder of the longer piece of webbing a final time around your waist, going clockwise, as before. To keep it out of the way, tuck the end behind the webbing above the right leg loop. (You will need it in a moment to finish tying a water knot.)
- 7 Turn your attention to the shorter, measured length of webbing on your left side.
- 8 With the measured length of webbing, tie a loose overhand knot ( $\frac{1}{2}$  of a water knot) around the wraps of webbing on your left hip.
- 9 Retrieve the other end of the webbing and use it to trace back through the loose overhand knot, thus completing a water knot.
- 10 Tighten the water knot. Check the harness to be sure it fits securely and that there are no unnecessary twists in the webbing. Wrap any remaining length of webbing around your waist and tuck the end under the previous wraps.
- 11 Use a locking carabiner to clip together all the webbing between the knots in front of your body.

FIG. 10. TYING A KNOTTED LEG-LOOP HARNESS



## Belay/Rappel Devices

Belay and rappel devices apply friction to a rope, allowing its speed to be controlled. Commercially made devices approved for BSA activities include the following.

- For belaying:** Slotted plate (Sticht plate)  
Tube device  
Specialized belay devices such as the Grigri
- For rappelling:** Slotted plate  
Tube device  
A figure eight used in a rappel mode  
Rappel rack (more appropriate for advanced rappellers; primarily used for caving)

### Slotted Plate

A slotted plate is also called a *Sticht plate*. It is available with or without a spring. The spring version may be easier to use.

### Tube Device

Tube devices are similar in operation to a springless slotted plate, although tubes feature greater surface area to dissipate heat.

### Specialized Belay Devices

Some specialized devices are appropriate for BSA activities. Among them is the Petzl Grigri, a belaying mechanism often used at indoor climbing gyms. Using the same principle employed by automobile seat belts, a camming device inside the Grigri locks up whenever the rope is loaded with sufficient tension. As a result, the Grigri is seen by many to be a belay device that requires minimal input from a belayer. However, it requires the same amount of belay technique as any other belay device.

## Storing Equipment

Careful storage and handling of climbing and rappelling equipment can substantially increase its life span and help protect it against loss or misuse. Except for bolts used as anchors, all hardware, ropes, and webbing must be removed from climbing areas at the end of each day and stored in an orderly fashion.

At district and council climbing facilities, establish a separate area for storing climbing and rappelling equipment in a building where access can be controlled. Tubs, tote boxes, or plastic garbage cans for sorting and transporting equipment will help prevent loss of gear and keep the equipment in the best possible condition.

A permanent display of worn equipment (ropes, carabiners, webbing, etc.) will help climbers and rappellers know what to look for as they inspect equipment for daily wear. Any equipment in the same or worse condition as that in the display must be retired and properly disposed of.

BEFORE EACH USE, CAREFULLY EXAMINE BELAY AND RAPPEL DEVICES. CHECK CLOSELY FOR GROOVES WORN INTO THE METAL BY THE PASSAGE OF THE ROPE, AND RETIRE ANY HARDWARE THAT APPEARS TO BE BENT OR SHOWS INDICATIONS OF EXCESSIVE WEAR.

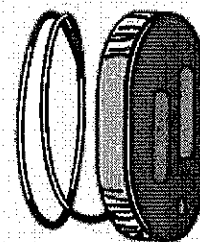


FIG. 11. STICHT PLATE

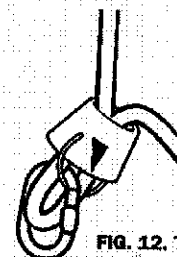


FIG. 12. TUBE DEVICE

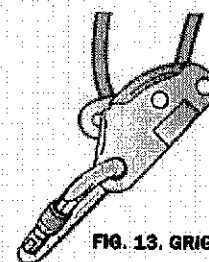


FIG. 13. GRIGRI

*The Grigri is a specialized belay device.*

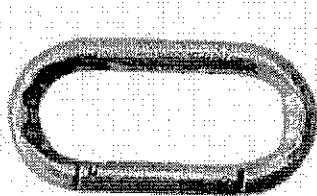


FIG. 15. WORN NONLOCKING CARABINER

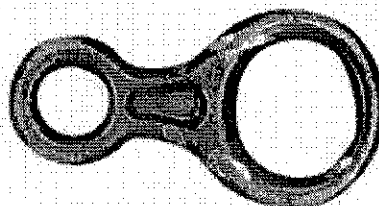


FIG. 16. WORN FIGURE EIGHT RAPPEL DEVICE

*Excessively worn items of climbing hardware should be retired.*

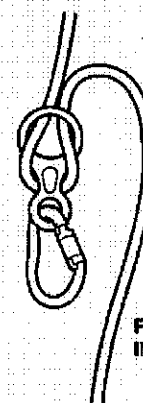


FIG. 14. FIGURE EIGHT IN RAPPEL MODE

# Chapter 4

## Rope and Rope Handling

Rope is the lifeline of climbing and rappelling. It is vital for stopping the falls that inevitably occur as participants learn and practice the arts of climbing and rappelling. The quality of a rope and the way in which it is handled can mean the difference between life and death.

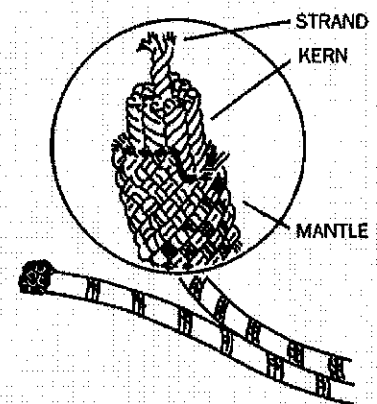
In the 1800s when people began recreational climbing in earnest, it was a commonly held hope that a climber simply would not fall. The thinking stemmed in part from the reality that the ropes of the time were likely to break when suddenly put under strain. Those ropes were constructed of natural fibers such as manila or sisal that were twisted or *laid* into lengths. They were prone to rot if allowed to remain wet for long periods. Natural fibers make ropes that are *static*, meaning they have little ability to stretch; they must absorb all at once, rather than gradually, the impact of a falling body.

By the 1950s, modern materials had made possible the development of rope described as *dynamic*, meaning it has a significant amount of stretch. Because of its elastic properties, a dynamic rope will stop a falling climber gradually rather than all at once. That reduces the shock load on the rope, on the anchors, and on the climber. Dynamic rope revolutionized the sport of climbing by making it possible for climbers to survive uninjured the sorts of falls that a century before could have been serious and even fatal.

Today, ropes that stretch little—static ropes—may be used for top-rope climbing or rappelling. Static ropes may also be used in situations requiring the use of ascenders or hauling, such as in caving and rescue work.

Dynamic and static ropes approved for BSA climbing and rappelling are *kernmantle* ropes. Each is composed of a woven sheath (the *mantle*) over a braided core (the *kern*). The core bears the brunt of the load placed on the rope, while the sheath protects the core from damage. A 50-meter (165-foot) kernmantle rope with a diameter of 11 millimeters ( $\frac{7}{16}$ -inch) weighs from 6 to 9 pounds. Its core is woven from 50,000 filaments and the sheath from 30,000, each filament running the full length of the rope.

FIG. 17. CONSTRUCTION OF A KERNMANTLE ROPE



*Kernmantle rope with its woven sheath (the mantle) over a braided core (the kern)*



## BSA ROPE STANDARDS

All cordage used for climbing (climbing ropes, accessory cord, and webbing) must be designed for climbing and used according to the manufacturer's recommendations. All dynamic climbing ropes must be UIAA- or CEN-approved.

All static ropes used for rappelling must have a tensile strength (breaking strength) of at least 22.2 kilonewtons (5,000 pounds) when new. A diameter of  $\frac{7}{16}$  inch or 11 millimeters is recommended for static rappelling ropes; every climbing rope must have a minimum diameter of 10.5 millimeters.

All ropes and nylon webbing must be new when procured. Use of three-strand rope for climbing or rappelling is prohibited. Three-strand (multiline) rope  $\frac{3}{4}$  inch or larger in diameter may be used for lobster claws and hand lines on low- or high-course elements. Webbing must be designed for climbing and must have a minimum breaking strength of 17.5 kilonewtons (4,000 pounds) when new.

A written log of the history of each rope used in the program must be kept, indicating: (1) the date the rope was purchased, (2) the date the rope was placed in service, and (3) any environmental or severe stresses that were placed on the rope. Each rope must be uniquely marked and permanently identified. All webbing must be marked with the date of purchase. All cordage (climbing ropes, accessory cord, and webbing) must be retired according to the manufacturer's recommendations, or when the condition warrants or five years from the date placed into service or 10 years from the date of purchase, whichever comes first.

## Purchasing New Rope

Rope for BSA climbing/rappelling activities must have a clearly documented history. Rope entering a climbing program must be new, have UIAA, NFPA, or CEN approval, and be procured from a reliable vendor. In most cases, that means buying rope of the standard length and diameter (50 meters or 165 feet in length with a diameter of 10.5 millimeters for dynamic rope,  $\frac{7}{16}$ -inch for static rope), or purchasing spools of rope of up to 1,000 feet in length and cutting the rope into appropriate lengths. Buying by the spool may afford some economy, but it also means a climbing area will have a great deal of rope aging at the same rate. Unless BSA climbing directors are certain the rope will be used in such large volume, it may be wiser to purchase rope in pre-cut lengths, and then only as the need arises.

Numbers printed on a band at each end of a new rope provide information about its intended uses.

① The number "1" in a circle indicates that the rope is rated for use as a single line—that is, as a belay rope for climbing or rappelling, or as a single line for rappelling.

② The fraction " $\frac{1}{2}$ " in a circle means a rope is rated for use with another " $\frac{1}{2}$ " rope. The emblem appears on ropes of 9 millimeters or less. A rope marked with  $\frac{1}{2}$  in a circle is not allowed for Scouting climbing.

When shopping for rope, you may have the option of buying either *standard rope* or *dry rope*. The mantle of dry rope is impregnated with a chemical treatment that makes the rope water resistant. Dry rope may cost more than standard rope, but for climbing areas where frequent rain or afternoon thunderstorms are a factor, not having to dry out soaked ropes can more than make up for the added expense.

### **Cutting Climbing Rope**

There are several ways to cut a climbing rope. Retail outlets usually have a hot wire that will sever a climbing rope and fuse the ends at the same time. You can duplicate that action with a soldering iron fitted with a tip designed for cutting linoleum, or you can heat a butter knife over a flame until it is hot enough to melt through the rope (wear leather gloves to protect your hands).

If you must cut a rope in the field, begin by placing a wrap of duct tape around it at the point of the intended separation. Use a sharp knife to cut through the tape and the rope. Before removing the tape, hold each end of the fresh cut over the flame of a butane lighter to melt the filaments and fuse them together.

Some climbing directors buy rope 10 feet longer than necessary. After each year of use, they cut off 2 feet of length from one end so that the center of the rope—the portion most prone to wear—migrates a little and is thus less likely to become damaged.

### **Marking Rope**

Tracking a rope requires that it be identified throughout the span of its useful life. One option is to purchase rope of a different color each year. All ropes with sheaths of the same color can thus be identified as having been bought at the same time.

To mark ropes further, dip the last 2 inches of each end of a rope into a jar of *rope dip*, available at hardware stores, and allow to dry thoroughly. Create a multicolored coding scheme by dipping the dried ends into rope dip of a second color, leaving a band of the original hue exposed. Rope retailers may also sell special shrink-wraps that can be slipped over the ends of a rope and then secured in place by applying heat. By noting the color of the rope's sheath and the unique set of colored bands or wraps at its ends, instructors and directors should be able to differentiate each rope from all others.

### **Maintaining Records**

An accurate written history of a rope is of vital importance to those deciding whether that rope is safe to use. Enter information about a rope in an equipment history logbook, including: 1) date of purchase; 2) date placed in service; and 3) any environmental, severe, or unusual stresses that were placed on the rope.



## **Rope Care and Maintenance**

### **General Rope Care**

- Use rope **only** for the purposes for which it was designed—climbing, rappelling, or belaying. Do not use climbing ropes for setting up tents or other camp shelters, towing vehicles, dragging logs, or any other activities outside the specific arena of climbing, rappelling, and belaying.
- To prevent them from fraying, fuse the raw ends of a rope by holding them above a flame. Take care not to apply heat to any other portion of the rope.
- Avoid stepping on a rope.
- Never drag a rope along the ground. Rock crystals can work into a rope and slowly damage the fibers.
- Never allow a rope to run over any sharp edge, especially if the rope is bearing a load. Sharp edges are extremely dangerous to ropes and are a major cause of rope failure. Place a burlap pad, a canvas shield, or other protective barrier under a rope whenever it must cross a sharp or dirty area.
- Never allow a moving rope to run across a standing rope or webbing, or through a loop made of webbing or rope. Friction created by rope movement may generate enough heat to melt the sheath and damage core fibers, or to weaken webbing.
- Never leave a rope stretched or under tension for an extended period of time.
- When it is not in use, keep rope coiled or stowed in a rope bag.
- Belayers can pile uncoiled rope on a tarp to protect it from dirt and grit.
- Keep rope dry, if possible, and air-dry wet rope (away from direct sunlight) before putting it into storage. A rope has a lower minimum breaking strength when it is wet than when it is dry, and may be more difficult to handle. Nylon itself will not mildew, but organic materials such as lichen and moss may become attached to a rope and produce mildew.
- Prolonged exposure to ultraviolet rays will cause a rope to deteriorate. While normal use in sunlight will cause negligible harm, ropes should not be stored in direct sunlight or allowed to hang on sunny climbing routes longer than necessary.
- Keep rope away from petroleum products (including sunscreen), pesticides (including insect repellent), and chemicals with the potential to destroy rope fibers. Ropes can be severely damaged by battery acid or rodent urine.
- Do not leave ropes hanging unsupervised; their use cannot be monitored, nor can their history be accurately recorded.
- Thoroughly examine a rope immediately after any of the following:
  - It has been hit by a falling rock, branch, or other object.
  - It has been subjected to a load while passing over a sharp edge such as a cliff or a nub of rock.

## Washing Rope

A dirty rope can be washed to remove grime and rock crystals that may otherwise shorten its useful life. Wash soiled rope in a mesh bag in tepid water with a mild soap such as Woolite or Ivory, either by hand or in a front-loading machine that has no agitator to entangle the rope. A commercial rope washer also may be used with a rope-washing soap. Rinse the rope well and air-dry it away from direct sunlight before storing it or using it again. Complete drying may take several days. **Do not dry rope in a dryer or expose it to excessive heat, bleach, or other chemicals.**

## HARD FALL

Hard falls are usually associated with lead climbing; a lead climber may fall 10 or 20 feet or more before the rope stops the descent. Rope manufacturers provide guidelines indicating that a rope should be retired after stopping a given number of hard falls.

Hard falls are impossible for climbers protected by top-rope belays, because an alert belayer will never allow more than a couple of feet of slack to form in the rope. For more on top-roping, see chapter 7, "Belaying and Belay Signals." For more climbing terminology, see the glossary.

## Rope Inspection and Retirement

Before each day's use, perform an inch-by-inch hand and eye inspection of every rope. Check a kernmantle rope for damage by slowly running a bare hand along the entire length of the rope, feeling for defects such as soft, hollow, or lumpy spots that are indicative of damage to the core. While running a hand along the rope, look for cuts, protruding puffs of core fibers, excessive stiffness, and discoloration or glazing of the sheath. Tie a figure eight knot in the end of the rope to indicate that it has been inspected.

If any damage is identified, retire the rope. Some fraying or fuzzing of the sheath may not necessitate rope retirement; however, ropes with excessive sheath abrasion (many of the outer sheath yarns are broken or the core is exposed) should be retired. If there are doubts of any sort about the safety of a rope, retire it. Regardless of its appearance, every rope should be retired according to BSA standards. A climbing rope should be retired by cutting it into 15-foot or shorter lengths. These rope sections can be used for knot-tying practice.

## Coiling a Rope

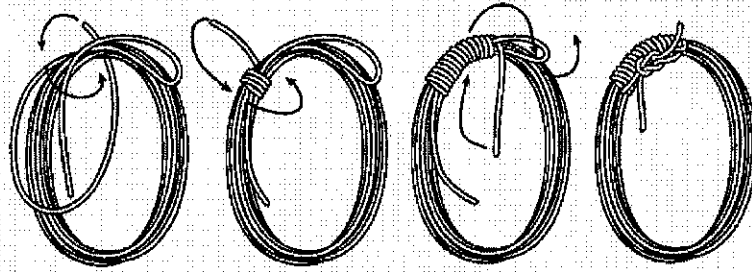
Coiling a rope keeps it in a neat package that is easy to carry and store. A good coil can also be loosened without tangling. This is especially important when a rope is being tossed down a cliff for a belay or rappel.

Two coiling techniques can be used—the *butterfly coil* and the *mountaineer's coil*. Each method has its advantages, so it is best to learn how to form both coils and be proficient in applying each to appropriate situations. The mountaineer's coil is a series of rope loops that forms a convenient package for carrying over a shoulder or securing to a pack. For a butterfly coil, the rope is laid back and forth in a U-shape that is unlikely to kink the line. Once formed, the butterfly coil can be tied quickly and neatly to a climber's back.

Begin every coil by removing any knots and hardware from the rope.

ROPES ARE FREQUENTLY RETIRED  
BECAUSE THEY HAVE SUFFERED  
ABRASIONS. SHIELD ROPES  
FROM ANYTHING THAT  
COULD CUT OR FRAY THEM  
DURING CLIMBING/RAPPELLING  
ACTIVITIES, DURING TRANSPORT  
TO AND FROM THE FIELD,  
AND WHILE IN STORAGE.

FIG. 18. MOUNTAINEER'S COIL



#### Mountaineer's Coil

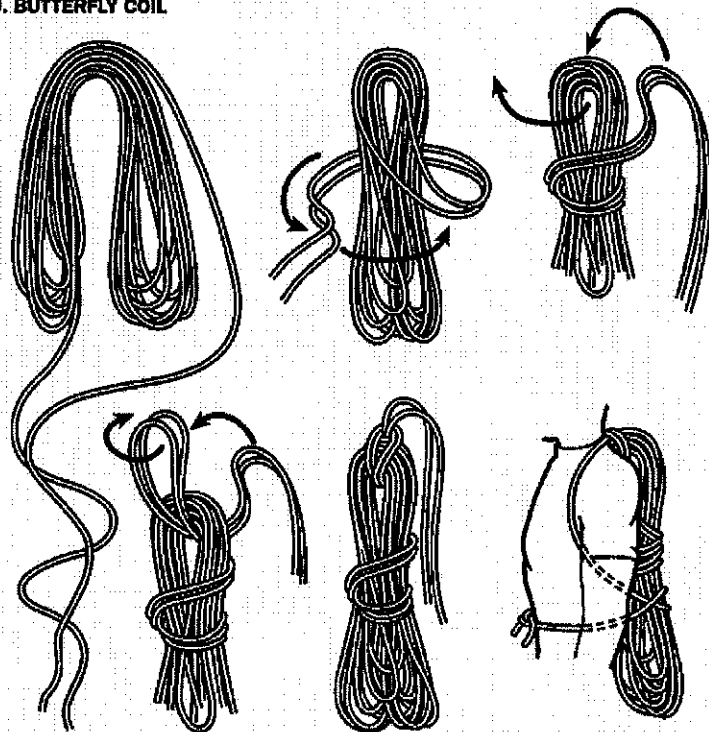
Sit, and begin wrapping the rope around your feet and knees. If the rope is long, you may want to coil half of it and lay that coil aside, then coil the second half and lay the second coil atop the first.

With about 10 feet of rope left, make a bend in the rope. Lay the bend on the coil, then wrap the remainder of the rope around the strands, working toward the bend. Pass the end of the rope through the bend and pull the bend snug.

#### Butterfly Coil

Starting about 10 feet in from one end, drape lengths of the rope over the back of your neck so that the loops hang below your waist. When you are about 10 feet from the other end, lift the loops from your neck, then grasp the two ends of the rope and wrap them several times around the coil. Thread a bend of the remaining lengths of rope through the coil, pass the ends through the bend, and pull the bend snug.

FIG. 19. BUTTERFLY COIL

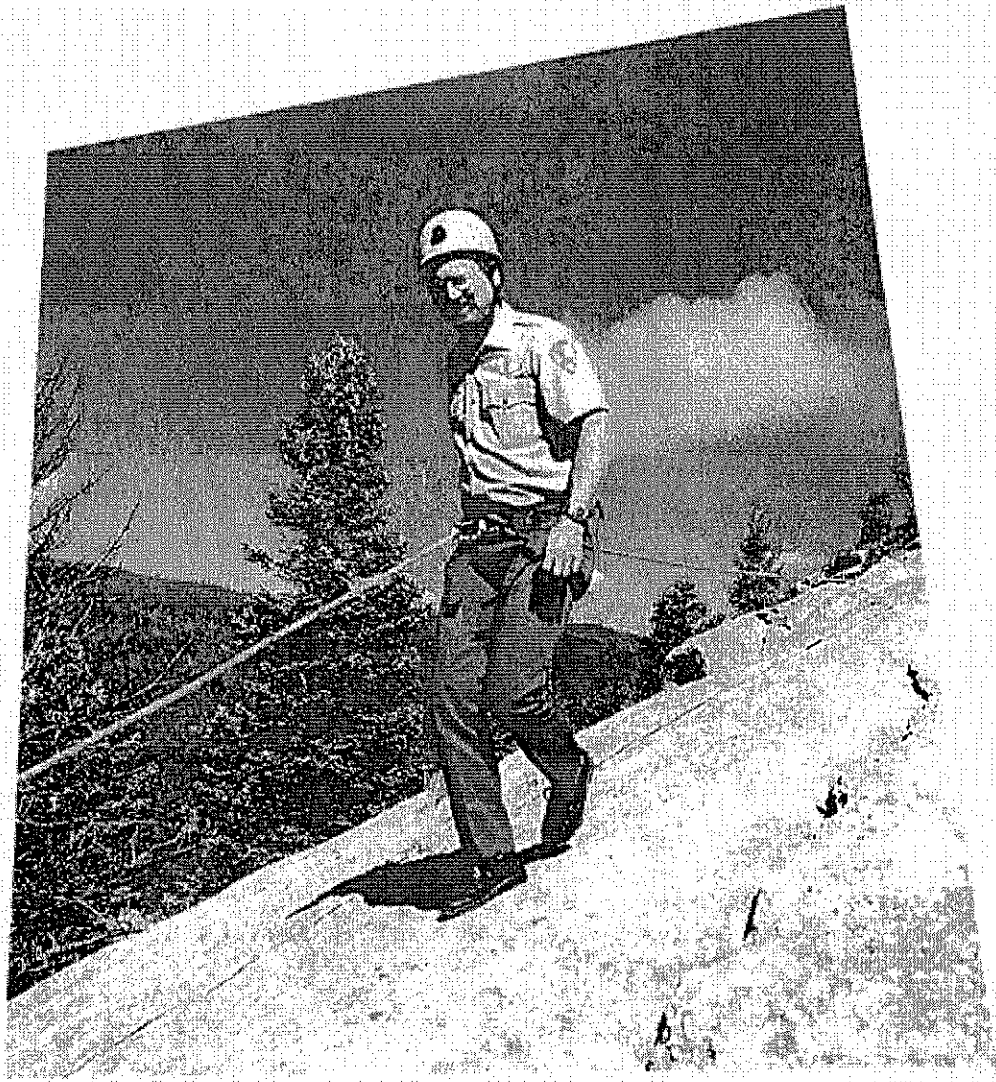


## Bagging a Rope

A practical way of organizing a rope is with a rope bag. Any stuff sack can be used as long as it is large enough to contain the rope. Commercially made rope bags may have a nylon loop sewn inside. A climber can begin storing a rope by tying one end of it to the loop. (Don't use a carabiner to attach the rope to the loop; the carabiner could be damaged if the bag is thrown over a cliff.) Simply stuff the rope into the bag for carrying or for storage.

To deploy a bagged rope, secure the free end to an anchor, make sure the area beneath you is free of climbers or bystanders, then toss the rope-filled bag down the climbing face. As the bag drops, the rope will extend itself.





*When there is danger of falling, clip into a safety line with a carabiner. Always wear a helmet while in the climbing area.*

### **Stacking a Rope**

Stacking a rope simply means tossing one coil at a time on top of each other so that the rope will play out freely as it is being used for belaying or rappelling. A little care taken to stack a rope can help prevent a lot of problems with knotting or snarling of the rope.

Each time you are stacking a rope, pay attention to the line as it passes through your hands. Check it for hard spots, puffs, fraying, and any other indications that it should be retired from use.



### **Tossing a Rope Down a Cliff**

It may seem a simple thing to throw a rope down a cliff. However, climbers can waste a remarkable amount of time untangling improperly thrown ropes. Consider the following steps that will contribute to orderly rope handling and subsequent mental health.

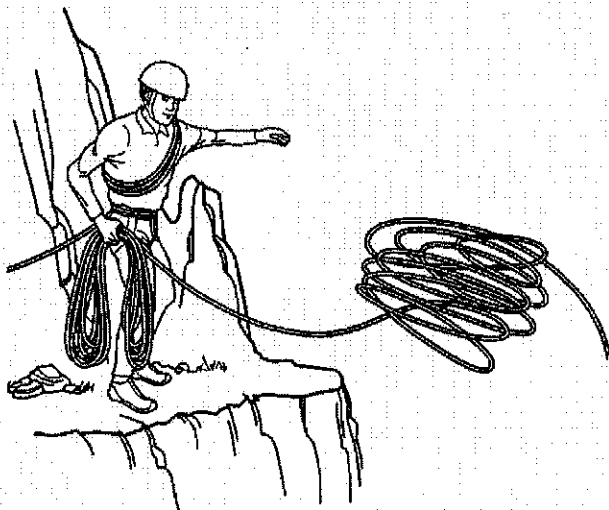
- If the rope has been coiled, loosen any loops used to tie the coils together. Divide the coil in half.
- Secure one end of the rope to an anchor. Be careful not to step into a loop of the rope.
- Shout, "Rope!" and then wait a moment. This standard signal used throughout the climbing community warns anyone below to be alert for falling rope. If there is some reason the rope should not be thrown, that information must immediately be shouted up to the person managing the rope by signalling "no."
- If the response "clear" is heard, then it is safe to throw the rope down.
- After waiting a few seconds for a reply to the shout and hearing none, toss the half nearest the anchor down the cliff and, once the rope has straightened itself, toss the other half.
- If the rope has been stowed in a rope bag, toss the bag over the edge of the cliff. The rope should pay out neatly as the bag descends.

### **Storing Ropes**

Update the written record documenting the history of the rope's condition and use.

Remove any knots and locking wraps. Loosely hang wet rope and allow it to air-dry. Do not hang a rope over nails. To store a rope overnight or for a few days, loosely coil it or bag it and then put it in a safe place that is dry, clean, cool, and not exposed to sunlight. For longer storage, be sure that the rope is dry and stowed away from sunlight, sources of heat, petroleum products, chemicals, or dirty areas. Do not store a rope in the trunk of a car.

**FIG. 20. THROWING DOWN A ROPE**



*While working near the edge, the climber is tied in to an anchor for safety.*

# Chapter 5

## Knots and Knot Tying

Knowing a variety of knots and their proper uses is of paramount importance for anyone interested in climbing and rappelling. Climbing instructors and directors must be able to tie knots with ease, and should know which ones to use when setting up safe systems for climbing, rappelling, and belaying. In an emergency, the ability to tie the correct knots quickly and with certainty can spell the difference between an effective rescue and one that is fraught with difficulty.

Becoming expert with knots is a matter of repetition. The more you tie them, the more deeply they will become ingrained in your fingers. Instruction is helpful, either from printed resources or from a good teacher, but mastery comes only with practice.

In addition to tying a knot correctly, climbers should also make it a habit to *dress* each knot—adjusting it so that the knot is neatly arranged and snug. That will align the strands of the knot in such a way that it will have the greatest possible strength. A good ritual to follow when tying knots is

- Tie it.
- Dress it.
- Load it.
- Check it.
- Double-check it.

"A NOT NEAT KNOT  
NEED NOT BE KNOTTED."

### KNOW YOUR KNOT'S STRENGTH

A rope is strongest when it is straight—free of knots, hardware, and bights. Adding any of these elements reduces a rope's strength, although some knots are stronger than others.

Type of Knot	Percent of Relative Strength
Straight rope	100
Figure eight	70 to 75
Double bowline	70 to 75
Double fisherman's	65 to 70
Water	60 to 70
Overhand	60 to 65
Clove hitch	60 to 65
Square	45

## Parts of a Rope

The following terms are useful for describing how to tie knots.

- **Running end**, also known as the *working end* or simply the *end*. This is the free end of a rope, most often used for tying a knot, for securing a rope to a climber or anchor, for reeving (passing) a rope through a rescue pulley, or for some other active use.
- **Standing part**. The portion of the rope that is not the running end is the *standing part*.
- **Bight or bend**. A *bight* in a rope (also known as a *bend*) is a simple turn that *does not* cross itself.
- **Loop**. A loop in a rope is a simple turn that *does* cross itself.
- **Tail**. The end of the rope left over after a knot has been made is the *tail*. Climbers often use the tail for tying a *safety knot*.

### SAFETY KNOTS

A safety knot (also known as a backup or *stopper knot*) added to the primary knot such as a figure eight follow-through will help prevent the free end of the rope from working itself loose. The most effective safety knot goes by several names—*barrel knot*, *one-sided grapevine knot*, and *half a double fisherman's knot*. Form it by loosely looping the tail of the rope twice around the standing part, then passing the end through the two loops thus formed. (This is the same method as is used to tie the first portion of the double fisherman's knot, described later in this chapter.)

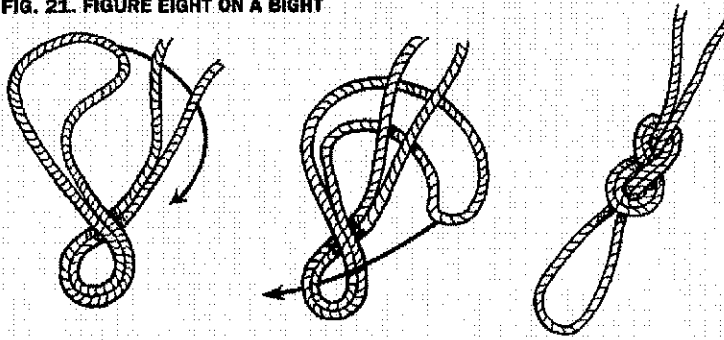
Work any slack out of the safety knot so that it lies snug against the knot it is protecting. Safety knots can also be used to protect knots tied in webbing. The overhand or half hitch is used as a safety knot in webbing.

## Knots for Anchoring, Climbing, Rappelling, and Belaying

The knots listed here have applications during BSA climbing/rappelling activities. Every BSA climbing director and instructor should master them.

- Safety knot
- Figure eight on a bight
- Figure eight follow-through
- Double-loop figure eight (super eight or Canadian eight)
- Water knot (ring bend) (used for webbing)
- Double fisherman's knot (grapevine knot)
- Basket hitch
- Bowline
- Bowline on a bight
- Girth hitch
- Clove hitch
- Prusik knot
- Mûnter hitch (Italian hitch)
- Mule knot
- Mariners hitch

FIG. 21. FIGURE EIGHT ON A BIGHT



### Figure Eight on a Bight

Making a bight in a rope and then tying a figure eight knot with it results in a loop that will not slip or come loose. Clip a carabiner into the loop, and the rope can be attached to an anchor sling. When this knot is tied in the end of a rope, back it up with a safety knot.

### Figure Eight Follow-Through

The figure eight follow-through is similar to the figure eight on a bight, differing only in the way in which it is tied. The figure eight on a bight must be tied in a rope *before* it is attached to a carabiner, while the figure eight follow-through is tied directly to a harness. The end of the rope can be passed through an anchor sling or a harness before the knot is tied.

Begin by tying a simple figure eight knot in a rope (steps 1-4 in the illustration). Run the end of the rope through the climbing harness or the hardware to which you want to attach the rope (step 5), then trace the end of the rope back through the figure eight knot to form a figure eight follow-through (the "follow-through," steps 6-8). Leave enough tail for a safety knot (step 9).

FIG. 22. FIGURE EIGHT FOLLOW-THROUGH

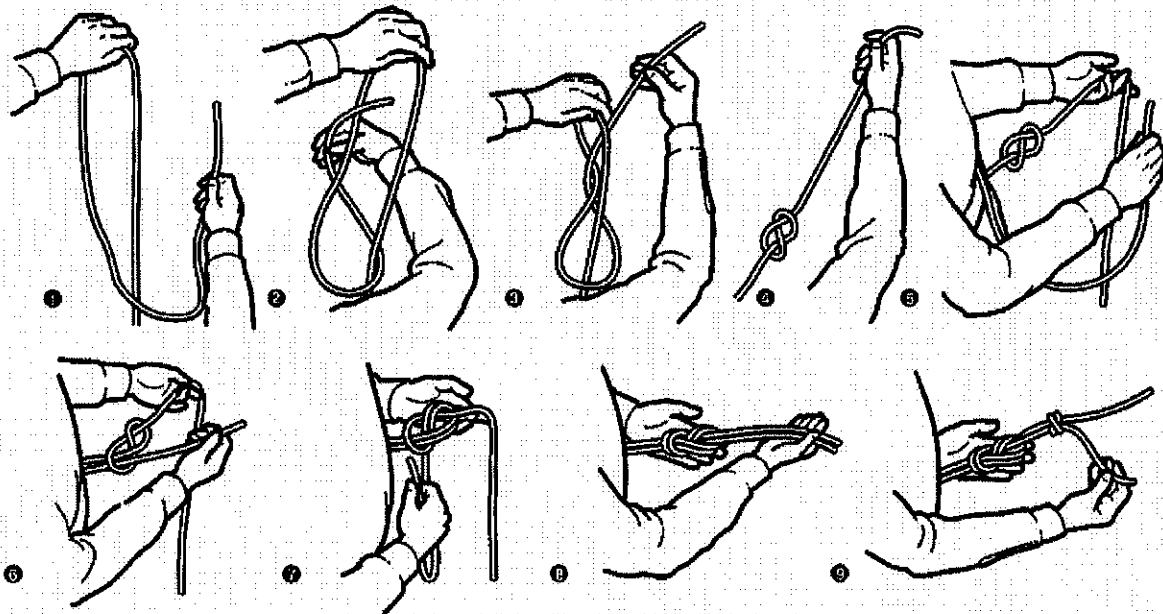
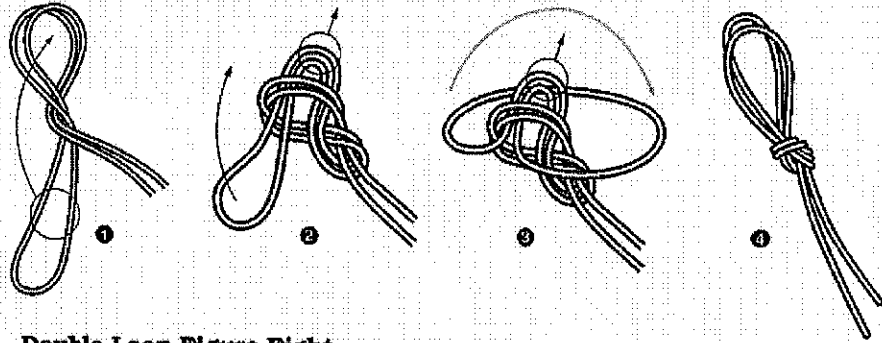


FIG. 23. DOUBLE-LOOP FIGURE EIGHT



#### Double-Loop Figure Eight

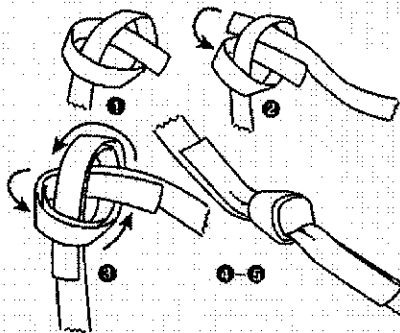
The double-loop figure eight is also known as the super eight and the Canadian eight. It is useful in climbing situations because the second loop acts as a backup to the first loop and it is easy to untie after being loaded. Clip into both loops for security, but do not use the loop to take the place of a figure eight follow-through, which is the preferred method of securing a belay rope to a person's harness. Use this loop to secure a rope to an anchor.

With the rope doubled, begin the knot as if tying a figure eight on a bight, leaving a generous length (18 to 24 inches) of rope for the end loop. Insert the center of the end loop through the loop formed for the figure eight.

Hold onto the two loops while you flip the remaining end loop over the entire knot.

Dress the bight and tighten it. The completed figure eight on a bight will have two loops instead of one, hence the "double-loop" in its name.

FIG. 24. WATER KNOT IN 1-INCH WEBBING



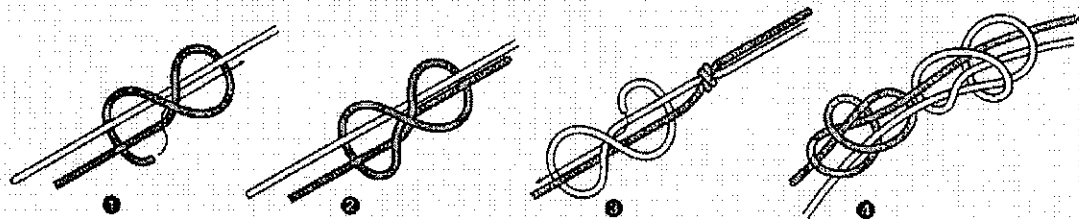
#### Water Knot (Ring Bend)

Use a water knot to tie together the ends of a piece of 1" seamless tubular webbing to make a loop sling for use as a runner in an anchor system, or when tying a harness. Once it has been tightened, the water knot seldom slips and can be difficult to untie.

(Also known as an *overhand bend* or a *sling knot*, the water knot should be used only with webbing. To form loops in rope, use the *double fisherman's knot*.)

Begin tying a water knot by forming an overhand knot in one end of the webbing, leaving a tail at least 6 inches long. With the other end of the webbing, trace the first end all the way back through the overhand knot (steps 2 and 3), again leaving at least a 6-inch tail. Dress the knot (step 4) so that the webbing lies flat, then cinch it tight (step 5). Back it up with safety knots.

FIG. 25. DOUBLE FISHERMAN'S KNOT



#### Double Fisherman's Knot (Grapevine Knot)

This knot is used for joining together two ropes of similar or dissimilar materials. It is also used to tie together the two ends of a shorter piece of rope or accessory cord to form a runner, or loop. Half of a double fisherman's knot (also known as a barrel knot) can be used as a safety knot to back up a primary knot such as a figure eight on a bight.



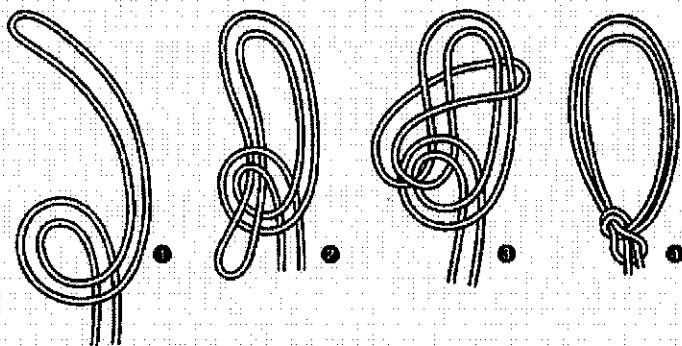
Lay about 2 feet of the ends of two ropes alongside each other, ends opposite. Loosely loop one rope end twice around the other, then thread the end of that rope through the loops. Repeat the procedure with the second rope end. Carefully tighten the two parts of the knot and slide them together so that the flat sides lie parallel against each other. If they don't fit together neatly, the knot is incorrectly tied. Always secure the tails with safety knots.

### Bowline

The bowline allows a climber to make a reliable loop around a tree or other anchor. The loop will not slip or cinch down and is easy to untie. Always tie off the tail.

Begin by making a small overhand loop in the standing part of a rope. Bring the rope end up through the loop, around behind the standing part, and back down into the loop. Tighten the bowline by pulling the standing part away from the loop.

FIG. 27. BOWLINE ON A BIGHT



### Bowline on a Bight

The bowline on a bight is a variation of a bowline. It is a high-strength knot. The completed bowline on a bight will have two loops.

Begin with a small overhand loop over the standing part of a doubled rope. Pass the free end up through the small loop, leaving a generous length of rope for the second loop. Open the bight where the rope is doubled and pull the main doubled loop through. Slide down the bight, then tighten the knot.

### Girth Hitch

A girth hitch has use where the webbing may move from its desired location. A more appropriate knot might be a basket hitch: Loop a tied piece of webbing around the anchor point and secure both end loops with a locking carabiner.

FIG. 28. BOWLINE

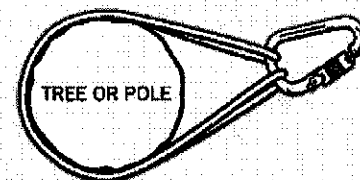
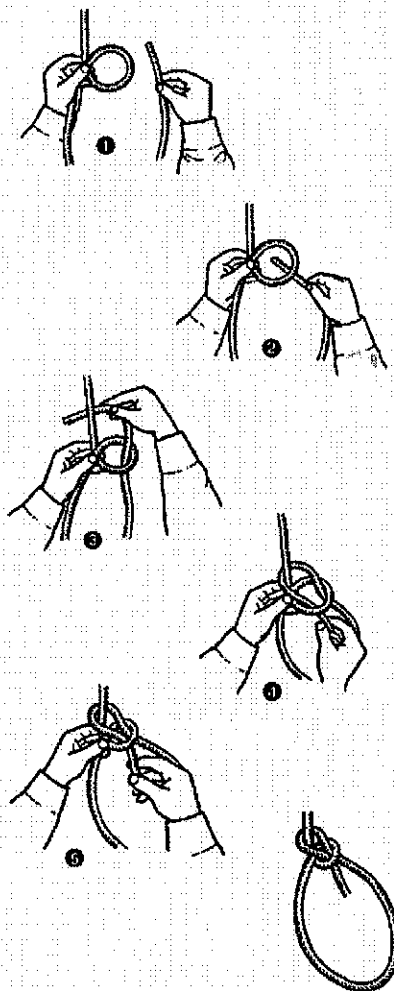
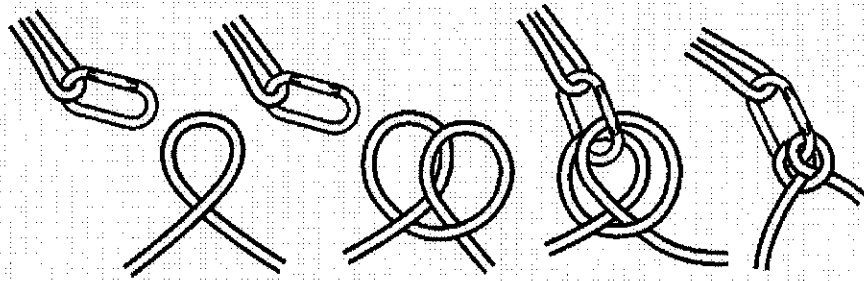


FIG. 28. BASKET HITCH

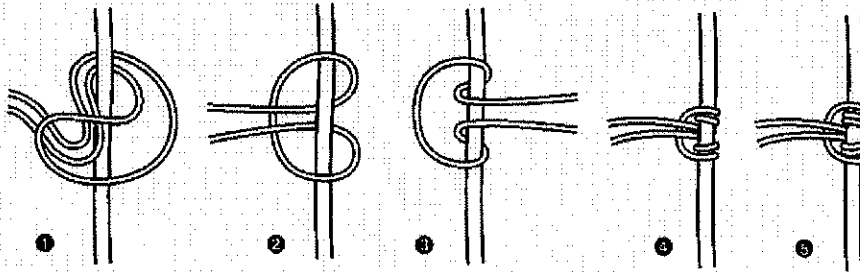
FIG. 29. CLOVE HITCH



#### Clove Hitch

A clove hitch can be used in anchoring and belay systems to secure a rope to a carabiner. Its advantages are that it is easy to install and to adjust. However, the system should also include at least one additional knot that will not adjust, such as a figure eight follow-through, to provide the fail-safe security not available with a clove hitch alone.

FIG. 30. PRUSIK KNOT



Follow steps 1-4 for tying a Prusik knot. Additional wraps can be added to increase friction (step 5).

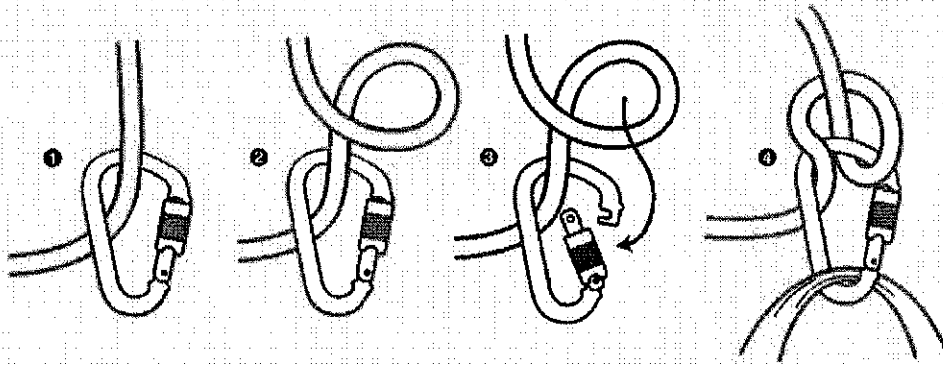
#### Prusik Knot

The Prusik knot secures a loop of smaller rope or accessory cord to a climbing rope in such a way that it can be slid along the rope, but when it is loaded will bend the rope and hold securely. The knot is commonly tied with accessory cord by a climber to ascend a rope or to secure a belay system in order to release the belayer. A Prusik cord should be 3 millimeters smaller or 70 percent smaller than the rope to which it is secured.

To tie a Prusik knot, use the loop of smaller rope to form a girth hitch around the larger rope, then bring the free bend of the loop around the larger rope a second time and pass it back through the other bend. Dress the knot so that it lies neatly on the larger rope, and remove any slack.

To use the Prusik knot to ascend a climbing rope anchored at the top of a route, clip a carabiner to the free bend of the Prusik and attach it to a runner that will serve as a stirrup. Clip the climber's harness to a second Prusik. A climber can stand in the stirrup and push the harness Prusik up the rope, then put weight on the harness and slide the stirrup Prusik higher. Repeating the process will carry the climber up the rope. (For information on using a Prusik to release a belayer in an emergency situation, see chapter 7, "Belaying and Belay Signals.")

FIG. 31. MÜNTER HITCH

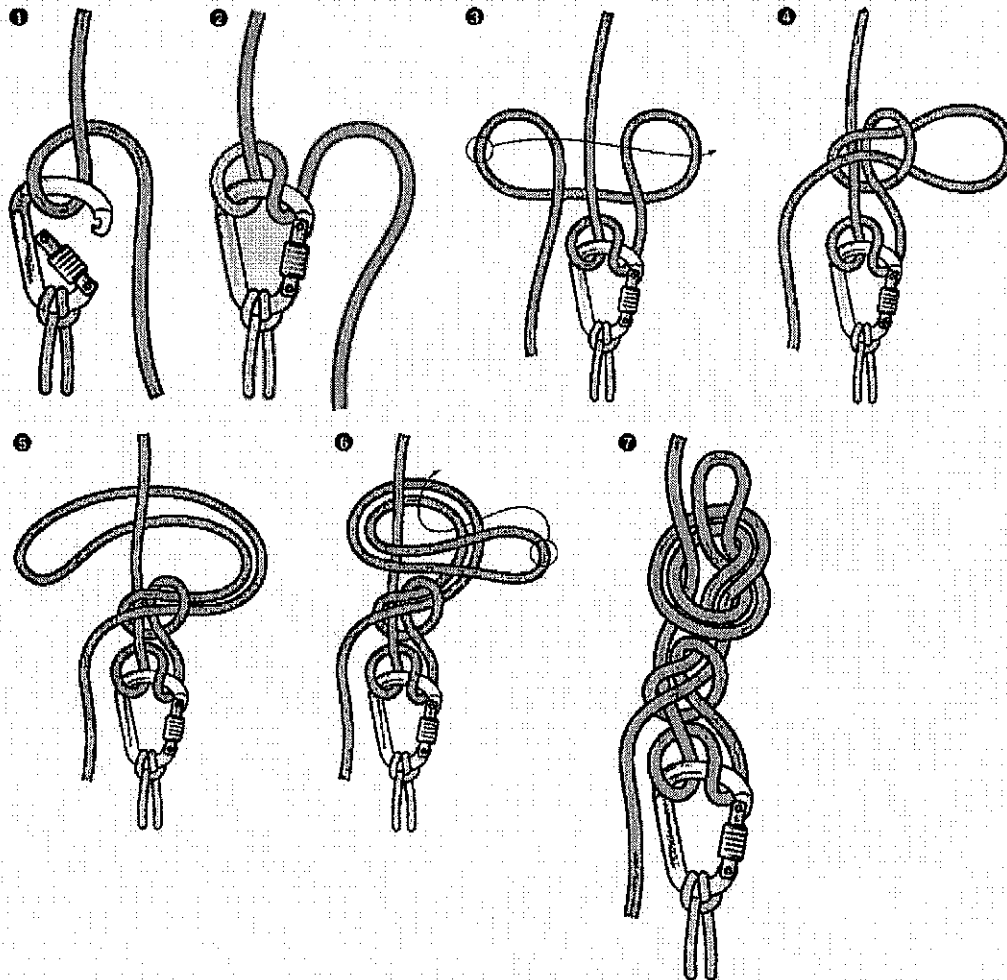


### Münter Hitch (Italian Hitch)

The Münter hitch is the knot to rely upon for emergency belaying when a belay device is not available. Used with a locking carabiner (a large, steel pear-shaped carabiner works best), the hitch allows the rope to be fed through the carabiner or pulled back. The Münter hitch can also be used by a rappeller to control the rate of descent. However, it tends to twist the rope. For these reasons, a rappel device, if available, is the better choice.

To form the Münter hitch, clip the carabiner to your harness and to the rope. Form a loop in the rope and clip that loop into the carabiner. Lock the carabiner.

FIG. 32. MÜNTER/MULE KNOT (STEPS 1-2, MÜNTER; STEPS 3-7, MULE KNOT)



### Münter/Mule Knot

The mule knot is a useful knot if you want to lock off a belay device or a Münter hitch.

- For locking off a belay device:

While maintaining a lock-off with your brake hand, use your guide hand to pass a bight of rope through the belay carabiner. Once through, you can hold onto this portion of the rope to maintain the lock-off while you tie the rest of the knot.

Create a small loop close to the belay device and then a second small loop or bight on the other side of the device.

Pass the second loop or bight through the first loop, making sure to enclose the load side of the rope. Pull the knot tight and slide it against the belay device.

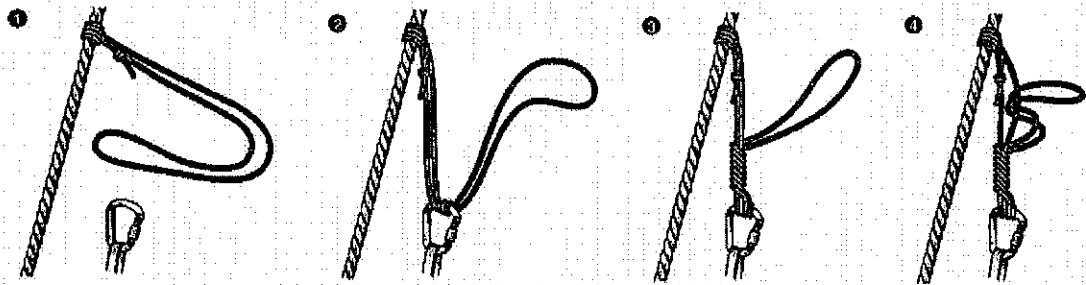
Pull enough slack through to have a bight roughly 18 inches in length. Using this bight, tie an overhand around the load side of the rope. This will ensure that the mule knot will not come untied. For extra safety, you can clip the end of the bight to the load strand using a carabiner.

- For locking off a Münter hitch (See Figure 32.):

Use the same method as above, except **do not** pass a bight through the carabiner. Tie the mule directly in front of the Münter hitch on the load strand as shown. Make sure to include the overhand backup knot.

For either system, it is important to remember to never lose control of the brake side of the rope until the mule knot is completely tied.

FIG. 33. MARINERS HITCH



### Mariners Hitch

This hitch uses a sling or accessory cord and a carabiner to create a load-releasable system, a technique that may be useful in special situations such as needing to escape a loaded belay.

Pass the looped sling or cord through the carabiner twice to make a full wrap around the end of the carabiner. Wrap the working end around the loaded strand four or five times (more wraps is more friction), and then tuck the end between the two loaded strands.

For extra safety, you can clip a carabiner to the end of this bight.

# Chapter 6

## Anchor Points and Anchoring Systems

A BSA climbing program must have fail-safe anchors securing every belayer and the ropes used for climbing and rappelling. Climbing directors and instructors should spare no effort to ensure that all anchor points are reliable and that the anchoring systems attached to them are put together with gear and techniques that meet the highest standards of safety. Lives will depend on it.

An *anchor point* is a boulder, a living tree, an installed bolt, or other fixed point located at the top of a climbing or rappel route or near a belay position. The *anchoring system* consists of the webbing or rope and the hardware secured to the anchor points in such a way that they can be attached to the harnesses and/or ropes protecting belayers, climbers, or rappellers.

At new climbing areas and when establishing new routes, experienced climbing directors should select the anchor points to be used for each climb, rappel, and belay, and oversee the design and use of the anchors attached to them.

### CHECK EVERY TIME

Never assume that an anchor point is safe simply because it has been used in the past. Even if you set it yourself, check every anchor point and every anchor each time you intend to use it. Slings and rope left on an anchor point by previous climbing/rappelling parties may have been damaged by heavy use or exposure to the elements. Remove any rope, webbing, or hardware you find attached to an anchor point and replace it with gear that you know to be in top condition.

Anyone who will be involved in teaching or supervising climbing and rappelling must be versed in the theory, placement, and use of anchors. Establishing anchors is left to experienced climbing directors, but instructors will often reinstall previously approved anchoring systems at the beginning of a day's activities. Instructors will certainly be expected to check the security of anchors before participants use them and also while participants are using them, and must call a halt to all events if they

"WHEN IN DOUBT,  
OVERCOMPENSATE."

—ADAGE FOR ANCHORING  
AND FOR LIFE



suspect something has gone awry with any part of an anchoring system. At the end of a day's activities, instructors remove webbing, ropes, and hardware from anchor points and store everything in such a way that those who will next put up the anchors will find the materials in order and ready to go.

How to set anchors can be learned through courses taught by nationally recognized outdoor organizations. Experience is a great teacher, too, but this is one subject that allows no room for error. Seeing to it that anchors are absolutely reliable is the first priority of every director and instructor.

### **Safety Lines**

Protect yourself whenever you are working with anchors at the top of a climbing or rappelling route. If working within a body-length of the edge of a cliff (6 feet or less), tie in to an anchor or a safety line before you begin setting anchors. Securing yourself may involve setting an anchor in a location where you can do so without danger (6 to 10 feet back from the edge of the cliff), then attaching a safety line to that anchor and to your climbing harness.

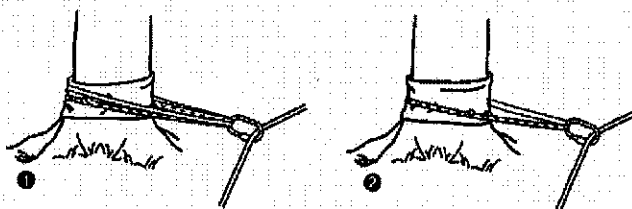
A safety line may be required each day when instructors are setting anchors, and for participants moving from the top of a climb to the top of a rappel. Determine the traffic patterns participants will follow and protect any exposed sites with safety lines. Consider also how participants will clip into the safety line, release themselves from the climbing belay, and then clip into the rappel system. They must be tied in to a belay rope or a safety line that will protect them if they fall.

### **BSA Climbing/Rappelling Anchors**

The basic principles guiding placement and use are the same for each of the following kinds of anchors common to BSA climbing/rappelling activities:

- Top-rope anchors for belaying climbers
- Rappel anchors
- Belay anchors to tie in belayers protecting rappellers

**FIG. 34. METHODS OF ATTACHING A RUNNER TO A TREE TRUNK**



- ① Basket hitch, looped around the trunk and clipped together with a carabiner.
- ② Retied around the trunk.

## Anchor Points

Anchor points may be divided into two categories—natural and artificial.

### Natural Anchor Points

Trees, rock outcroppings, boulders, and other immovable objects in the right locations at a climbing site are natural anchors that can be used simply by placing around them a sling of webbing or, in some cases, a climbing rope. Natural anchor points have three distinct advantages over other forms of anchors.

- Anchors using natural anchor points are often easy to rig before a climbing session and to dismantle when a group is done.
- A natural anchor is often highly reliable regardless of the direction in which it is loaded.
- Natural anchors are the least environmentally disruptive means of protection, increasing a group's ability to climb and rappel without leaving a trace.

### Trees as Anchor Points

Anchoring to a solid, sizable tree is usually straightforward. The tree must be healthy, securely rooted, and at least 6 inches in diameter at the point of attachment.

To set an anchor with webbing, use a commercially sewn runner or tie a sling, and encircle the tree using a basket hitch. Keep the webbing close to the ground where the tree is strongest. Placing anchor webbing higher on a tree trunk will create undesirable stress on the anchor point.

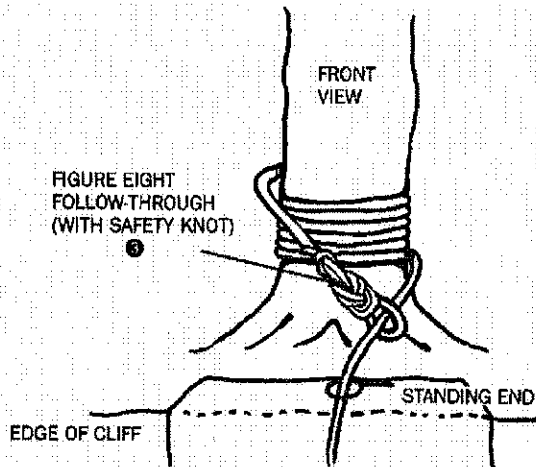
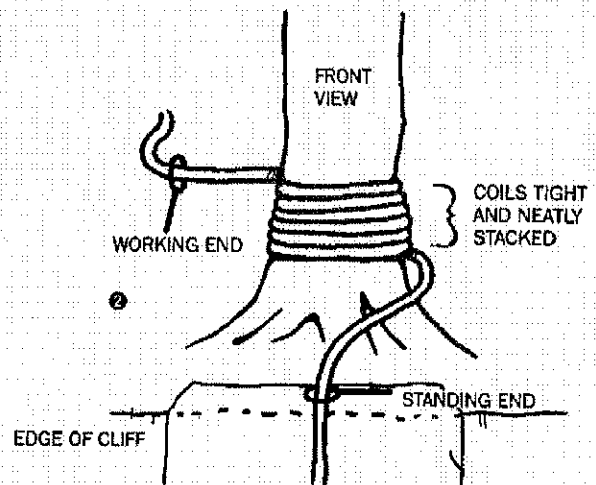
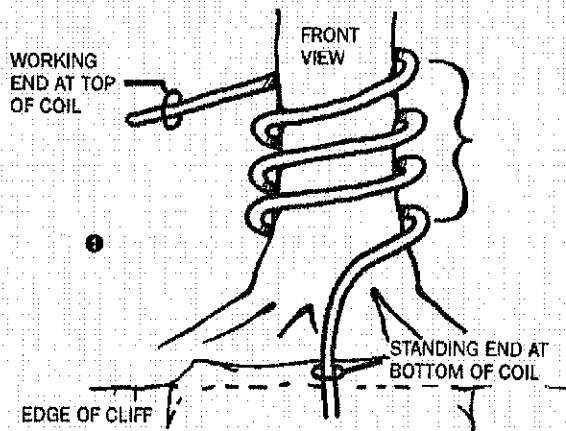
Webbing should not abrade or otherwise harm a tree. If you suspect your anchor might cause damage, shield the bark by placing padding between the bark and the anchoring material. (Burlap, carpet scraps, or strips of old fire hose work well.) **Never tie off a tree with a string of linked carabiners—they are not designed for this use.**

To anchor a climbing rope directly to a tree, use *tensionless rigging*, also known as a *coil wrap*. Tensionless rigging comes by its name because the system requires no knots on which stress can be placed. With the coil wrap in place, the tree absorbs the maximum amount of a load while the rope receives the minimum.

Before anchoring a climbing rope directly to a tree, carefully inspect the tree. Some trees ooze pitch that can be difficult to remove from the sheath of a rope. If you are not convinced that you can attach a rope to a tree without causing harm either to the tree or to the rope, design an anchor using a webbing runner instead.

ANCHORS SHOULD  
BE PLACED ONLY BY  
QUALIFIED PERSONNEL.

FIG. 35. COIL WRAP/TENSIONLESS RIGGING



### Rock Anchor Points

A boulder can serve as an anchor point if it has sufficient mass and is situated so that no amount of load placed upon it by climbers or rappellers will jar it loose. A rock outcropping has potential, too, if it is a continuous part of a cliff. Another common anchor point is a *chockstone*—a rock jammed into a crack in such a way that it cannot be dislodged. Study any boulder, outcropping, chockstone, or other likely rock formation before relying on it as an anchor point. Is the quality of the rock good? If not, it may crumble or break under the stress of a load.

FIG. 36. SECURING A RUNNER TO A ROCK HORN WITH A CLOVE HITCH

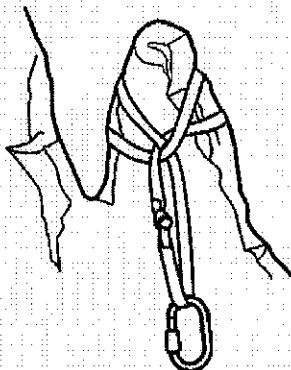


FIG. 37. ANCHORING TO A ROCK OUTCROPPING WITH A WEBBING RUNNER

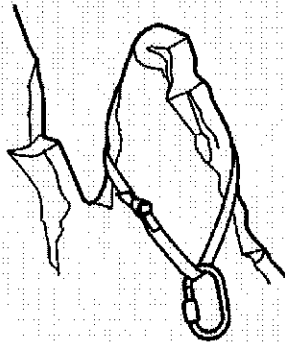
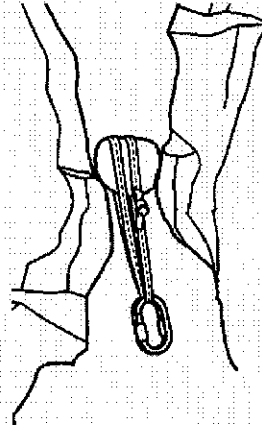


FIG. 38. ATTACHING A RUNNER TO A CHOCKSTONE



*These would be locations for using a multi-point anchor system.*

### Artificial Anchor Points

Artificial anchor points include bolts installed in solid rock, and passive or active protection. *Passive protection* consists of carefully shaped pieces of metal that can be jammed into cracks in the rock. These metal pieces have no moving parts. *Active protection* incorporates hardware featuring camming devices and other moving parts.

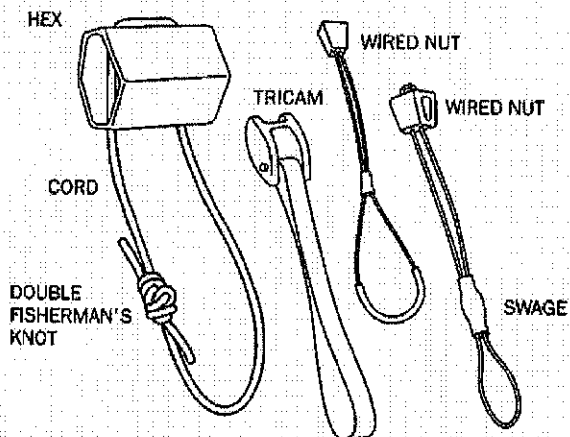
#### WEBBING VS. ROPE TO SET AN ANCHOR

It's usually better to use webbing rather than rope to set an anchor around a rock because the rough surface of rock may abrade rope or create small cuts in the sheath. Situate the webbing so that it will not slip off or come into contact with sharp edges; take advantage of notches or other irregularities to help secure the anchor in place. Padding the rock with burlap, sections of old fire hose, or carpet scraps can help shield webbing from damage.

### Passive Protection

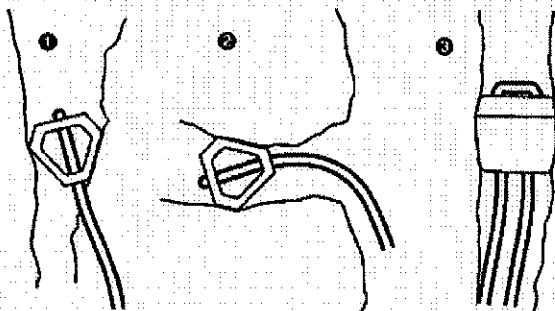
The sport of climbing has, in the last quarter of a century, developed an assortment of hardware that can be used for setting reliable anchors in cracks. Chief among these are chocks (nuts). In many cases, all trace of chocks can be removed at the end of a climbing session.

**FIG. 39. CHOCKS**



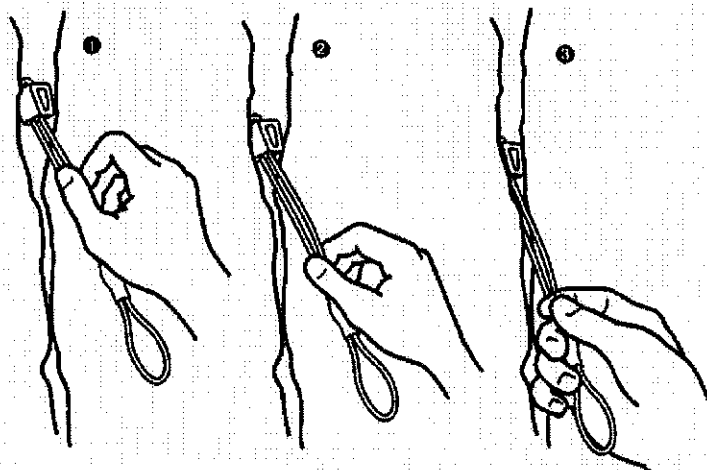
*Chocks are available in a wide variety of shapes and sizes.*

**FIG. 40. PLACEMENTS OF THE HEXENTRIC CHOCK**

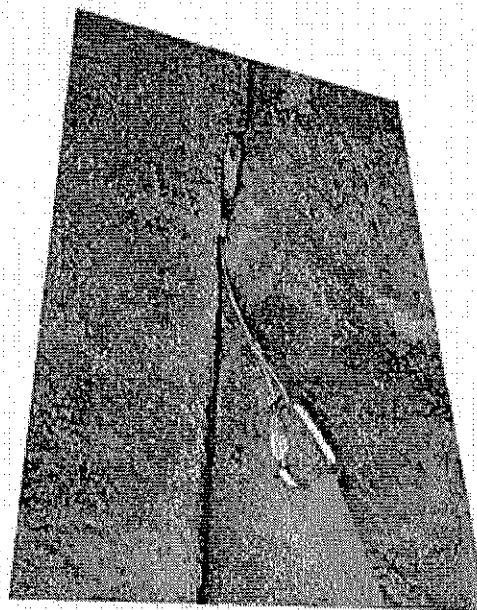
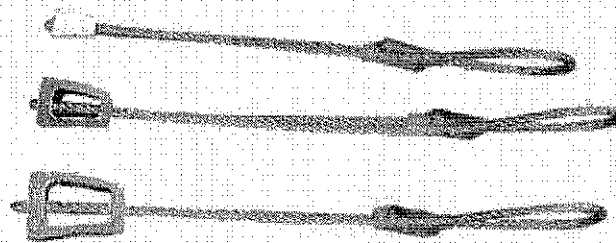


❶ In a vertical crack, as a passive cam—good contact with the rock gives greater holding power. ❷ In a horizontal crack, as a passive cam—the sling exits near the roof of the crack for proper camming action. ❸ Sideways in a crack, as a passive cam.

**FIG. 41. PLACING A WIRED NUT**



❶ Placing a wedge into a crack above the constriction. ❷ Sliding it into place. ❸ Tugging on the chock sling to set it.

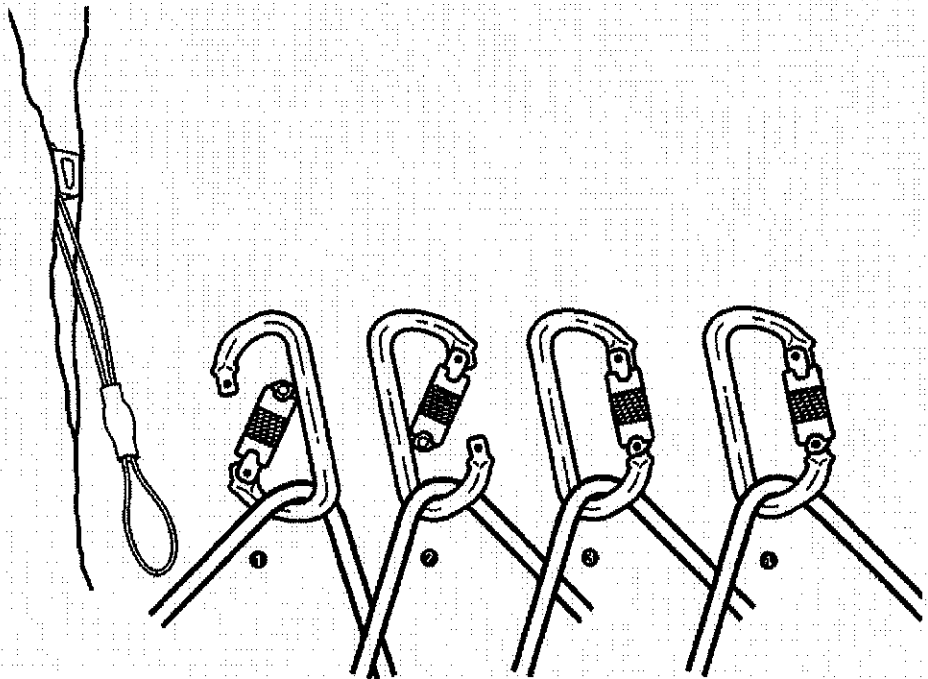




Chocks come in a wide range of sizes, as small as  $\frac{1}{4}$  inch across and as large as several inches. Their shapes vary, too, from tapered rectangles to hexagons of irregular dimensions. Whatever their size and shape, each is outfitted with a loop of wire or drilled holes to accommodate an accessory cord.

A chock must be matched in size to the crack in which it will be placed. A carabiner or webbing runner can be secured through the loop attached to a chock, and that, in turn, connected to the rest of the anchoring system. When a load is placed on the chock in an expected direction, it will jam more tightly into the crack. Removing a chock is a matter of pulling it in the opposite direction. A nut tool is handy for popping loose chocks that have become stuck in cracks.

FIG. 42. CORRECT DOWN-AND-OUT POSITIONING OF A CARABINER



- ① Clip a locking carabiner in a downward direction.
- ② Rotate it out and away from the rock.
- ③ The gate opening is now down and facing out from the rock.
- ④ Make sure the rope runs freely through the carabiner in the direction of travel without twisting the carabiner around.

### Active Protection

A spring-loaded camming device (SLCD) placed in a crack of a width for which it was designed can provide a very solid anchor point. The cams of the device should not be fully retracted when they are released inside the crack. That allows the device to achieve maximum grip while still being easy to extract. Orient the stem of an SLCD in line with the pull of any potential falls.

FIG. 43. EXAMPLES OF SPRING-LOADED CAMMING DEVICES (SLCDs)

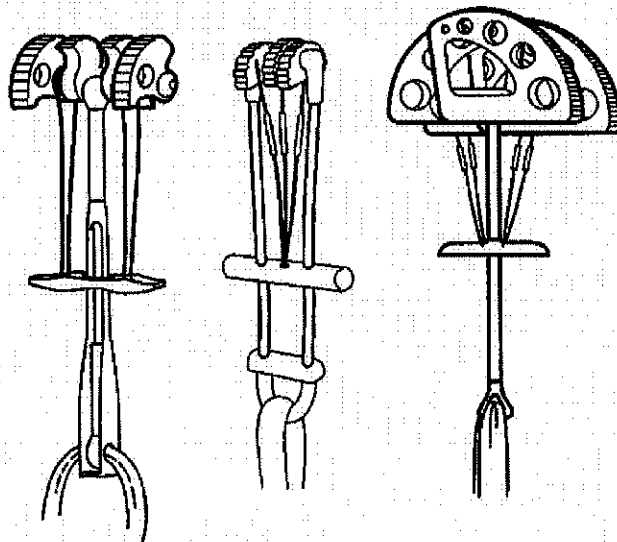
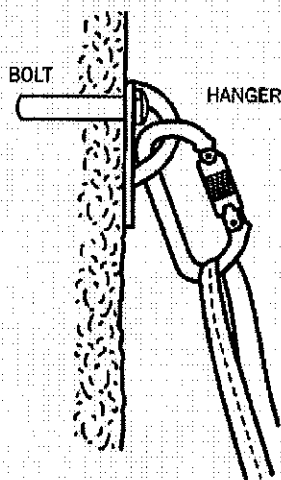


FIG. 44. BOLT AND HANGER



## Bolts and Hangers

While chocks and camming devices are usually removed at the end of a climbing session, bolts are secured in holes drilled into the rock, and are permanent. Likewise, the bolt hanger (a bent strip of metal secured by a nut screwed onto the bolt) also stays in place, providing the means to connect a locking carabiner of an anchoring system to the bolt.

### BOLT PLACEMENT

Only qualified experts should place bolts. Bolt placement is beyond the scope of this manual, and should not be attempted by BSA leaders without specialized training and extensive experience. Bolts may be installed at climbing sites on BSA property only with permission of the council's climbing/rappelling committee.

### Types and Sizes of Bolts

Of the several types of bolts in common use today, only a UIAA- or CEN-approved bolt meets BSA standards.

- **Contraction bolt.** Has a split shaft that compresses as it is driven into a hole. This type of bolt is not allowed for anchor points.
- **Expansion bolt.** Expands an attached sleeve as it is driven into the rock or tightened with a wrench.
- **Glue-in bolts.** The bolt's shaft is glued into a predrilled hole.

Bolts used in climbing areas must have a diameter of at least  $\frac{3}{8}$  inch and be designed specifically for climbing.

A new generation of  $\frac{3}{8}$ -inch bolts is made especially for use on climbing routes. Hangers attached to the bolts may be colored to match the hues of the rock, thus reducing their visual impact.

### BOLT AND HANGER STANDARDS

Always observe these prohibitions when engaged in BSA climbing/rappelling activities.

- Use no bolts less than  $\frac{3}{8}$ -inch in diameter. Quarter-inch bolts are no longer placed as anchors. Avoid them if they are found on any climbing routes.
- Use no aluminum hangers.
- Use no homemade bolts, hangers, or other improvised anchoring hardware. New bolts should be designed specifically for use as protection for climbers, rappellers, and belayers.
- A single bolt may not be used as the only anchor point. It should be one of the anchor points in a multi-point anchor system.
- Use only one carabiner per hanger unless the hanger is designed for more than one carabiner.

Where bolts have been placed for use as anchors for top-roping, for rappelling, or for belaying rappellers, directors and instructors of BSA climbing/rappelling activities must determine the reliability of those bolts before allowing participants to trust their lives to them. There is no absolute method to test the security of bolts embedded in rock, although the following suggestions will provide clues.

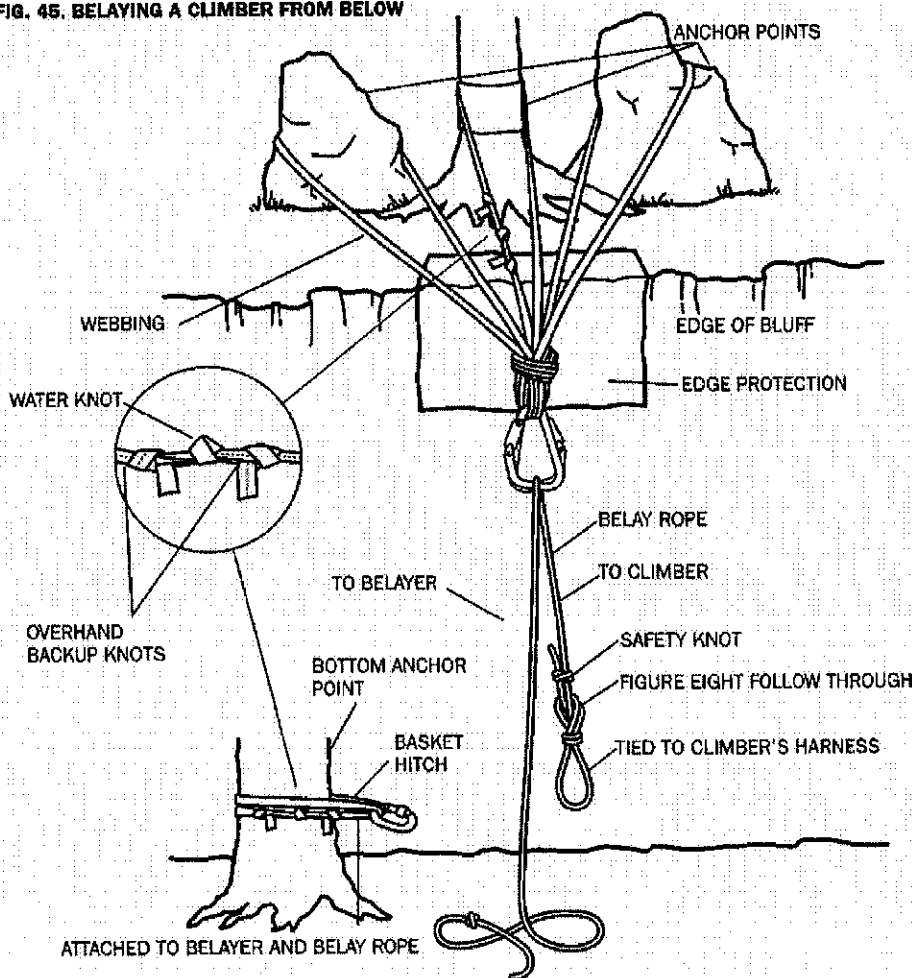
- The bolt must be fully inserted into the hole and the hanger fairly snug against the rock.
- The bolt and hanger must not be damaged, or rusted.
- The rock around the bolt should be intact, not beaten out by poor drilling or excessive pounding.
- Never test a bolt by pounding on the bolt or the hanger.
- Bolts should be installed at least 6 inches apart and at least 6 inches from fractures in the rock.
- If a bolt is loose, it must be tightened, removed, or disabled.

### PITONS

The Boy Scouts of America does not permit the placement of pitons or the use of previously installed pitons. Pitons you may find in a climbing area cannot be considered reliable.

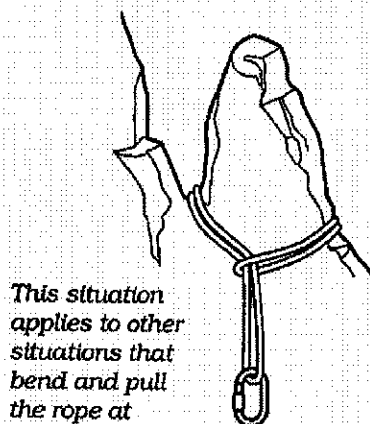
Because they can scar rock and widen cracks, pitons are rarely used today. Instead, climbers use nuts, chocks, camming devices, and other pieces of protection that are easy to remove and will not mar the faces of climbing areas.

FIG. 45. BELAYING A CLIMBER FROM BELOW

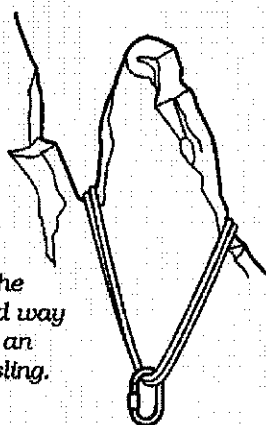


How to set up a belay system using a tree and rocks. Note that the system is extended to allow the carabiners securing the belay rope to hang freely over the edge of the cliff. That helps prevent the rope from being abraded.

FIG. 46. ANCHOR SLINGS

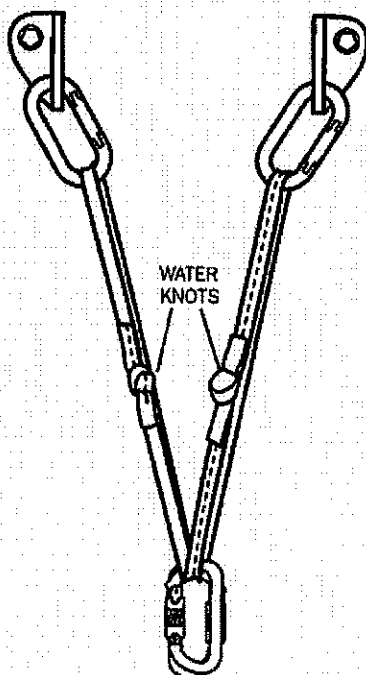


This situation applies to other situations that bend and pull the rope at angles greater than 120 degrees.



This is the preferred way of using an anchor sling.

FIG. 47. SIMPLE STATIC EQUALIZATION



## Anchoring Systems

Use multiple anchor points and design each anchor to be failproof so that the entire system has redundancy (backup). Different types of anchors should be used for each anchoring system, such as a large tree or boulder, a climbing nut or chock, a bolt, or a spring-loaded camming device.

Redundancy is a key concept in anchoring. Securing belayers, climbers, and rappellers to systems attached to several anchor points provides backups that could prove to be lifesaving if one anchor pops loose. *Never rely on a single anchor point to ensure the safety of a climber or rappeller.*

For practicality in running a BSA climbing/rappelling program, keep anchoring systems as simple as possible. Instructors must be able, without difficulty, to set up the systems before a session begins and to remove the equipment at the conclusion of the day's activities. The layout of each system must be clear so that, while the system is in use, instructors can be certain of its security.

Of course, an anchoring system is adequate only if it is fail-safe. Each anchor should be placed so that it provides the most effective protection for anyone who will be using it. An anchor system must not be loaded in any direction other than the intended direction of force.

### Equalized, Angle, Redundant, No Extension, Solid, Timely

Every anchoring system must exhibit the five essential qualities that spell EARNEST: **E**qualized, **A**ngle, **R**edundant, **N**o Extension, **S**olid, and **T**imely.

- **Equalized.** Develop each anchoring system so the load is distributed as equally as possible among all the anchor points. That will reduce the strain on a given point and reduce the chances of any of the points failing.
- **Angle.** Keep the angle less than 90 degrees between the legs of the anchor system.
- **Redundant.** All anchors must be fail-safe or backed up. If you have even the slightest suspicion that an anchor is anything but completely reliable, build enough redundancy into the system so that the failure of an anchor will not imperil a climber, rappeller, or belayer.
- **No extension.** If an anchor point fails, the anchor system will not extend and be *shock loaded*.
- **Solid.** Anchors must be utterly reliable. There is no room for compromise. Take all the time you need to do the job right. If you are unsure of your expertise, find someone who is qualified to provide guidance.
- **Timely.** Use your time wisely and efficiently. Send staff ahead to set up so that the program is ready to go when the Scouts arrive.

### Equalized Anchors

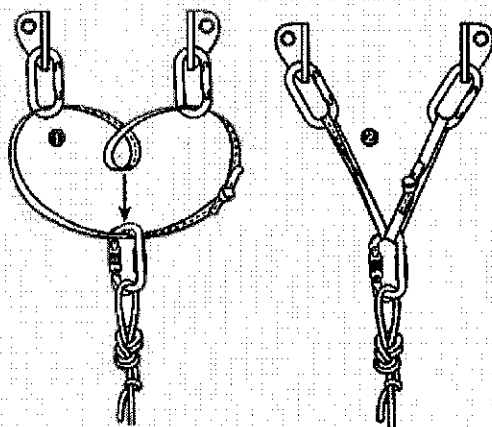
A properly equalized anchor distributes forces to all points of the anchor system. The points may be a combination of bolts, trees, rocks, cables, or pieces of artificial protection.

There are two types of equalized systems: self-equalized and pre-equalized.

- A *self-equalized anchor* may also be called self-adjusting. A loop of webbing or cordelette is attached with carabiners to several anchor points. The webbing from each leg of the anchor system is brought together as shown in Figures 48 or 49. This will allow the anchor system to adjust itself if a climber were to traverse sideways. The half twists in the upper portions of the webbing or cordelette must be used to limit the extension since a self-equalized system would have some extension if one point of the system were to fail.

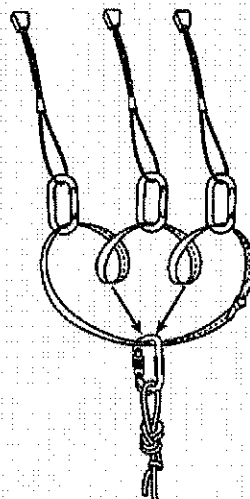
- A *pre-equalized anchor* is designed to work in only one direction of pull. A loop of webbing or cordelette is attached with carabiners to several anchor points. The webbing from each leg of the anchor system is brought together as shown in Figure 50. Clip a carabiner into all of the loops. Pull the carabiner in the direction of pull. Tie an overhand knot or figure-eight knot with all of the loops.
- If the overall angle between the legs approaches 120 degrees, the forces applied to the anchor are greater than the weight of the climber.

**FIG. 48. TWO-POINT SELF-EQUALIZATION**

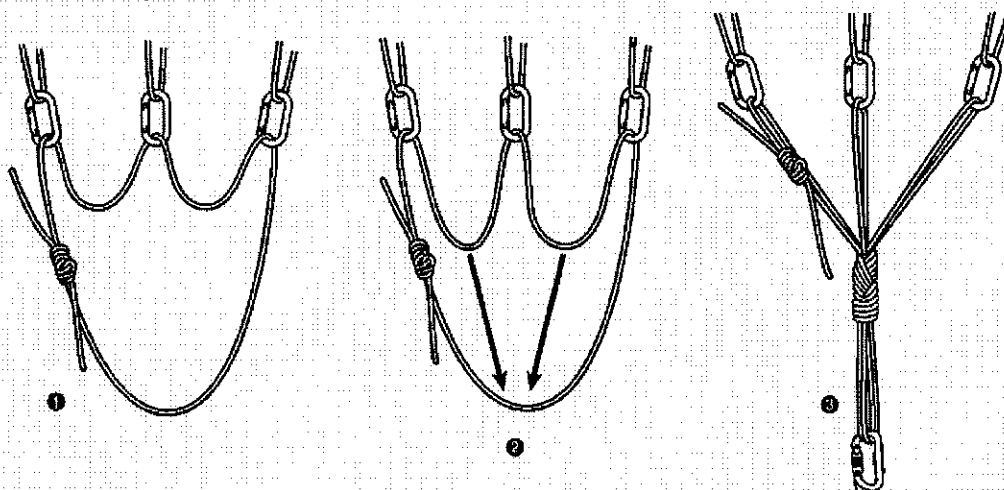


- 1 Clip a single runner to the anchor carabiners and form a loop at the top.
- 2 Clip into the loop and the bottom part of the runner.

**FIG. 49. THREE-POINT SELF-EQUALIZATION**



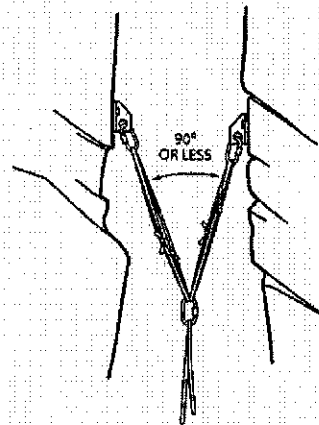
**FIG. 50. PRE-EQUALIZATION WITH CORDELETTE**



- 1 Clip the cordelette into three anchors.
- 2 Pull the segments between the anchors down.
- 3 Clip a locking carabiner into the loops, grasp all three loops together, and tie an overhand or figure-eight knot.



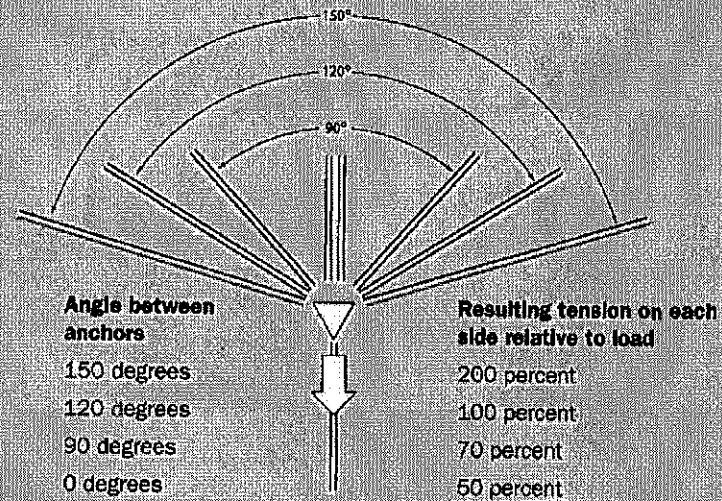
FIG. 51. OPTIMUM ANGLE BETWEEN ANCHORS



An angle of 90 degrees or less between anchors is good.

The forces on the individual points of the anchor system increase as the angle between the anchor points increases.

FIG. 52. FORCE EXERTED ON A ROPE



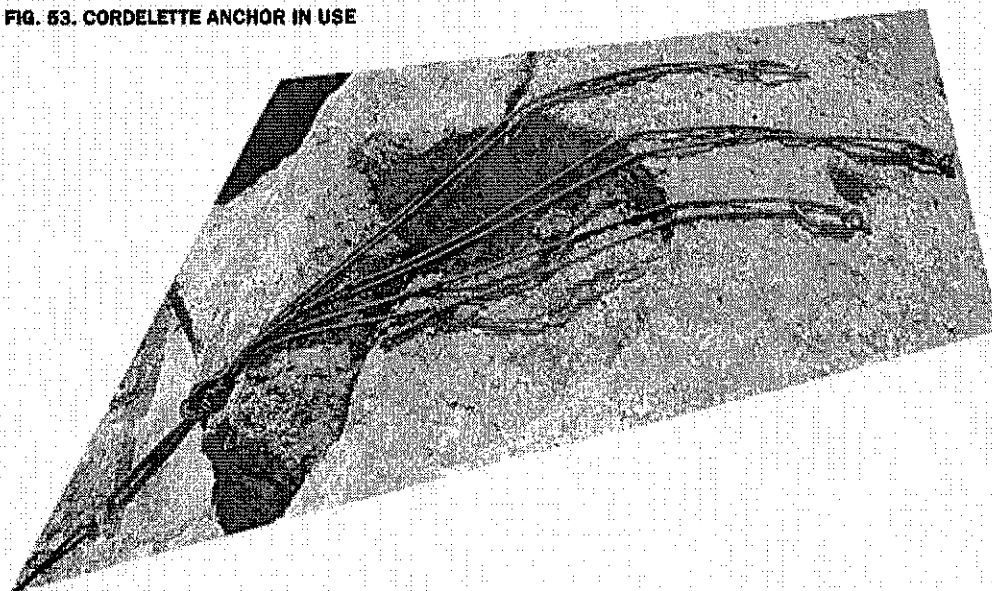
### Two Anchors

Using two anchors to tie off requires special attention. The angle the rope makes between the two anchors can place stresses upon the rope that far exceed its working load. Even though it seems that the twin anchors are sharing the load, situations might arise that cause each anchor to sustain more than the actual weight of the load. When the two ropes form a 120-degree angle, each leg of the anchor is supporting 100 percent of the load. Angles greater than 120 degrees cause the tension to increase dramatically. At 150 degrees, the load is 200 percent of the original load on each leg. In actual field work, 90 degrees is a safe relationship between two legs.

### **Cordelette**

With a minimum of equipment, a cordelette can divide the force of a load among several anchor points. Begin the cordelette by forming a loop with a double fisherman's knot in about 20 to 24 feet of accessory cord with a minimum diameter of 7 millimeters. Connect the loop to each anchor using a carabiner. Draw the slack from the cord to form a separate bend between each anchor, then gather the bends together and secure them with an overhand knot or figure eight knot. Clip a carabiner into the loop of the knot and use it to secure a belayer, a climbing rope, or a rappel rope.

**FIG. 53. CORDELETTE ANCHOR IN USE**

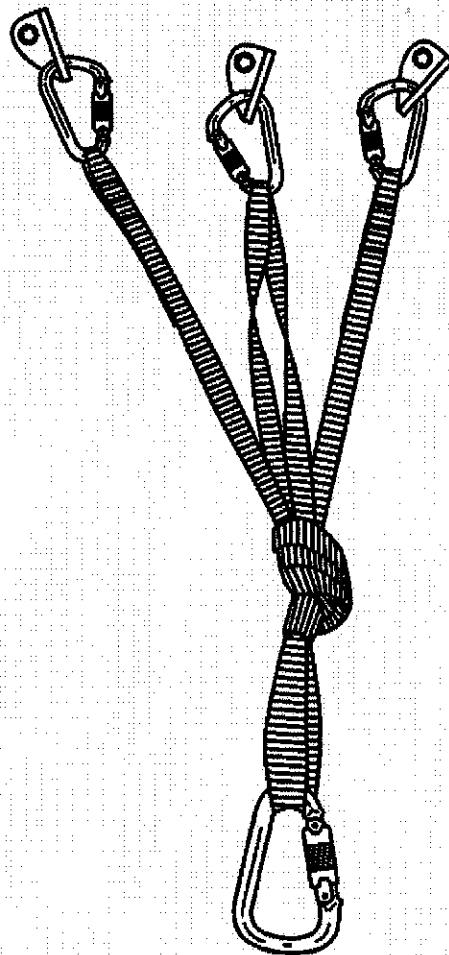


### **Reminders for Safe Anchoring Systems**

- Each anchor must be failproof or backed up and the load equalized.
- Examine every anchor before using it, even if at first glance everything appears to be in order. Before trusting it, understand an anchor's strengths and weaknesses.
- Do not allow a rope to run over nylon webbing. Friction created by the motion of the rope may melt the webbing and lead to system failure.
- Set and rig anchors in such a way that the system is set up with the direction of pull.

- Keep the system simple so that it is convenient to set up and easy to monitor.
- During periods of use, anchoring systems should be periodically checked to make sure they are secure.
- Use the minimum amount of hardware to do the job safely and efficiently. Each component introduced into an anchoring system is one more piece that could fail.

FIG. 54. WEBOLETTE ANCHOR



# Chapter 7

## Belaying and Belay Signals

Managing the ropes protecting climbers and being always ready to arrest a fall, competent belayers are vital to the safe operation of a climbing/rappelling program. In fact, belaying may be the most important skill in climbing. A belayer can safeguard inexperienced climbers and rappellers, and can make it possible for skilled climbers to attempt routes that would otherwise be too dangerous. There is no way to compensate for a belayer who does not have sound skills and good judgment. Climbing/rappelling activities cannot begin until a climbing director or lead instructor is confident that all belayers are well trained and highly responsible.

The techniques of belaying have evolved dramatically through the decades. The earliest belayers simply grabbed a rope with their hands, braced themselves as best they could, and hoped that the climber tied to the other end would not fall. Over time, belayers learned the importance of tying themselves to an immovable object so that they would not be pulled down the mountain during the tumble of a climber they had been entrusted to protect. They also discovered ways to wrap the rope around their bodies and manage it to give anyone tied to the other end the best chance of surviving a fall. More recently, the development of belay devices has revolutionized belaying by providing belayers with simple, reliable means of maintaining maximum control over the rope with a minimum of effort.

### **BELAYING IN THE BSA**

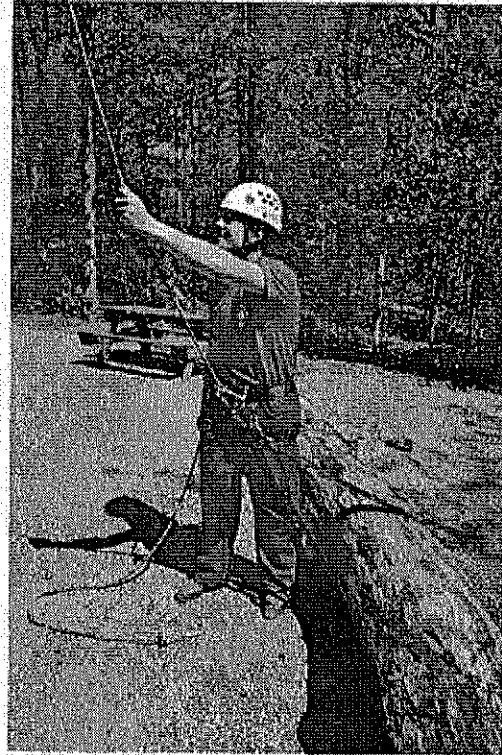
BSA climbing/rappelling guidelines require that any climber or rappeller more than shoulder height above the ground must be protected by a belayer. Climbers and rappellers may be belayed either from the top of the climb or from the ground. Anyone who is *bouldering*—practicing climbing moves closer to the ground or beginning a climb—does not need to be tied into a belay rope, but should be protected by *spotters* positioned to lessen the impact of a shortfall.

The ideal belaying setup is to belay off of the anchor and to have the belayer attached to the system. Belaying without an anchor puts both the belayer and the climber or rappeller at risk. If the climber or rappeller falls, an unanchored belayer may be pulled out of position, even over a cliff, and both the belayer and the climber or rappeller could be injured.

**FIG. 55. BOTTOM BELAY SYSTEM SETUP**



**FIG. 56. BELAYER PROPERLY ANCHORED FOR A BOTTOM BELAY**

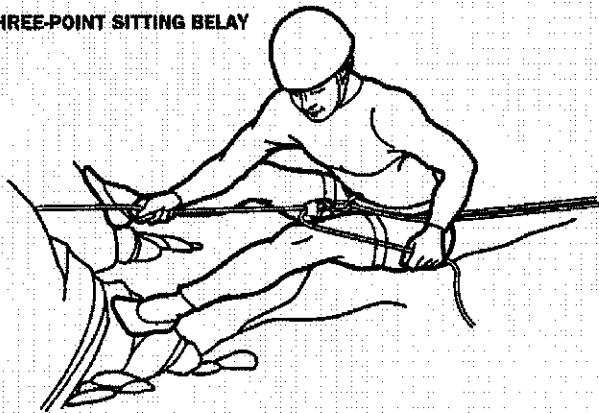


A belayer should be tied-in in such a way that there is no slack. In addition, belayers can create greater stability by bracing their feet against the ground or a rock outcropping. Belayers must at all times remain alert with their attention focused on the climbers or rappellers they are protecting.

## SAFETY ON EDGES

Anyone in the area of a potential fall must be on belay or anchored.

FIG. 57. THREE-POINT SITTING BELAY



*The three-point sitting belay is a strong belay position.*

FIG. 59. ANCHORING THE BELAYER

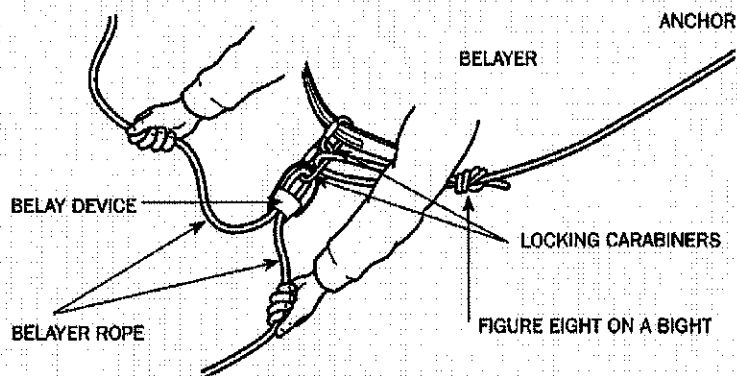
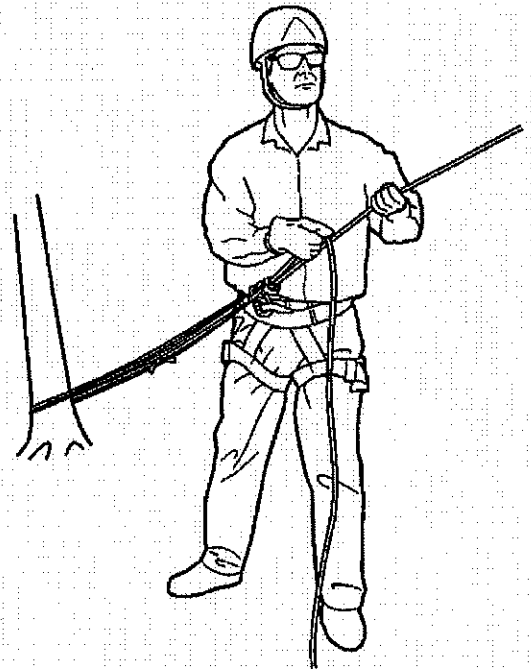


FIG. 58. BELAYING FROM BELOW



### Belaying From Above

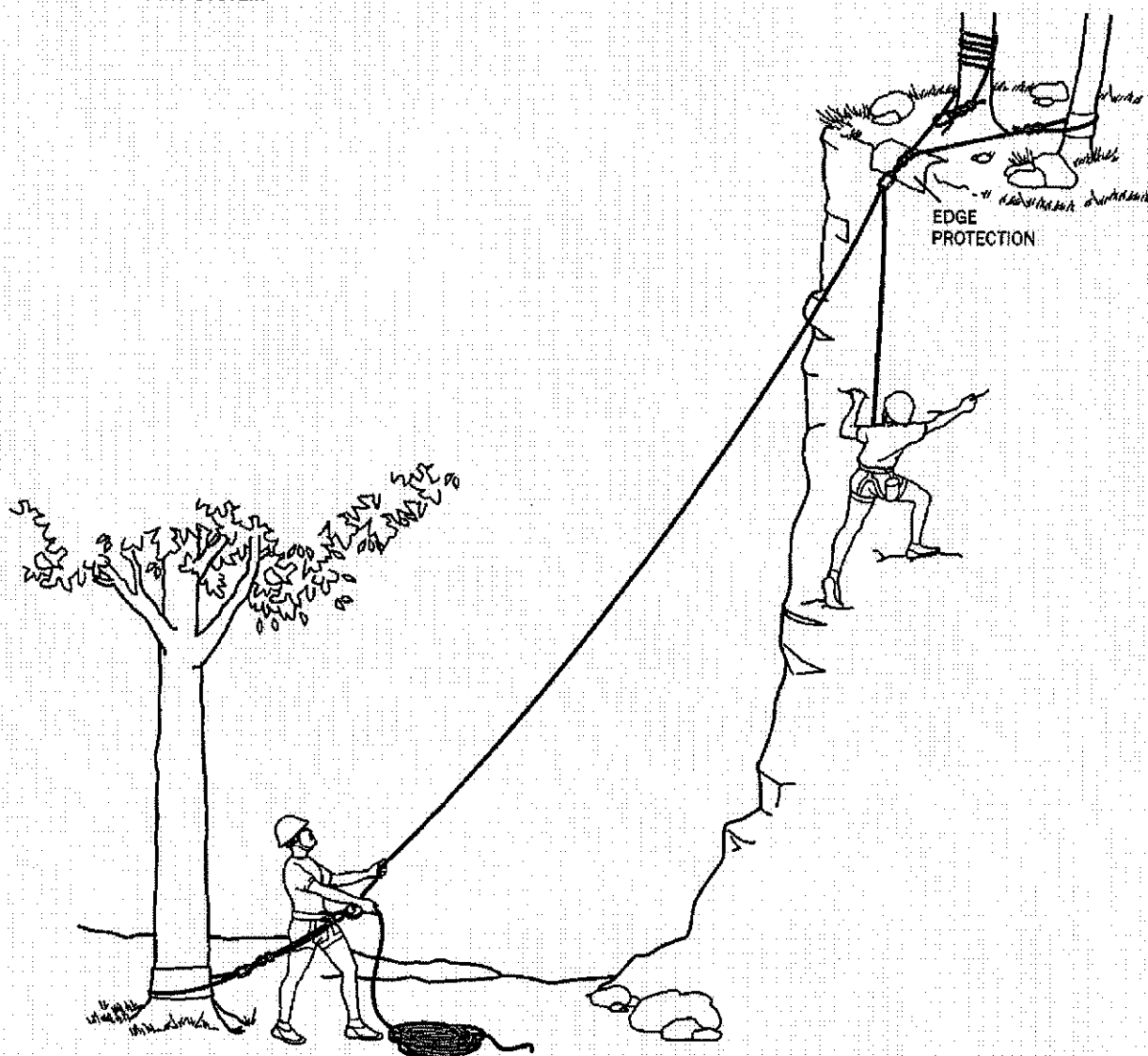
To belay from above, attach the belayer to the belay anchor with a locking carabiner (double locking carabiner preferred) clipped to the front (preferred) of the seat harness. The belayer should move forward to remove any slack between the harness and the anchor points. That will help prevent the belayer from being yanked off balance if the climber or rappeller falls. If necessary, adjust the length of the anchor sling to improve the belay position.

The belayer's location should be directly between the belay anchor system and the fall line. When the belay rope is sharply angled to one side of the fall line, a climber or rappeller who slips may pendulum across the face, increasing both the chances of injury and the strain on the belay system. Such a fall could also pull the belayer out of position if the loading force on the rope comes from a direction for which the belayer was not prepared.

Belay a climber or rappeller with a commercially manufactured belay device. (For more on belay devices, see chapter 3, "Equipment.")



FIG. 60. ANCHORING SYSTEM



*Redundancy builds safety into anchoring.*

### **Belaying From Below**

While the techniques of belaying from the bottom of a route are the same as those used by belayers at the top of a climb or rappel, the methods by which a belayer is anchored may differ.

A belayer on the ground who is belaying a climber may need to be tied in to a single anchor point—one sturdy tree, for example, or a single rock outcropping—as opposed to the multiple anchor points of a belayer at the top of a climb. Belayers at the bottom of a route are usually situated so that even if they are pulled out of position, they cannot be dragged over a cliff or otherwise seriously endangered.

A belayer on the ground should be secured to anchoring systems in the same manner as for belaying from above. The belayer must be outside the fall zone. A locking carabiner connects the front of the seat harness to the anchor sling. While sitting or standing, the belayer moves forward and/or adjusts the length of the anchor system to remove any slack between the belayer and the anchor point.

## Sitting vs. Standing Belay

An effective belay can be accomplished from either a sitting or a standing position. A sitting belay is generally more stable because the belayer makes three points of contact with the ground. If the belayer's feet can be braced against rocks, that provides a solid belay stance. A sitting belayer is less apt to tire when belaying a number of climbing or rappelling participants; however, it is wise to change belayers long before the belayer tires physically or mentally. A sitting belayer is easily observed by a nearby instructor.

A standing belay from the top allows an experienced belayer to peer over the edge to observe the progress of the climber or rappeller. The anchor points should be fairly high so that the belayer stays in line with the direction of pull on the rope. A standing belayer can move effectively to take in or feed out rope as the progress of the climber or rappeller is observed. One foot should be placed forward of the other to provide the most stable stance.

A standing belay from the bottom of the climb can be easy to manage. Stay close to the face of the climb. If you back up too far from the base, you are increasing the forces, and the belayer may be yanked off his or her feet should the climber fall.

## Belaying Variations

In addition to the standard belay scenarios described above, climbing directors may encounter one of several acceptable variations. In some climbing programs, a belayer anchored on the ground in the standard way is provided a backup anchor in the form of another person gripping the belayer's harness and using body weight to hold the belayer in place. An additional participant can be assigned the task of handling the loose rope, a job that keeps excess rope out of the way and helps occupy the time and attention of one more person.

## Belaying With Belay Devices

A belay device will bend the rope in such a way that the belayer can smoothly take in or feed out line. The belayer can also arrest a fall by bending the rope more sharply, creating friction and locking the rope in place. The devices are especially helpful if a small belayer is protecting larger rappellers or climbers. As with other climbing and rappelling skills, handling a belay device efficiently requires instruction and practice.

Use a locking carabiner to clip a bend of rope and the keeper loop of the device directly to an anchor system to which the belayer is independently clipped. The keeper loop will prevent the device from migrating along the rope and beyond the belayer's reach.

Arrange the rope so that the belayer's stronger hand (usually the right hand for people who are right-handed) will be the *brake hand*—the hand closest to the free end of the rope. The other hand will be the *guide hand*, resting on that part of the rope leading to the climber or rappeller. (Specialized belay devices such as the Grigri are set up a little differently. Refer to the manufacturer's guidelines.)

FIG. 61. SITTING BELAY



*For a sitting belay, the belayer is off anchor and is tethered to an independent line.*

FIG. 62. BELAYING

There are a variety of acceptable techniques for belaying. The most important requirement is that the brake hand never leaves the rope. In the past, the most commonly used technique has been called, "slip-slap-slide."

To take up slack as a climber ascends:

- ① Grasp the rope with both hands and feed it through the belay device, pulling the guide hand toward the body and moving the brake hand away.
- ② Holding the rope firmly with the brake hand, slide the guide hand out along the rope, away from your body.
- ③ Use the fingers and thumb of your guide hand to clasp both sections of the rope firmly, then slide your brake hand back toward your body. Begin the sequence again. (**Remember—the brake hand must never leave the rope!**)
- ④ Whether you are letting out rope or taking up slack, stop a fall by grasping the rope tightly and pulling it back toward the hip on your brake-hand side.

The BUS (brake-under-slide) technique has become popular.

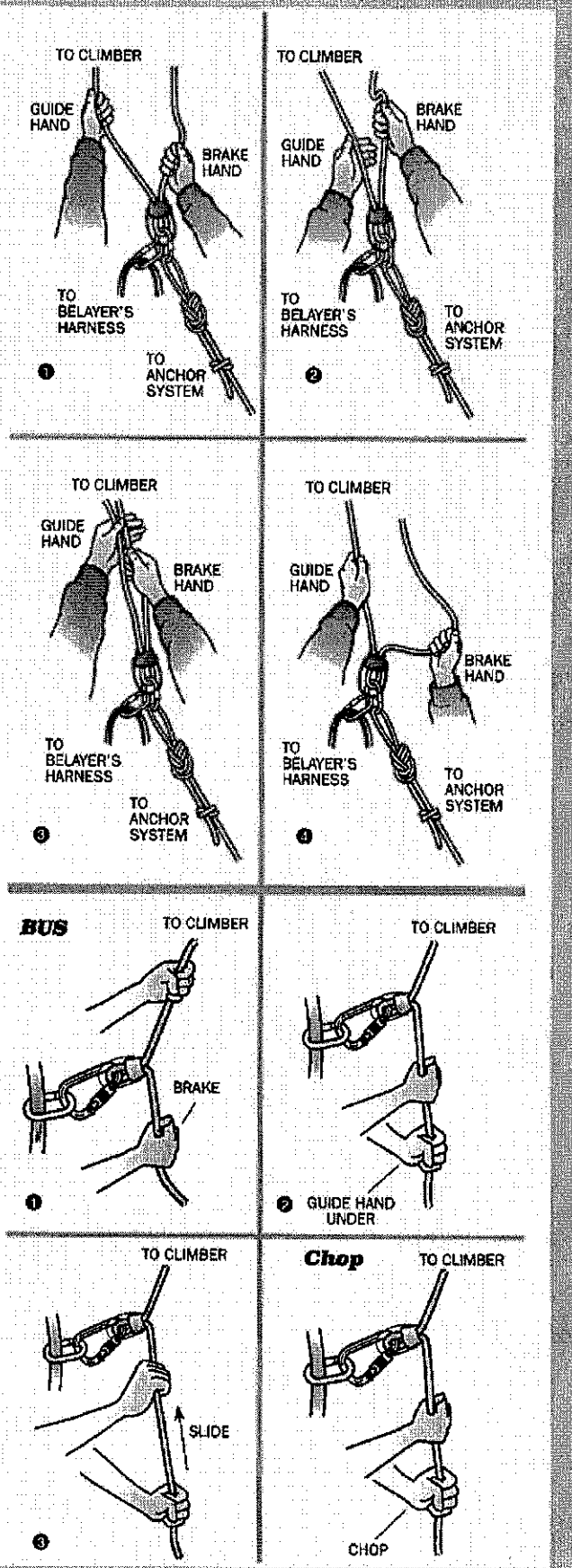
- ① **Brake** or lock off the belay rope by pulling downward with the brake hand.
- ② Move the guide hand **under** the brake hand.
- ③ **Slide** the brake hand up toward the belay device.

You are ready to repeat the procedure.

A variation of the BUS is the **Chop** technique since the hand movement is similar to chopping wood.

Both hands are brake hands. They pull the rope through the belay device and then lock off as both hands move down. Next, one hand slides up toward the belay device. The other hand slides up toward the first hand.

You are ready to repeat the procedure.



When a climber is moving, the belay process requires coordination between the guide hand and the brake hand.

- For the "slip-slap-slide" technique, the guide hand is extended down the rope away from the belay device, grasps the rope, and pulls in slack. At the same time, the brake hand pulls rope away from the belayer's body and draws the slack through the belay device.
- While the brake hand tightly holds the rope, the guide hand slides back down the live part of the rope, then reaches across beyond the brake hand and grasps both parts of the rope.
- The brake hand slides back to the belay device and again grasps the rope securely. The process is repeated each time slack forms in the rope.

**The brake hand must never leave the rope.** The fingers must always be curled around it, ready to arrest a fall by bending the rope across the belay device.

When a rappeller is descending, the belayer's guide hand feeds rope out through the belay device. To lock off the rope and arrest a fall, the belayer uses the brake hand to bend the rope sharply across the device.

The ability to arrest a fall with a belay device depends on smooth, practiced handling of the rope and a constant focus on the climber or rappeller. Belayers must be alert to any changes in the situation and aware of the security of anchors, equipment, and the belay stance itself.

### **Verbal Signals for Climbers and Belayers**

Safety at climbing/rappelling areas is impossible without good communication. Climbers, rappellers, and belayers have developed a standard set of signals to exchange information with one another. Participants should be introduced to these signals and should use them throughout BSA climbing/rappelling activities.

#### **HEARING-IMPAIRED PARTICIPANTS**

Climbing instructors may have opportunities to work with participants who are hearing-impaired. Instructors should meet ahead of time with the adult leaders of those participants to develop appropriate strategies for ensuring safe communications during climbing and rappelling. A climbing instructor should be willing and able to work with hearing-impaired participants in a climbing/rappelling activity.

Limit talking in climbing areas to essential exchanges of information. Noise and the distractions of casual conversations can confuse belayers and those on belay. Participants waiting their turn should curtail visiting and avoid horseplay. If chattering becomes an issue, instructors should suspend climbing and rappelling activities until the situation has been remedied. If the day is too windy or the area too noisy for climbers and belayers to hear one another clearly, climbing and rappelling should be postponed or moved to another site.



## Rock!

A shout of "Rock!" is perhaps the most important of climbing's signals. It warns everyone that there is immediate danger from something falling—a rock, a carabiner, an article of clothing, etc. Yells of "Rock! Rock! Rock!" warn of more danger than a single shout. Those hearing the warning should not look up, but must immediately protect themselves in the most efficient way—taking refuge under a ledge, moving quickly to the left or right, or becoming "small" under one's climbing helmet.

The signals between a belayer and a climber or rappeller are clear commands and answers of just a word or two. Each command is always followed by a response of acknowledgment to ensure that the command was heard and correctly understood. Each word should be enunciated loudly and slowly, especially if the wind is blowing, distance is a factor, or a ledge or overhang prevents a belayer and a climber or rappeller from seeing one another. Several participants climbing or rappelling in close proximity should use names to be sure the right person is getting the message. When in doubt, repeat signals and responses.

### Signals for Belaying Climbers

Generally accepted signals exchanged between a climber and a belayer include the following, listed in a normal sequence.

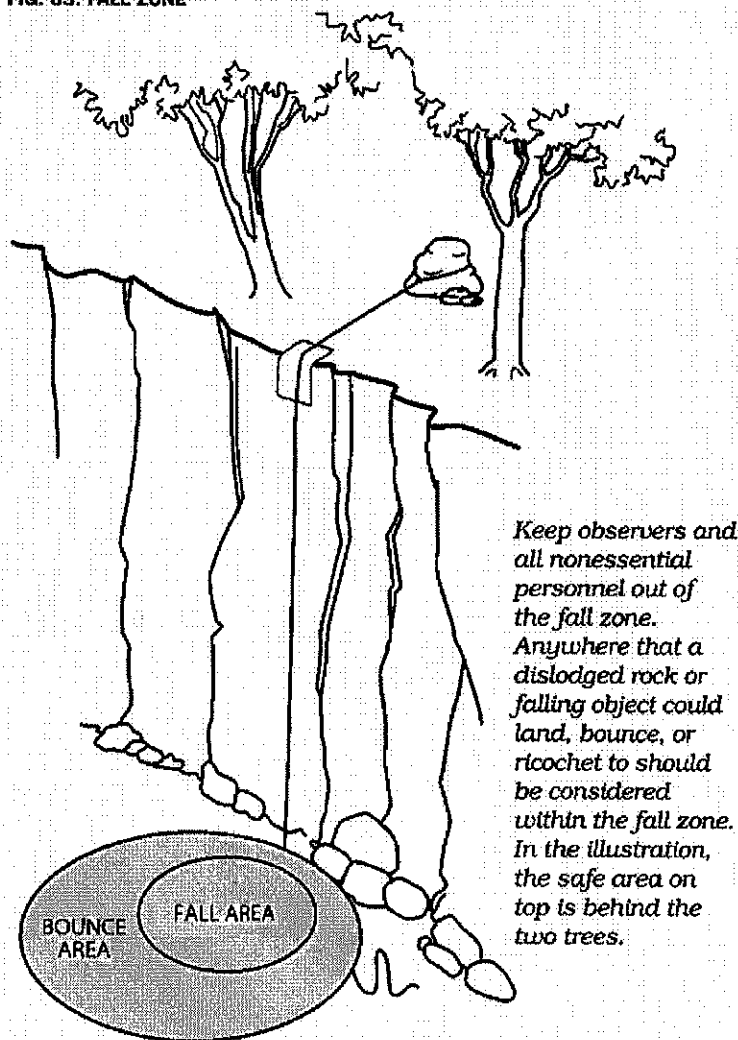
CLIMBER	BELAYER	MEANING
"On belay?"		"Is the belay ready?"
	"Belay on."	"Your belay is ready."
"Climbing."		"Here I come."
	"Climb" or "Climb on."	"Come ahead."
"Slack."		"I need some slack in the rope."
"Up rope." or "Tension."		"Take in the loose rope."
"Falling!"		"I'm falling! Brake the rope!"
"Ready to lower."		"Lower me down the route."
	"Lowering."	"I'm letting you down now."
"Rock!"	"Rock!"	"Look out for falling objects."
"Rope!"	"Rope!"	"Rope being thrown down."
"Clear."	"Clear."	"It is safe to throw down a rope."
"Off belay."		"I'm in a safe place and no longer need a belay."
	"Belay off."	"I'm no longer belaying you."

### Signals for Belaying Rappellers

The verbal signals used by rappellers are a little different from those of climbers, but the basic information they share is the same.

RAPPELLER	BELAYER	MEANING
"On belay?"	→	"Is the belay ready?"
	"Belay on."	→ "I'm ready to belay."
"Rappelling."	→	"Your belay is ready."
	"Rappel on."	→ "Go ahead."
"Falling!"	→	"I'm falling! Brake the rope!"
"Off belay."	→	"I am done rappelling and am in a safe place."
	"Belay off."	→ "I'm no longer belaying you."
"Off rappel" or "Off rope."	→	"The rope is free of hardware and is ready for the next rappeller."

FIG. 63. FALL ZONE



Keep observers and all nonessential personnel out of the fall zone. Anywhere that a dislodged rock or falling object could land, bounce, or ricochet to should be considered within the fall zone. In the illustration, the safe area on top is behind the two trees.



## Getting Out of a Belay System

In extremely rare situations, it may be necessary to remove the belayer from the anchor system. If the belay rope is attached directly to the anchor system with the belayer attached independently, it is very easy to do this:

- ❶ Use a belay device with a mule knot (or a Münter/mule knot with an HMS carabiner) to tie off the belay rope.
- ❷ The belayer can now detach from the system without affecting the integrity of the belay system.
- ❸ Another belayer can clip into the system.
- ❹ Untie the mule knot.
- ❺ Resume belaying.

If the belay rope is attached directly to the belayer's harness and not directly to the anchor, it is much more involved.

- ❶ Tie off the belay device with a mule knot. (See Figure 32 in chapter 5.)
- ❷ Attach a cordelette or webbing sling to the belay rope above the belay device using an appropriate friction knot. Put a locking carabiner in the cordelette or sling.
- ❸ Attach another long cordelette or webbing sling to the anchor. Tie the other end to the carabiner in Step 2 using a Mariners hitch. (See Figure 33 in chapter 5.)
- ❹ To tie the Mariners hitch, do the following:
  - Pass the cordelette or sling through the carabiner twice.
  - Then wrap the free end around the standing part of the lines, making four or five wraps.
  - Finish by passing the free end between the two strands.
- ❺ The belayer can now detach from the system.
- ❻ Another belayer can now clip into the system.
  - Untie the Mariners hitch.
  - Untie the mule knot.
  - Resume belaying.

Pick-off and cutaway rescues add additional risk because they remove the participant from his or her primary belay system. These procedures should be reserved for professional rescue personnel and should not be taught or practiced as a part of our program.

## Assess the Situation First

As in any emergency, rescuers and bystanders must be aware of their own safety so that they do not complicate an already difficult situation by becoming victims themselves. Belayers at the top of climbing or rappelling routes should assess their positions before releasing themselves from an anchor. In some cases, it will be appropriate to clip into a safety line or another anchor before giving up the security of the original position.

(For more on ensuring an appropriate environment for climbing and rappelling, see chapter 2, "Safety and Leadership." For more on responding to emergencies at climbing/rappelling sites, see chapter 12, "Incident Resolution, First Aid, and Emergency Response.")

# Chapter 8

## Climbing and Bouldering

For many participants in BSA climbing/rappelling activities, there is nothing quite so challenging and thrilling as tying in to a climbing rope and making their first ascent of a steep face. The power of that experience can affect them on many levels—increasing self-confidence, overcoming personal barriers and fears, gaining skill, and taking on new responsibilities. In addition, they will discover that climbing can be downright fun.

To maximize the climbing experience and minimize the risks inherent in the sport, instructors should thoroughly prepare participants before allowing them to go on the rock. That can include a short introduction to cover the basics of using climbing's verbal signals, of being belayed, and of employing a three-point stance. Instructors can also demonstrate basic holds for the hands and feet and discuss what participants should do during and after a possible fall.

A portion of the introductory segment at a climbing site must include a few minutes of stretching to allow participants to loosen up and prepare for the rigors of the activities ahead. Novices may be further encouraged to be aware of the ways in which their bodies move as they walk on flat surfaces. If the terrain allows it, instructors can have participants do the same on gentle inclines and then more steeply angled rock. That will also allow them to experience the gripping ability of shoe soles, the use of small nubs and edges for holding body weight, and the incorporation of the hands to form a three-point stance, the foundation of all climbing. (For more on guiding participants through a climbing experience, see chapter 11, "Conducting a Climbing/Rappelling Program.")

### Falling

Instructors working with a group new to climbing should explain how a belay works, mentioning that dynamic rope will stop falls gradually rather than all at once. Participants who are especially concerned about their safety might find their fears muted if instructors also show them the way that anchors are set and that there are backups in the unlikely event of an anchor failing.

Do not, however, lead participants to believe that they will not fall. Falling is part of learning to climb. The security of a proper belay will protect climbers from falling far. Clear communication with belayers will help ensure that when falls do occur, they will be relatively harmless.

THE THREE-POINT STANCE  
IS A STABLE POSITION  
FOR THE CLIMBER.  
AT ALL TIMES, THE CLIMBER  
KEEPS GOOD HOLDS ON  
THE ROCK USING ONE HAND  
AND BOTH FEET OR  
TWO HANDS AND ONE FOOT.

FIG. 64. CLIMBER FALLING



*Every climber falls occasionally. Climbers and rappellers who are top-rope belayed should not fall more than a couple of feet as the rope stretches.*

Falling climbers should try to turn toward the wall and use their hands and feet to cushion any impact against the climbing face and to prevent themselves from spinning. They should avoid grabbing the rope; doing so will occupy their hands rather than leaving them free to absorb the force of bumping into the wall.

Once a fall has been arrested, the climber, before finding good holds for the hands and feet and resuming the climb, may want to take a few moments to collect his or her thoughts and reassure those on the ground that everything is all right. (For more on the correct verbal signals to use, see chapter 7, "Belaying and Belay Signals.")

#### **In Case of Injury**

Instructors who suspect that a fall may have resulted in injury to a climber must carefully assess the situation before taking action. If the climber can answer questions, instructors should learn what they can about the climber's condition. In most cases, that will provide assurance that it will be safe for the belayer simply to lower the person to the ground for further diagnosis and treatment. However, if the climber is nonresponsive or if instructors suspect that injuries are more than minor, it may be wise for an instructor to rappel down to the climber to conduct an up-close evaluation and to be in position to assist in completing a rescue.

For more on evaluating injuries and carrying out rescues, see chapter 12, "Incident Resolution, First Aid, and Emergency Response."

#### **Climbing Classification System**

Climbing classification systems rate the difficulty of different climbs. Guidebooks for popular climbing areas use these scales to help people decide which routes match their skills. In the classification system most frequently used in the United States—the Yosemite Decimal System—there are usually five classes.

**Class 1—Hiking.** The hands are not needed for balance.

**Class 2—Simple scrambling.** The hands are occasionally used for balance. A rope is not needed.

**Class 3—Scrambling.** Climbers use their hands and some basic climbing skills. A rope may be used to belay anyone who is uncomfortable with the exposure.

**Class 4—Simple climbing,** often with exposure. Anchored belays are used, and natural protection can be found easily.

**Class 5—Roped climbing with protection.** All climbing involves using a rope, belaying, and protecting the leader from a fall. A belay is always required with climbers ascending higher than shoulder height.

Class 5 climbing is further divided into 15 categories of difficulty:

**5.0-5.5:** Novice and beginning climbers will enjoy these areas. They're a great place to start.

**5.6-5.9:** The climbs are more difficult. Specific climbing skills such as jamming, liebacks, and mantles are used.

**5.10-5.15:** Progressively more difficult climbing areas that demand physical training and climbing skills, as well as repeated experience climbing that area.

*Aid climbing*—roped climbing with artificial assistance—is sometimes considered a sixth class of climbing. Climbers on smooth, steep faces or overhangs place their weight on artificial aids such as climbing stirrups.

## Bouldering

*Bouldering* is a fine way to learn climbing techniques. While its name comes from the practice of climbers working out moves on actual boulders, it can also be done on any face that presents usable handholds and footholds—the lower reaches of climbing towers, for example, or of stone buildings or artificial climbing walls. (Always obtain permission from owners or facilities managers before bouldering on structures.)

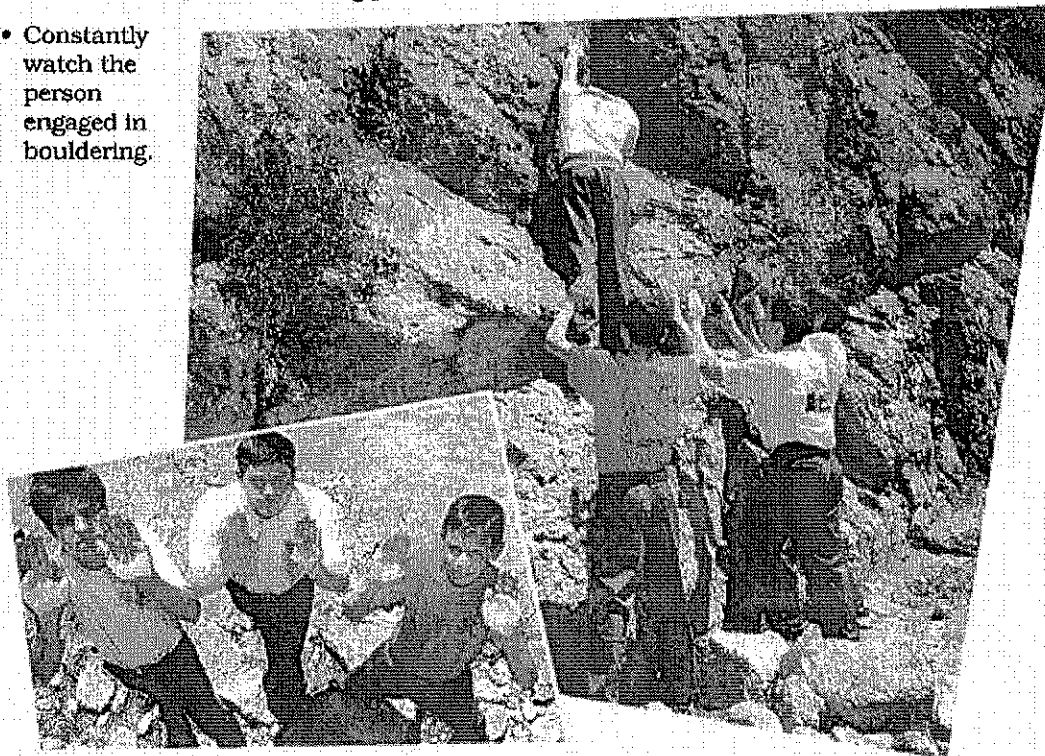
The key to safe bouldering is that climbers keep their feet fairly close to the ground, never ascending higher than their shoulder height above the ground. The goal is to move gracefully from one hold to the next. Boulderers are more likely to move sideways than they are to go up or down. They often find that bouldering is ideal for practicing the placement of their hands and feet, learning to balance, and increasing the ease with which they can move in a vertical environment.

Anyone engaged in bouldering must be protected by *spotters*. In addition to spotters, mats or pads should be placed at the base of indoor climbing walls to protect boulderers. Instructors and participants who climb higher than shoulder height above the ground must have a belay to protect them in case they fall. And they will fall. It is part of learning to climb. (For guidance on selecting appropriate sites for bouldering, see chapter 10, "Site Selection.")

## Spotting

*Spotting* means providing protection to a boulderer/climber in such a way as to help prevent injury in case the boulderer/climber falls. Assigning spotters is important whenever someone is bouldering. Every boulderer should have at least two spotters positioned to support the head, neck, shoulders, and torso of a falling person. To accomplish this, spotters must

- Assume a stable stance. Their feet should be apart with one foot forward of the other, and their knees and elbows bent to absorb shock.
- Have their hands in the air with fingers together and with the palms turned outward or upward in a supportive position. Another method is to have spotters extend their arms downward with palms facing upward to help lower a falling person.
- Constantly watch the person engaged in bouldering.



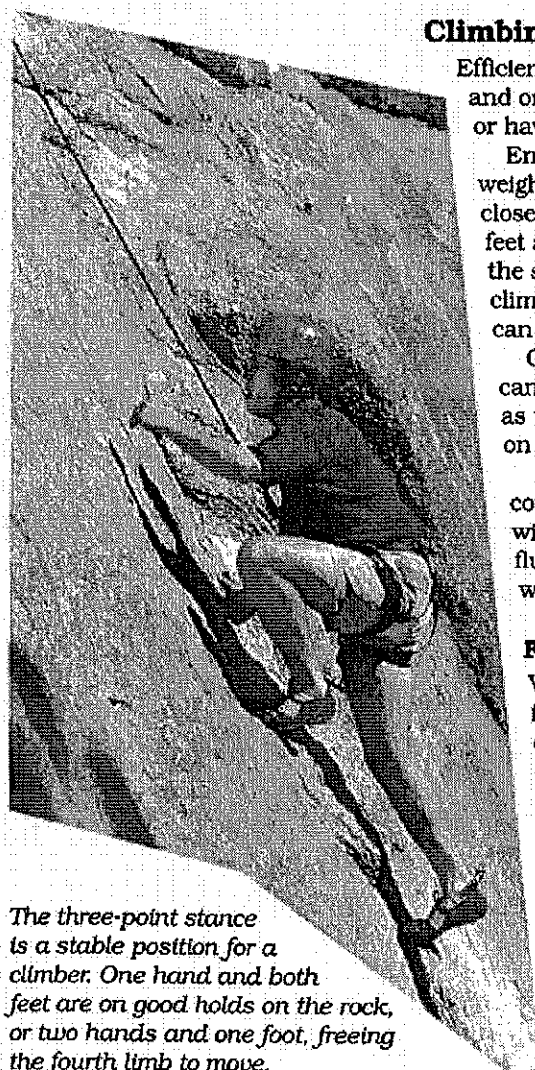
Spotters are not expected to catch a falling boulderer in midair—something that is nearly impossible even in a fall of only a few feet, and may result in injury to both parties. Rather, spotters should support the upper body of a falling person, especially the head and neck, and ease that person to a safe position.

### Verbal Signals for Boulderers and Spotters

Boulderers and spotters use the following verbal signals to ensure clear understanding of their intentions and actions.

Boulderer	Spotters	Meaning
"Spotters ready?"	→	"I'm ready to start."
	"Ready!"	→ "I'm ready to protect you."
"Climbing!"	→	"I'll start up as soon as spotters give a go-ahead."
	"Climb on!"	→ "Go ahead."
"Falling!"	→	"I'm about to fall."

FIG. 65. THREE-POINT STANCE



The three-point stance is a stable position for a climber. One hand and both feet are on good holds on the rock, or two hands and one foot, freeing the fourth limb to move.

### Climbing

Efficient climbing is built on the *three-point stance*—keeping two hands and one foot on good holds while moving the free foot to a new location, or having both feet and one hand on holds as the free hand moves.

Encourage climbers to lean out a little from a wall so that the weight of their bodies rests on their feet. A climber whose torso is too close to the rock may find it difficult to look down and see where the feet are moving. Hands should be used primarily for balance while the stronger muscles of the legs do the work. Whenever possible, climbers should avoid climbing on their knees and elbows, as that can put them in precarious positions and inhibit further movement.

Climbing is a mental as well as physical challenge. Instructors can encourage participants to look ahead and plan several moves as they climb, much as a chess player looks for a larger strategy on the board rather than seeing only the next placement of a piece.

With a route in mind and a sense of the motions required to cover the distance, climbers can link together a series of moves with grace, rhythm, and efficiency. Climbers should strive to be fluid in their movements. Teach them to relax, to concentrate on what they are doing, and to remember to breathe.

### Footholds

Various techniques allow climbers to gain purchase with their feet on ledges, nubs, cracks, and other irregularities on a wall or rock face. Regardless of the shoes they are wearing, novice climbers can master footwork needed for large holds. More advanced climbers will find that shoes made specifically for climbing will greatly enhance their ability to move.

The sizes and locations of holds will determine the ways climbers position their feet to take advantage of holds. Encourage participants to place their feet solidly on each hold and keep them still until they are ready to move to the next hold. The foot techniques climbers most often use are *edging*, *smearing*, and *jamming*.



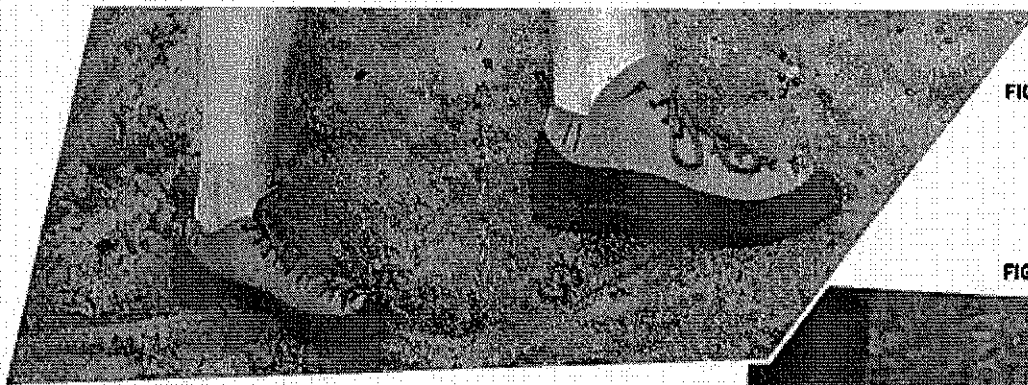


FIG. 66. EDGING

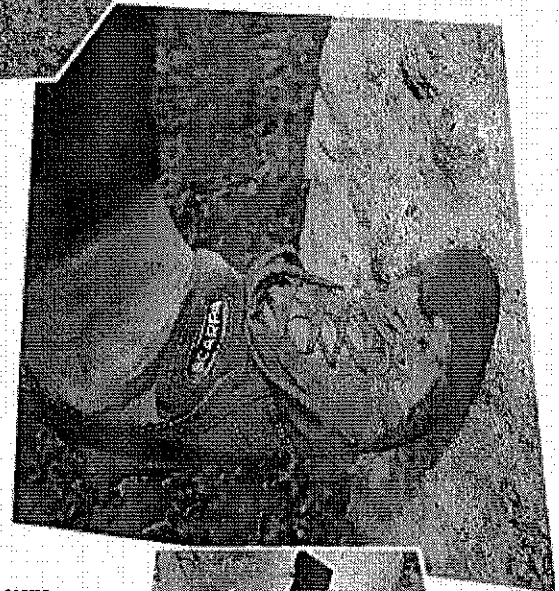


FIG. 67. SMEARING

**Edging.** A climber can turn a foot sideways and place the edge of the sole on a nub, narrow ledge, or other hold. It may feel most natural to edge with the inside of the shoe, although edging with the outer portion of the sole sometimes makes possible a series of moves.

**Smearing.** Instruct a participant to place the sole of the shoe toe against the rock. As the foot bends and takes the body's weight, the rock will dig into the sole and hold the climber, especially if the participant's body is vertical and the weight is directly over the feet. The sticky rubber soles of modern climbing shoes are intended to enhance this kind of traction. Both smearing and edging are more difficult to accomplish with hiking boots or regular athletic shoes.

**Jamming.** Climbers can sometimes fit their feet sideways into cracks in the rock and then twist their ankles to create a more secure stance. A "jammed" foot should wedge tightly enough against the sides of the crack to hold the climber's weight.

#### Handholds

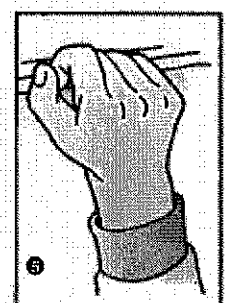
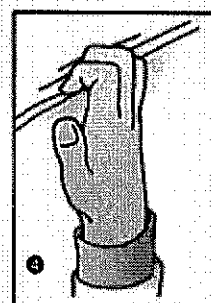
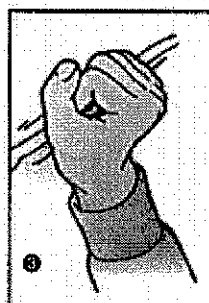
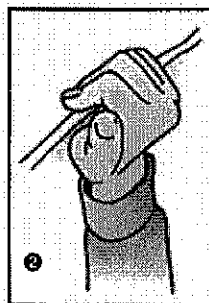
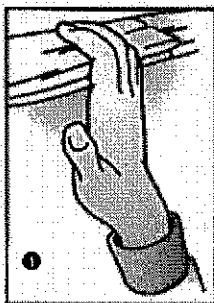
Holds present themselves in many shapes and sizes, from tiny pockets and small nubs to cracks and ledges. There are a number of ways for climbers to position their hands to take advantage of available holds. However, beginning climbers may not have adequate finger strength to manage some of these holds.

**Clings.** Place your fingertips on the edge of a table, bend your fingers at the second joints, and pull down with your wrist. That's a cling hold, the most common way climbers hang onto edges. If a hold is small, you might cling to it with only a couple of fingers, perhaps with your thumb braced across the top of your fingers. (Climbers sometimes call a big hold—using all four fingers and the thumb—a bucket or a jug because using it is like grabbing the lip of a large container.)



FIG. 68. JAMMING

FIG. 69. CLINGS



- ① Open grip. ② Cling grip. ③ Cling grip, with the thumb used to support or brace the fingers. ④ Fingertip grip. ⑤ Bucket or jug grip.



FIG. 70. UNDERCLING



With the undercling, the hands pull one way while the feet push the other way.

**Underclings.** If you are grasping a rock with your palm up rather than down, the hold is an undercling. An undercling works because your hands are pulling one way while your feet are pushing the other. Use the undercling to move sideways along a face, or for balance as you search above for your next handhold.

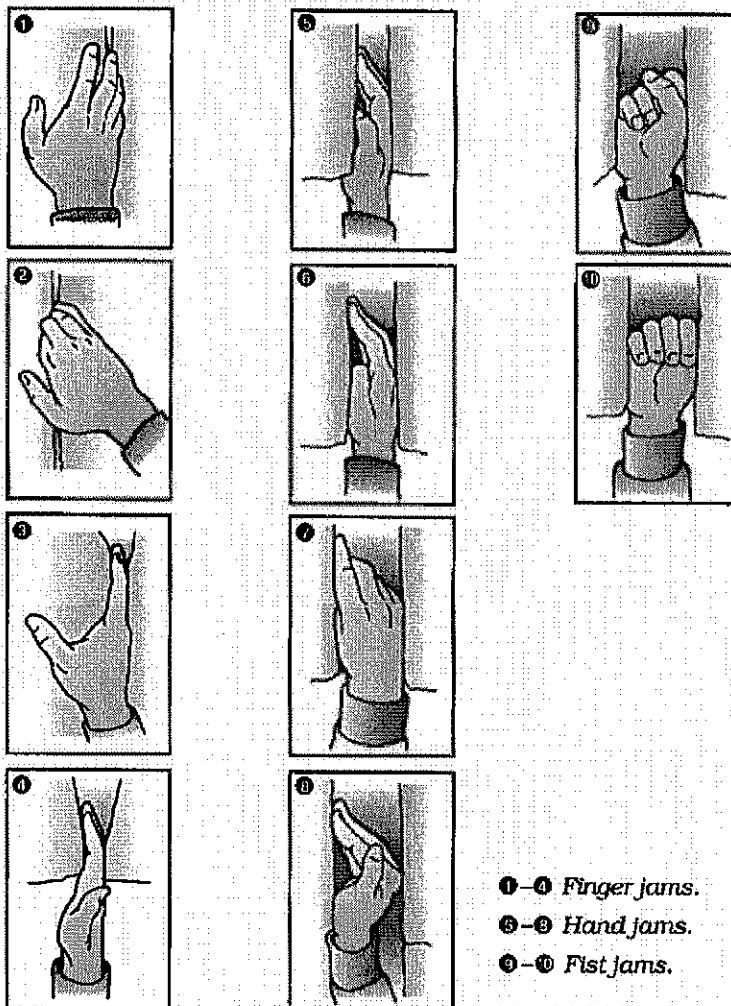
**Jams.** A crack in a wall might be just the right size for you to fit in some or all of your hand. Arch your fingers or clench your fist to tighten your hand in or against the sides of the crack. Knuckles can be taped to avoid injury.

*Finger jams* are usually done with the thumb pointing down and the fingers twisted to lock them into a solid position. Arch your fingers or clench your fist to tighten your hand in or against the sides of the crack. Try stacking the fingers on top of one another and pressing the fingers and thumb against the sides of a crack.

*Hand jams* can be used in cracks large enough to accommodate the entire hand. Twist the hand and put the thumb across the palm to create pressure against the sides of a crack. When moving up past a hand jam, be aware that the pressure on the hand will change and the climber may need to change hand and body position to maintain a secure hold. Depending on the size and shape of their hands, different people will approach jamming a crack in different ways.

A *fist jam* makes use of a fist turned or tightened to put pressure against the sides of a crack.

FIG. 71. JAMS



①-④ Finger jams.  
⑤-⑧ Hand jams.  
⑨-⑩ Fist jams.

USE JAM HOLDS WITH CARE.

TWISTING HANDS OR FEET TOO

HARD CAN RESULT IN INJURY,

ESPECIALLY IN A FALL.

### Combination Holds

In certain situations, climbers employ holds that are a combination of handholds and careful foot placement. Combination holds that participants may find useful are *liebacks*, *counterbalance*, *chimneying*, and *mantling*.

**Liebacks.** Use a lieback (also called a *layback*) to negotiate where two rock faces meet to form a corner. With your hands, hold the crack where the walls join, then push against either rock face with your feet. Moving one foot or one hand at a time (while maintaining three-point contact at all times), work your way up the route. Constant pressure on your hands and feet will prevent you from falling.

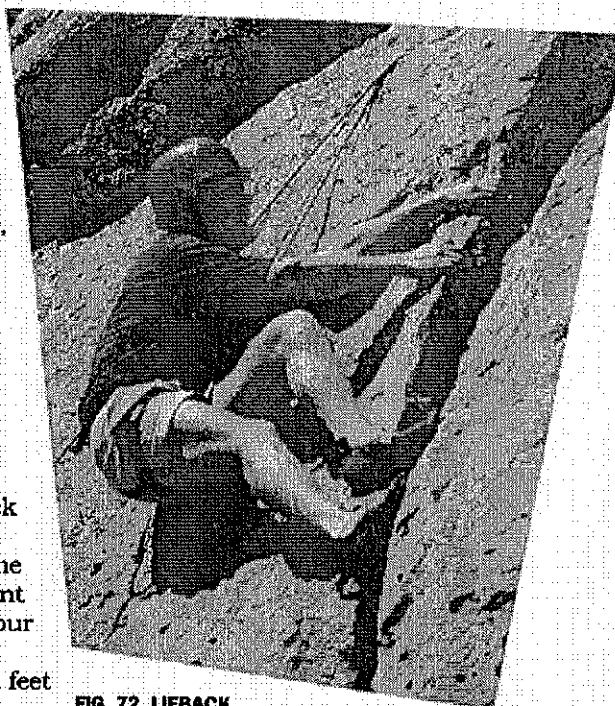
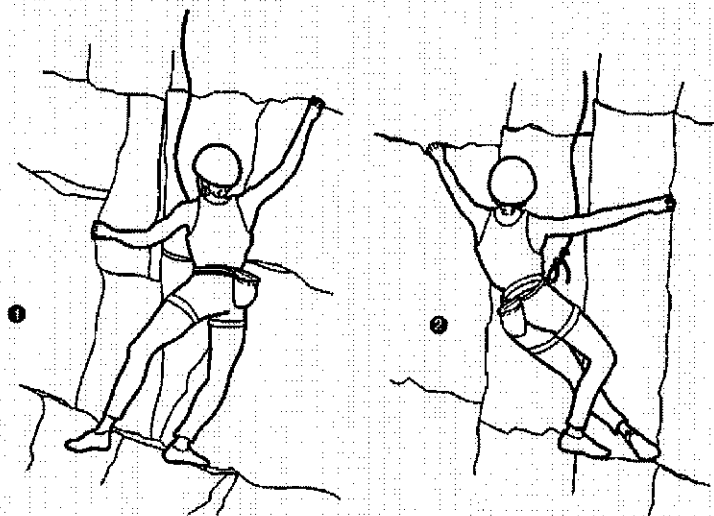


FIG. 72. LIEBACK

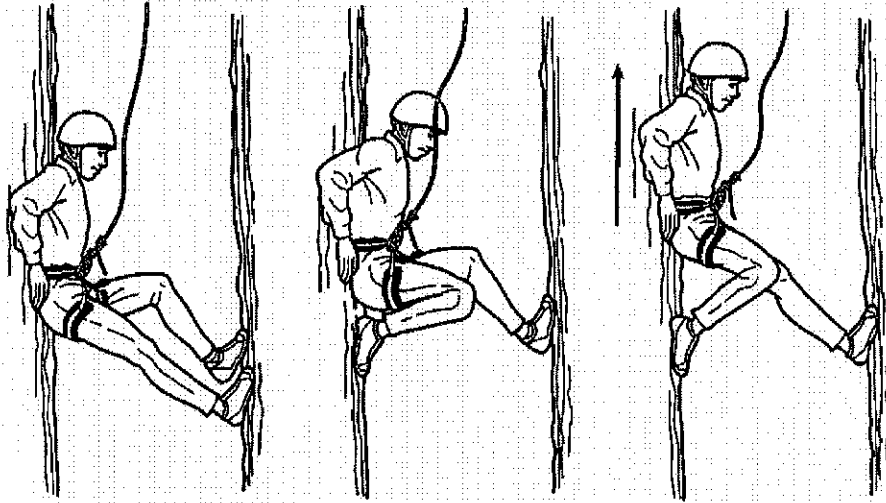
FIG. 73. TWO EXAMPLES OF COUNTERBALANCE



- ❶ The left foot is extended to the side to provide counterbalance.
- ❷ The left foot is flagged in front of the right for counterbalance.

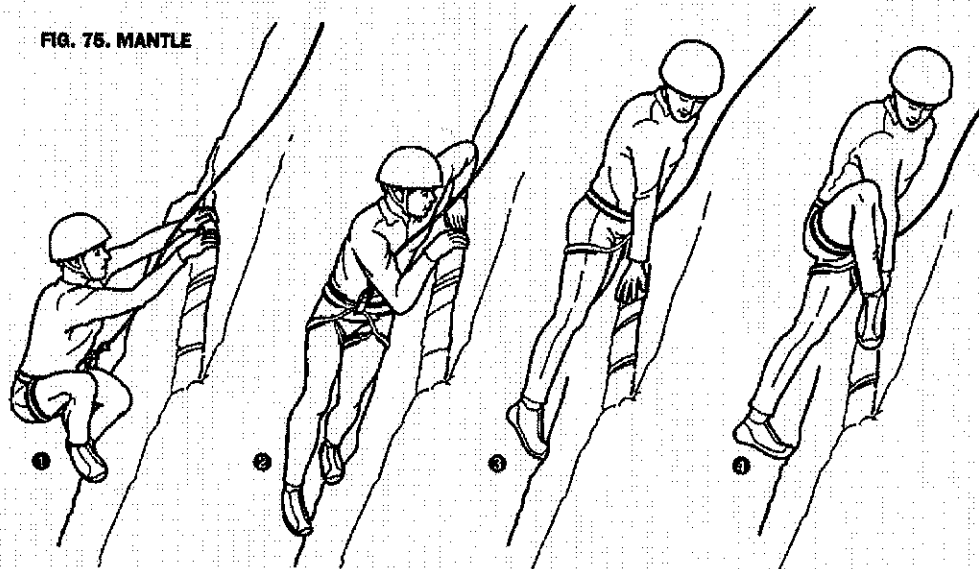
**Counterbalance.** A climber can sometimes extend a leg or an arm to a position that does not offer a solid hold, but rather provides balance during an ascent. Counterbalancing involves the entire body, using position and weight distribution to make the most of minimal holds by applying pressure from your feet or hands in opposite directions to maintain a position. Counterbalancing can take a variety of forms, including crossing one leg in front of the other, a move known as *flagging*.

FIG. 74. CHIMNEYING



**Chimneying.** If a crack in a rock face is wide enough—what climbers call a *chimney*—you can press your back against one side and your feet against the other, keeping your hands low and pressing with the palms. Or you can press one foot and one hand against each side. Move upward by “walking” up with your feet and pushing with your hands against the sides of the chimney. As you straighten your legs and push with your hands, your back slides upward against one side of the chimney. Alternate leg positions with each upward move to help balance the stresses between the legs and avoid cramping.

FIG. 75. MANTLE



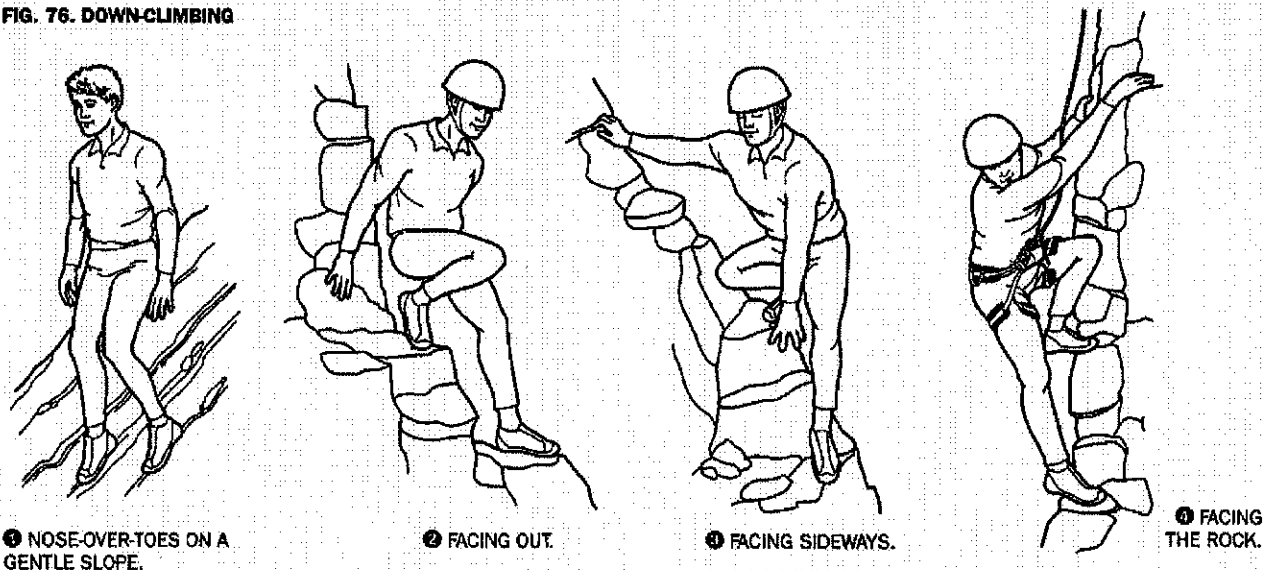
- ① Approach the ledge. ② Place a palm on the ledge and cock your arm.
- ③ Push yourself up, then push down as you straighten your arm.
- ④ Lift a foot to the ledge and stand, balancing your weight over your foot.

**Mantles.** Use a *mantling* move to hoist yourself onto a ledge or over the top of a wall or cliff. First, climb high enough to place a palm on the ledge. Push your body up, then push down as you straighten your arm, using your legs and your other arm as much as possible. Lift a foot to the ledge, then stand upright as if you were getting out of a swimming pool.

## Resting While Climbing

Although the top-roped climbs of participants in BSA activities will seldom be of great length, novice climbers may take a while to reach the top. Now and then while making their ascents, it might be helpful for them to rest. Instructors can point out efficient techniques that climbers use to rest—locking the knees or hanging from the arms in ways that use the skeletal system to hold body weight rather than relying on muscles.

FIG. 76. DOWN-CLIMBING



*A helmet is needed anytime danger from falling objects exists or there is danger of a climber falling. A rope and harness are needed whenever the climb exceeds shoulder height.*

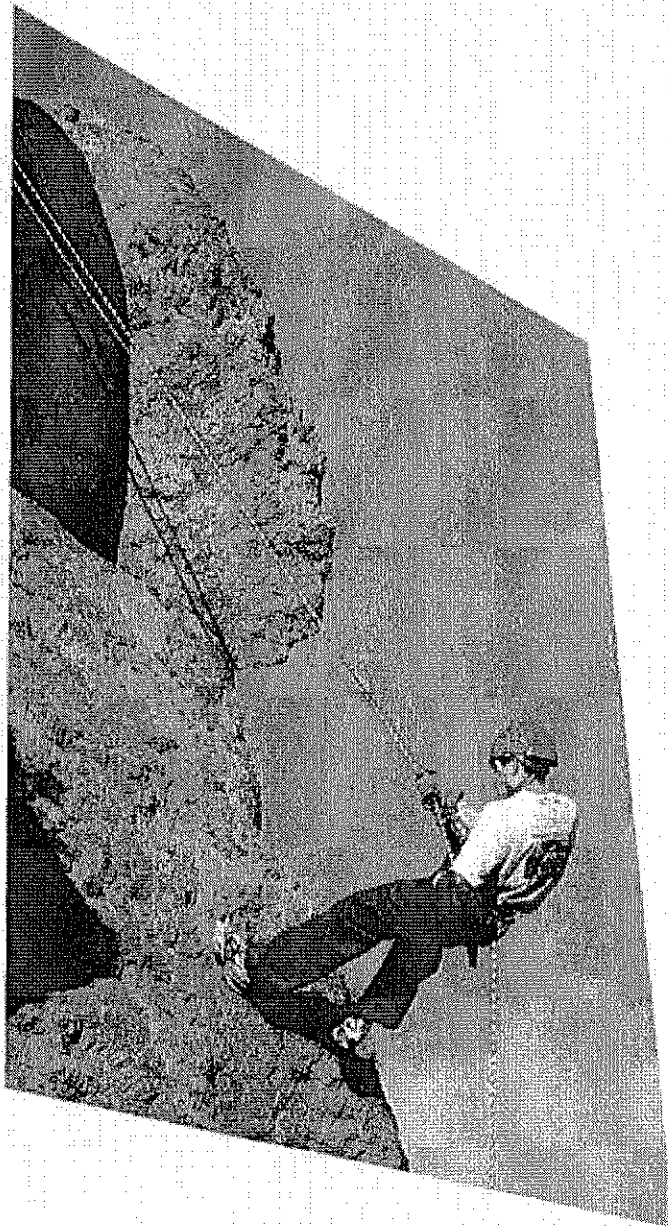
## Down-Climbing

Climbing down a face can be more difficult than going up, since climbers may not be able to see or anticipate the holds as well. On gentle slopes, climbers should face out and lean forward in a *nose-over-toes* position that keeps body weight over the feet. Where terrain is steeper, they can move sideways, keeping at least one hand on the rock as they descend. On the steepest walls, it's best to face the rock and use the three-point stance. Leaning out with their weight over their feet will give them the clearest view of the holds below.

### **CLIMB SMART! PROGRAM**

BSA climbing directors and instructors may have occasion to refer to the Climb Smart! program, a national public awareness campaign designed to promote safe climbing and individual responsibility. The Climb Smart! program is based on the four points of the Universal Warning:

- Climbing is inherently dangerous.
- Instruction is required.
- Climbing equipment is for climbing only.
- You are responsible for your own actions.



# Chapter 9

## Rappelling

*Rappel* is a French word meaning "recall." Climbers use rappelling to descend steep cliffs by making a controlled descent of a stationary rope. Rappelling is a vital skill for anyone interested in becoming a well-rounded mountaineer. It is also a terrific activity for novices, giving them opportunities to learn something new, to increase their self-confidence, and to enjoy an activity they are likely to find exciting.

For decades, people rappelled by wrapping rope around their bodies in ways that capitalized on friction to slow their descents. Rappel devices used by modern alpinists make rappelling more reliable, safer, and easier to master. Several belay/rappel devices are acceptable for BSA climbing and rappelling, including the figure eight device, Sticht belay plate, tube devices, and specialized belay devices such as the Grigri. Rappellers must be given specific instructions for the type of rappel device being used.

### Anchors

Every rappel rope must be securely anchored. Anchoring systems must be set in line with the direction of the load that will be placed upon the rope.

Rappelling may be done with either a single rope or a double rope. Because two ropes will generate more friction when wrapped around a figure eight, the descent of a double-rope rappeller will be slower than the rappel of someone on a single line. That additional friction may discourage rappellers from attempting to make rapid descents or from bouncing down the rock face, practices that can put greater strain on rope, hardware, and anchor points.

- A rope to be used for a single-rope rappel can sometimes be attached directly to a fail-safe anchor point such as a tree, using the coil-wrap/tensionless rigging method. Otherwise, tie a figure eight on a bight near the end of the rope (back it up with a safety knot) and clip the resulting loop to the anchor system with locking carabiners. (Anyone using a single-rope rappel must be belayed with an independent belay rope.)
- To anchor a rope for a double-rope rappel, find the center of the rope and use two locking carabiners to clip into the anchor system. Use two separate figure eight on a bight knots (or double-loop figure eights) so that the two ropes are independently attached to the anchor. (Anyone using a double-rope rappel must be belayed either with an independent belay rope or with a fireman's belay on both of the ropes.)



- Both the single-rope rappel and the double-rope rappel can be set up as releasable rappels that could prove useful in the case that something becomes jammed in the rappel device. See page 96.

(For guidelines on using the coil-wrap/tensionless rigging method and other forms of anchoring, see chapter 6, "Anchor Points and Anchoring Systems." Later in this chapter, find guidelines for belaying rappellers.)

## Rappel Rope

All cordage used for climbing (climbing ropes, accessory cord, and webbing) must be designed for climbing and used according to the manufacturer's recommendations. All dynamic climbing ropes must be UIAA- or CEN-approved. All static ropes used for rappelling must have a tensile strength (breaking strength) of at least 22.2 kilonewtons (5,000 pounds) when new. A diameter of  $\frac{7}{16}$  inch or 11 millimeters is recommended for static rappelling ropes. All ropes must be new when procured.

(For more on rope types and measurements, see chapter 4, "Rope and Rope Handling.")

The established routes used by most BSA climbing/rappelling programs are of known height, so it is likely that a rope set up for rappelling will reach all the way to the bottom with plenty of slack to spare. Even so, instructors should get in the habit, every time they attach a rappel rope to an anchor, of making sure the rope is long enough so that there is no chance a participant can slide off the rope before reaching a safe, off-belay stance on the ground. A stopper knot must be tied in the end of the rappel rope to prevent anyone from rappelling off the end of the rope.

Every rappeller must be belayed with either an *independent belay rope* or a *fireman's belay*.

- **Independent belay.** The rappeller is connected to a belay rope tied directly to his or her harness with a figure eight follow-through knot backed up with a safety knot. The belay rope may or may not be connected to a different anchor than the rappel rope, depending on the type of anchor system used.

As a belayer, begin by double-checking the belay system to be sure it is secure, that you are properly anchored, and that the belay device is correctly set. The bulk of the belay rope should be loosely piled next to you on your brake-hand side. Exchange verbal signals with the rappeller. As the rappeller descends, gradually release the belay rope through the belay device.

- **Fireman's belay.** In a double-rope rappel with the center of the rope clipped into an anchoring system, use two separate figure eight on a bight knots or two double-loop figure eights (super eight or Canadian eight). One line can be considered to be the rappel rope while the second line serves as the belay rope, as long as a fireman's belay is in place at the bottom of the ropes.

To use the fireman's belay, position yourself at the bottom of the route and grasp both lines of the rappel rope. Exchange verbal signals with the rappeller. As the rappeller descends, be ready to pull down on the rope with enough force to increase friction on the rappel device and thus slow or stop the rappeller's progress.

Some rappellers may wish to use an independent dynamic belay line in addition to a two-rope rappel. If this is used, the fireman's belay is not required.

### WHY RAPPELLERS ARE BELAYED

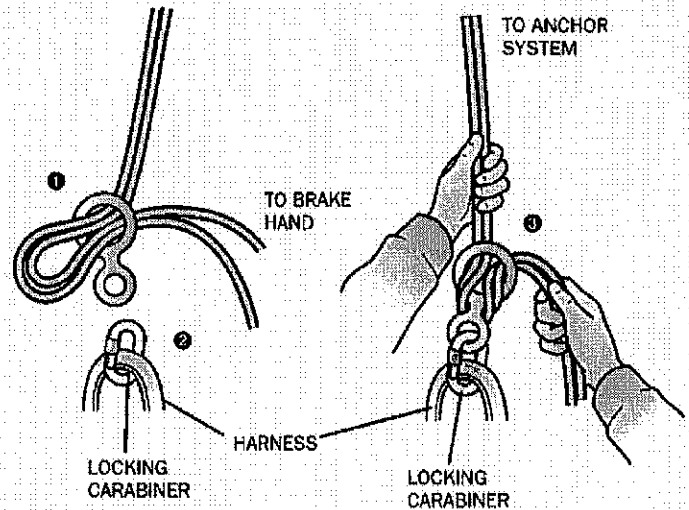
Belaying rappellers provides an important margin of safety, especially for participants with beginning and intermediate skills. Anyone involved in BSA rappelling activities must be belayed with an independent belay line. (For more information, see chapter 7, "Belaying and Belay Signals.")

## Rappel Program Protocol

Standardized routines at a rappel site will help ensure the safe and orderly management of activities. Among the most important guidelines are these.

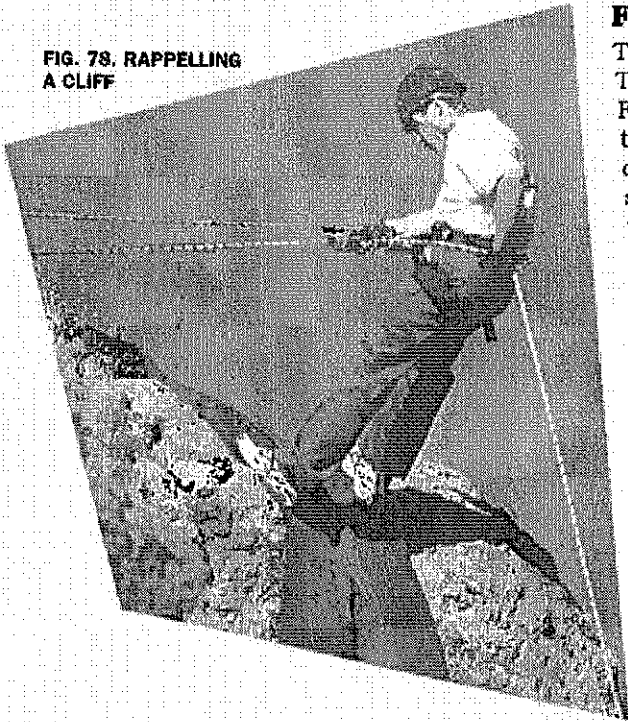
- Tie an appropriate knot or knots to the anchor system.
- When a tree is the anchor point, the rappel rope may be secured directly to it using the coil-wrap/tensionless rigging method.
- To keep them from tangling or rubbing together, the belay rope is ideally set at a slight angle to the rappel rope.
- The rappel rope hanging down the route should be perpendicular to the edge of the cliff and free of obstructions including brush, loose rock, etc.
- Use burlap, pieces of carpet, or other padding to protect rappel ropes from the sharp edges of cliffs.
- Participants must be tied into the belay as soon as they approach the top of the rappel route. If they are attached to a safety line, they remain clipped into it until the belay rope has been secured and the rappeller is on belay. Protected by the belayer, they can then secure themselves to the rappel rope.
- *Never expose an unbelayed, unsecured participant or staff member to a dangerous situation.* Everyone must be belayed or attached to a safety line before approaching the edge of a cliff. This also applies to any set-up and take-down work.
- Long hair and loose clothing must be secured to prevent them from entangling in the rappel rope or hardware. Rings, watches, and dangling jewelry must be removed. Pockets must be emptied of any items that could injure a rappeller such as pens, pencils, combs, and items like compasses that have sharp edges.
- Each rappeller must wear properly fitted leather gloves to prevent rope burns and improve control. The director will determine the appropriate gloves for the site.
- As with all climbing/rappelling activities, rappellers, belayers, instructors, and anyone else in the vicinity of the rappel route must wear climbing helmets that are UIAA- or CEN-approved.
- Keep onlookers away from the fall zone where they could be in the path of falling objects.
- Instructors independent of the belayer should position themselves at the top of the route to prepare participants for rappelling, and at the bottom to help them disconnect from the rappel and belay ropes and move to a safe location. Instructors on the ground can also monitor the movement of rappellers on the face, direct traffic among participants waiting their turns to climb, and in other ways keep the operation running smoothly.

FIG. 77. ATTACHING A FIGURE EIGHT DEVICE FOR A DOUBLE-ROPE RAPPEL



- 1 Figure eight rappel device.
- 2 Attaching rope to the device.
- 3 Figure eight rappel device in use.

FIG. 78. RAPPELLING  
A CLIFF



### Figure Eight Descender

The most commonly used rappel device is the *figure eight*. To secure it to a rappeller, form a bend in the rappel rope. Feed the bend through the back of the larger opening of the figure eight, then loop the bend over the smaller portion of the device. If the rappeller is right-handed, the rope should hang from the right side of the figure eight (from the left side for a left-handed rappeller). Next, use a locking carabiner clipped into the smaller opening of the device to secure the figure eight to the rappeller's seat harness.

A right-handed rappeller should consider the right hand to be the *brake hand*, the left to be the *guide hand*. With the guide hand, the rappeller lightly holds the rappel rope above the figure eight device, then grasps the trailing end of the rope with the brake hand and brings it tightly alongside the right buttock. **The brake hand must never leave the rope!** (For left-handed rappellers, the left hand is the brake hand, the right hand serves as the guide hand, and the rappel rope passes along the left side of the body.)

As the rappeller backs down the cliff, friction created by the rope's motion through the rappel device will slow the descent. The rappeller can control the speed or completely stop the descent by pulling the rope more securely against the body with the brake hand. (Participants who

have experience with belay devices may recognize that the principles involved in rappelling with a rappel device are somewhat similar to those practiced by belayers, including the designation of a guide hand and a brake hand.)

An instructor stationed at the bottom of a rappel can monitor the progress of each participant and provide guidance and encouragement. That instructor can serve as the belayer, standing ready to place tension on the end of the rappel rope (a *fireman's belay*) to help a participant control the rate of descent.

### Rappelling Technique

Rappelling is usually a matter of simply walking backward down the face of a wall while controlling one's speed with the rappel device. A seasoned rappeller should have no difficulty with that concept, but novices can find it completely counter-intuitive to lean backward over open space. They may be nervous and even fearful. One way to help beginners is to provide introductory training on flat ground or on a small hill. Using a foot stop, participants can be instructed to lean backward until they are sitting on the ground.

Instructors can help participants overcome their concerns by helping them understand that the anchors are secure, the belayer will provide unquestioned security, and the basic rappelling technique will ensure a safe trip down. Recognizing the anxieties of rappellers and guiding them in a calm, reassuring manner will greatly enhance the experience for participants and for instructors.

After a participant has been secured to the belay system and the rappel rope, the instructor at the top of the route must double-check the way the participant is tied in to the belay and rappel ropes, see that the belayer is positioned and ready, and make a quick visual survey of the anchoring systems. When everything is in order, the rappeller may commence in the following sequence.

- ❶ Keep the guide hand away from the rappel device, and the brake hand on the rope and alongside and behind the hip.
- ❷ Exchange the correct verbal signals with the belayer. (For a discussion of verbal signals used by rappellers and belayers, see chapter 7, "Belaying and Belay Signals.")
- ❸ Back to the edge of the cliff and position the feet a shoulder-width apart.
- ❹ With knees slightly bent, lean back and place body weight on the rappel rope. The correct position is similar to sitting in a lawn chair.
- ❺ Take small steps and walk backward down the face, slowly releasing rope through the rappel device. The rappeller should start backing down with his feet just before reaching a horizontal position at the edge of the cliff to avoid being inverted. Keep the feet flat against the wall and the weight on the heels.

Instructors should discourage rapid descents, bounding rappels, pendulum swings, and any other actions that can put unnecessary strain on the rope and anchoring systems. Instructors must also set a good example by using proper technique whenever they are rappelling.

### AUTOBLOCK

An autoblock is a method of using accessory cord or webbing as a backup or an "extra hand" to the brake hand of a rappeller.

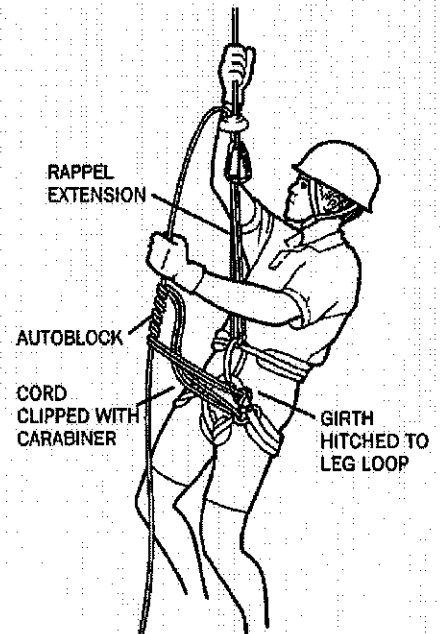
An autoblock is typically made using 4- to 6-millimeter accessory cord tied into an 18-inch loop or with a 24-inch sewn runner, preferably made of nylon and not Dyneema.

Girth hitch the loop around the leg loop of the harness on the same side as the brake hand of the rappeller. Wrap the doubled material three to five times around the brake side of the rope and then clip the end back to the leg loop with a carabiner.

Always check to make sure the autoblock will grab by pulling up on the rope. If it slips, disconnect the carabiner and add more wraps until it grabs. Also make sure that the autoblock cannot touch the rappel device as it could fall to grab or get stuck in the device.

When rappelling, one technique is to place the brake hand above the autoblock wraps and slide them down as you let the rappel rope feed through them. Another technique is to place the brake hand below the autoblock wraps and use the guide hand above it to bump or slide it down. This also puts two brake hands on the rope, giving more control. If the rappeller wants to stop descending, let the autoblock slide up, and it will hold the rope.

FIG. 79. AN EXAMPLE OF AUTOBLOCK BACKUP FOR A RAPPEL (INDEPENDENT BELAY LINE OMITTED FOR CLARITY)



### **Beginning Descents**

A key role for instructors at the top of a rappel route is helping rappellers position themselves to begin their descents. A special case can occur when the rappel rope is anchored at a point lower than the waist level of a rappeller. An instructor can ease the situation by gathering a few feet of slack in the rappel rope and using it to lower a rappeller down the cliff to a point where it is possible to assume the correct rappel stance. Remember that everyone near the cliff's edge, including the instructor, must be secured to a belay or a safety line.

### **Releasable Rappel**

#### **Single-Rope Rappel**

The preferred technique is to employ a static rappel line as the activity rope and to tie an independent dynamic rope for the belay into the climber's harness. The lines are tied to the anchor system. If the static rappel rope is twice the height of the rappel, you have the option to lower the rappeller to the ground. For example, for a 40-foot rappel, at least 40 feet of extra rope must remain at the anchor.

Leaving the appropriate length of rope, use a belay device and a mule knot or a Münter/mule knot with an HMS carabiner (*halb mastwurf sicherung*, translated from German as "half clove hitch") to anchor the rappel rope.

If the rappel device becomes jammed, follow this procedure.

- ❶ Tie off (with a mule knot) the dynamic belay rope.
- ❷ Slowly untie the mule knot on the static rappel rope. With the belay device or the Münter, it is easy to lower the static rappel rope to create some slack. The rappeller is now supported by the belay rope.
- ❸ Clear the rappel device.
- ❹ At the anchor, take the slack out of the static rappel rope and tie it off again.
- ❺ Untie the mule knot in Step 1 that is locking off the belay line. Lower the rappeller a few feet so that his weight is back on the static rappel rope. The rappeller may now continue the activity.

#### **Double-Rope Rappel**

A common technique is to employ two independently anchored static rappel ropes with a fireman's belay. The lines are tied to the anchor system. If each static rappel rope is twice the height of the rappel, you have the option to lower the rappeller to the ground. For example, for a 40-foot rappel, each static line must have at least 40 feet of extra rope at the anchor.

On each rappel rope, leaving the appropriate length of rope, use a belay device and a mule knot or a Münter/mule knot with an HMS carabiner.

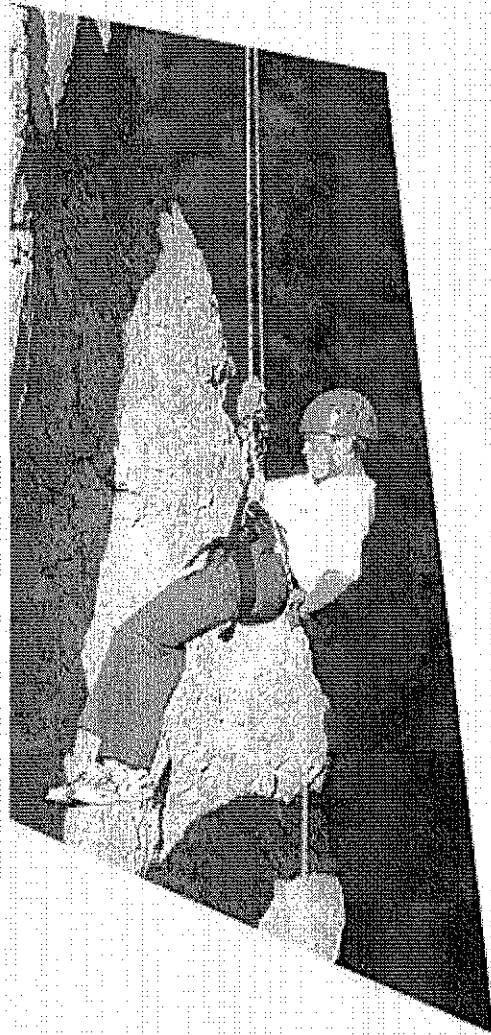
If the rappel device becomes jammed, follow this procedure.

- ❶ Have the fireman's belayer pull on the two ropes to lock off the rappeller.
- ❷ Slowly untie one of the mule knots on one of the static rappel ropes.
- ❸ Use the belay device or the Münter to lower one of the static rappel ropes to create some slack. The rappeller is now being supported by the other static rappel rope.



- ④ Clear the obstruction from the slack rope.
- ⑤ At the anchor, take the slack out of the now-cleared static rappel rope and tie it off again.
- ⑥ Repeat the procedure with the other rappel rope. Both ropes are now clear, and the rappeller may continue the activity.

In either case, the double length of rope needed for the rappel will allow belayers to lower the rappeller all the way to the ground if necessary.



## Site Selection

Not many years ago, climbing was almost always practiced in the mountains. Today, however, climbing areas can be found throughout the country. Among the most popular kinds of sites are natural rock faces and artificial walls.

### Natural Rock Faces

Steep cliffs, mountainsides, and canyon walls have long attracted climbers to find handholds and footholds on rock faces. Trees, boulders, or rock outcroppings serve as anchor points for belay and rappel ropes.

Some of these rock faces are in Scout camps. Many others can be found in state and national parks or other public lands, and on private property. Whatever the case, all climbers must secure permission from property owners or land managers before setting out on a climb, and then follow any guidelines a public agency or private landowner may require.

### Artificial Walls

In recent years, outdoor climbing walls have been built in some of America's city parks and Scout camps. These walls are often formed from concrete with rocks embedded to serve as holds for hands and feet. Metal rings set into the tops of the walls provide anchors for belay ropes. At the base of the walls may be a bed of gravel or shredded rubber to cushion the impact of boulderers jumping down.

A growing number of schools, climbing clubs, and climbing gyms have indoor walls that challenge climbers from beginners to experts. Handholds of different shapes bolted to the walls create climbs of varying difficulty and interest. The handholds can be moved around to provide climbers with fresh routes. These holds will occasionally need to be retightened. Belay ropes anchored above the walls allow climbers to be top-roped as they practice their moves.

Scouts attending summer camp may enjoy climbing and rappelling outdoors on towers that offer a number of faces with routes of differing degrees of difficulty. Permanent or temporary walls established outside or indoors may be fairly high, up to 30 feet or more. Other walls are horizontal rather than vertical, providing climbers with opportunities to practice traverses and bouldering moves while ascending no more than a few feet above the ground. Provision should be made to monitor or disable climbing facilities to a height of 12 feet when not in use. Plywood panels or a heavy tarp placed over the climbing holds may be used to secure climbing facilities.

FIG. 80. NATURAL CLIMBING AREA

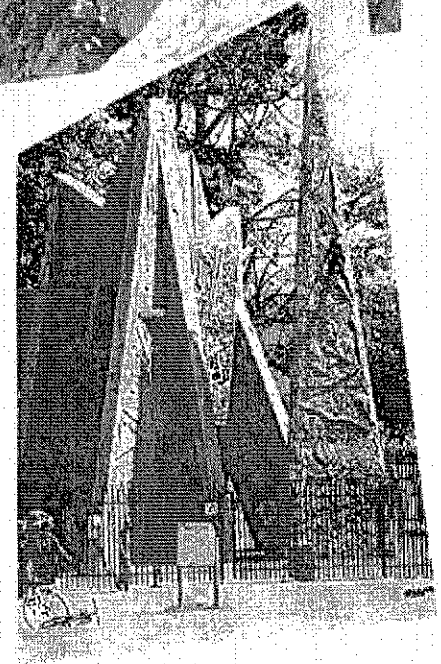
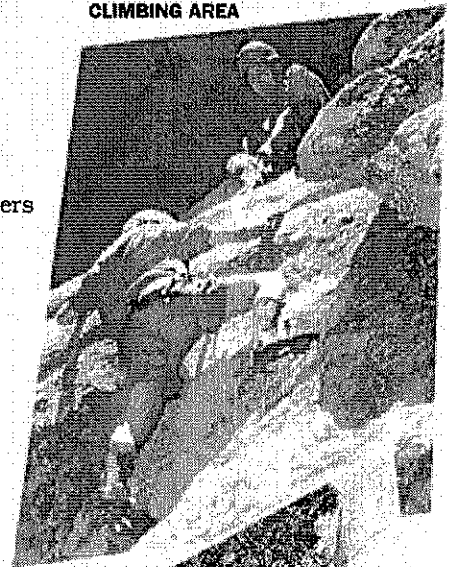


FIG. 81. ARTIFICIAL CLIMBING WALL

## **Selecting a New Site for a BSA Climbing/ Rappelling Program**

Choosing an outdoor location as the site of a climbing/rappelling program requires a good deal of thought and the input of knowledgeable people. The following steps will help ensure that a site is challenging, safe, and worthwhile.

- Engage the assistance of local rock-climbing authorities or BSA climbing directors from other areas who have extensive, safe climbing experience and an understanding of the program the BSA offers young people. Rock climbing organizations may also be able to provide advice.
- Avoid areas where rock is unduly fractured, brittle, loose, slippery, or crumbly. Easily dislodged rock will present a hazard to climbers, rappellers, and bystanders.
- The site should be reachable by road or trail, or should have other quick access to emergency aid within a reasonable time.
- Participants in warm, arid regions may be more comfortable on climbing and rappelling faces oriented toward the north or east, out of direct afternoon sunlight.
- Depending on the number of participants expected during normal sessions of the program, establish climbing routes of 30 to 60 vertical feet. If regular operations will involve a large number of climbers, shorter routes will allow participants to complete their ascents more quickly. Several routes of varying difficulty are preferable, allowing instructors to match the routes for a day with the experience level and abilities of participants, or to encourage participants to select the route they most want to test.
- The incline for climbing should be a 40° to 80° slope, with 60° to 70° slope being about right. There should be plenty of holds for hands and feet, preferably a variety of cracks, ledges, and protrusions. Relatively smooth surfaces will not do, especially for beginning climbers.
- A rappelling pitch should have a reasonably constant slope from top to bottom. Avoid routes with large ledges or benches that could interrupt constant tension on the rappel rope or interfere with the ability of instructors to observe and monitor rappellers throughout their descents.
- To ensure a feeling of adventure and accomplishment, a rappel route should have a vertical length of at least 30 feet. Descents require only a few moments for each participant to complete, so a program can operate efficiently even with long rappels.
- Every route for climbing and rappelling must feature fail-safe anchor points, preferably large, living trees or solid rock projections. If artificial protection must be installed, use bolts of at least 3/8-inch diameter approved for climbing purposes, and have them installed by a qualified expert approved by the council's climbing/rappelling committee. (For more on anchoring, see chapter 6, "Anchor Points and Anchoring Systems.")
- There must be sufficient area above each route to accommodate at least three people comfortably—a belayer, an instructor, and a climber or rappeller. (A route on which a belayer will lower a top-roped climber to the ground does not require as much space at the top, but does need enough room that an instructor can safely install anchoring systems each day before participants begin to climb.)
- If participants will climb and then rappel in sequence, establish a safe path from the top of the climb to the top of the rappel. The path should not run next to the edge of a cliff; if it does, install a safety line and require participants to clip into it before unclipping the belay rope. A safety line keeps participants out of harm's way when moving to the next activity.

- There must be good places for belayers to position themselves, ideally where they can brace their feet against the direction of a potential fall.
- Remove any trees, limbs, shrubs, or other obstacles that could interfere with climbing, rappelling, or belaying without significant harm to the vegetation or geologic formations. If that is not possible, choose another site. Follow the Leave No Trace principles.
- Place routes so that participants can be observed from below throughout all climbs and rappels, and preferably from above as well.
- Consider where bystanders and participants waiting their turns to climb will gather. The gathering area must be well removed from the line of fall of rocks or climbing equipment. Unless they are belaying or spotting, keep bystanders out of the safety zone below the climb or rappel.
- Establish a secure place to store ropes and hardware. Whether near the site or at some other location, the equipment cache must be protected from rodents, weather, and vandals.
- Toilet facilities should be convenient, both for the comfort of participants and for the protection of the environment.
- The site should have a source of safe drinking water. Otherwise, instructors and participants must bring their own water.

### **Evaluating the Safety of a Climbing/Rappelling Area**

The temperature, lighting, and stability of an indoor climbing area can be controlled as easily as in any sports gym. At outdoor climbing areas, however, conditions will vary. Before beginning a day's activities, instructors should take a few minutes to check the overall status of an outdoor climbing/rappelling site and note anything that might have an impact on the safety and experience of participants. Here are some factors to consider.

#### **Weather**

Check the weather forecast before departing for the climbing site. Have an alternate plan for weather conditions that make climbing unwise. If it is raining, stay off rock faces. Water can make climbing surfaces slippery. Wet ropes can be difficult for belayers to hold, and climbing equipment that has become damp must be dried before going into storage.

Lightning can be a serious concern, especially in mountainous areas. Afternoon storms may develop quickly, catching climbers unprepared if they are not vigilant. Many climbing/rappelling program sites are near ridge tops that may be targets of lightning strikes; lightning can also hit locations deep in valleys. Carabiners and other metal climbing hardware may attract electrical currents from lightning, as can wet rope. Whenever there is bad weather or lightning in the area, immediately suspend all climbing/rappelling activities and retreat to a safe location.

#### **Rock**

The kind of rock found in an area can make a big difference in the safety of climbing. In general, hard rock such as granite offers climbers the best surfaces. Softer rock or rock that is fractured or layered, such as shale, may crumble or slide away under a climber's weight. Seek advice from someone in the area on the best climbing sites.

Look above the climbing area to see what might be waiting to fall. Stay away from faces that are beneath leaning pinnacles or boulders. Listen for the sound of small stones bouncing down the rock—an indication that there is unstable material above.

## **Climbing and Rappelling Towers and Artificial Climbing Walls**

The "Resources" section in this book includes plans to build climbing and rappelling towers.

### **Portable Climbing Structures**

Portable climbing structures may be appropriate for use at Scout shows, camporees, or anywhere that a fixed structure or natural climbing site is unavailable. Portable climbing/rappelling structures must be securely anchored. The surface of all climbing/rappelling structures should not have protruding hardware.

If mobile climbing walls are used, the following items must be considered and implemented:

- Manufacturer's recommendations
- Appropriate state and local laws
- Applicable climbing and Project COPE standards
- Appropriate use of the facility
- Replacement schedule for cables and equipment
- Anchoring and wind resistance

It is recommended that participants not be charged a fee because this might incur additional regulations and/or liability.

Units using portable climbing structures must conduct their activities according to the guidelines laid out in Climb On Safely. District and council activities using portable climbing structures must be conducted according to the current Project COPE and Climbing/Rappelling National Standards.



# Chapter 11

## Conducting a Climbing/ Rappelling Program

The smooth operation of a BSA climbing/rappelling program relies on instructors who are well versed in what they will present, and upon the orderly involvement of participants in the program's activities. This chapter provides an example of a successful presentation at an outdoor climbing area.

- Before participants arrive, instructors at the site check each rope and piece of hardware for signs of damage or wear, then establish anchors and install ropes for rappelling and for belaying climbers and rappellers. They set out helmets and harnesses where they will be easily accessible. They make sure that all items required for a safe program are readily available (including a first-aid kit and a radio or cell phone), as well as any gear to be used for demonstration and discussion (extra carabiners, lengths of rope for knot tying, etc.).
- Instructors have in their possession any relevant information about medical conditions that might affect a participant's experience. The BSA climbing director and the adult unit leaders may help instructors determine the best ways to provide a satisfying experience for people with particular needs.
- Participants have been previously informed of the nature of the activities they will encounter at the climbing/rappelling area, and know what they are to bring and what they are to wear. Recommend that beginning climbers wear long pants.
- Participants may be accompanied to the climbing area by their own group leaders, by BSA climbing instructors, or by other members of a camp staff. There is an obvious place for them to gather and for instructors to conduct the following presentation.

### **Program Presentation**

#### **A. Opening**

- ① Greet participants and help them feel welcome. Find out where they're from and what they expect from the next few hours.
- ② Introduce the BSA climbing staff.
- ③ Learn something about each participant's climbing/rappelling experience. That information may lead instructors to divide participants into ability groups, each tackling routes appropriate for their level of skill.

① Stress that this program will introduce the basics of climbing and rappelling, but that participants will not learn enough or gain sufficient experience to start climbing on their own. Explain that in the future they may want to find reputable organizations or climbing gyms for further instruction and practice. Emphasize again that the day's activities will offer a taste of a great sport, but **will in no way prepare participants to try rappelling or rock climbing without qualified supervision.**

② Review each point of Climb On Safely, the BSA's recommended procedure for conducting climbing and rappelling activities.

## **B. Orientation**

① Check the clothing and footwear of participants, ensuring that they are dressed appropriately for the area and the weather.

- a. Shorts and short-sleeved shirts are fine for temperate or warm conditions.
- b. Footwear—boots with narrow welts are best. Tennis shoes are adequate for friction climbing. Sandals and bare feet must not be allowed.
- c. Loose-fitting clothing may be hazardous, since it may tangle in rappel systems. Clothing should be tucked inside of the harness so that instructors can readily observe harness buckles and rope tie-ins.
- d. Long hair must be secured.
- e. Necklaces, bracelets, earrings, watches, rings, belt buckles, and other jewelry should be removed and held by a group leader or stowed in a prearranged secure storage area.
- f. Glasses (regular or tinted) may be worn, but consider using a strap to keep them from slipping off.
- g. When they are not yet wearing helmets, encourage participants to use appropriate sun protection—hats; sunscreen with a sun protection factor (SPF) of at least 15—and to drink plenty of fluids during the program. Caution them to keep sunscreen and insect repellent from coming into contact with rope or webbing.

② Provide an overview of equipment.

- a. Briefly explain the rope and hardware used for climbing and rappelling activities, and describe how the anchor systems are designed to hold even if several anchor points fail.
- b. Underscore the danger of using gear that is damaged, worn out, or inappropriate, and tell how instructors check equipment and maintain records of its use.
- c. Describe the kinds of rope approved for BSA climbing and rappelling. Explain the characteristics of *dynamic* rope and *static* rope.
- d. Go over proper rope care:
  - Never step on a rope. That can force grit into the fibers and cause the rope to wear out rapidly.
  - Protect the rope from sharp edges or abrasive rocks. Pad edges with burlap or old canvas.

- A moving rope should not cross webbing or another rope. Heat caused by the movement can melt and weaken the rope and/or the webbing.
  - At the end of a program, remove knots from a rope and coil it for storage.
  - Store rope away from direct sunlight to help prevent undue ultraviolet damage.
- ① Show participants the knots they will use that day while climbing and rappelling. Instructors may want to provide participants with 6-foot lengths of retired kernmantle rope so that they can practice knot-tying while waiting their turn to climb or rappel.

The knots generally used by participants are:

- Figure eight follow-through (for tying in to the climbing rope)
  - Safety knot (for backing up other knots)
- ① Discuss verbal signals.
    - a. Explain the reasons for using verbal signals while climbing, rappelling, bouldering, and belaying.
    - b. Lead participants in practicing the verbal signals they will use during the day's activities.

#### **C. Helmets and Harnesses**

- ① Before any instructors or participants move close to the climbing/ rappelling area, they put on UIAA- or CEN-approved helmets that are properly fitted and correctly worn.
- ② Participants who will be belaying, climbing, or rappelling put on seat harnesses. Instructors check the security of each harness after a participant has put it on, then check it again when the participant ties in to climb, rappel, or belay.
- ③ Emphasize the importance of doubling the tail back through the buckle of a harness waist belt that requires it.
- ④ If tied-seat harnesses are to be used, instructors provide clear direction about how the webbing is to be fitted and tied, and then check and double-check the harness tied by each participant.

#### **D. Belaying**

- ① Explain the basics of belaying, including the fact that belayers may wear light gloves to help protect their hands.
- ② When instructors will do the belaying, they take their positions; double-check the security of anchors, belay systems, and harnesses; and get ready for the first climber or rappeller.
- ③ Participants who volunteer to act as belayers should have received previous instruction and be able to demonstrate the required skill. Instructors double-check their harnesses, then help them secure themselves to the anchoring system and assist them in double-checking anchors, harnesses, and the belay system. (An instructor remains near a participant belayer to monitor the belaying, to offer guidance, and to step in if a belayer is not providing appropriate protection for a climber or rappeller.)

## **E. Climbing**

① Instructors demonstrate proper tie-in techniques, verbal signals, belaying, and climbing methods, including the three-point stance and a variety of hand- and footholds. Use correct form in all demonstrations and follow standard belaying methods to the letter. Participants will learn as much from what they see instructors do as from what they hear instructors say.

② Before participants begin to climb, instructors station themselves at the bottom and the top of a climbing route. (In climbing gyms and at outdoor sites where climbers will not go over the top of a route but, rather, will be lowered to the ground by belayers, instructors may be stationed only on the ground.)

③ Have a participant tie in to the climbing rope using a figure eight follow-through knot tied directly to the harness, then back up that knot with a safety knot tied in the tail of the rope. Double-check to see that each knot is correctly tied and sufficiently tight.

④ Monitor the exchange of verbal signals between the climber and the belayer, insisting that they use the correct signals in the correct order.

⑤ Provide supportive encouragement as a climber ascends. Listen carefully to the questions and concerns of participants, keep comments positive, and at all times bear in mind the safety and well-being of everyone at the site.

⑥ An instructor greets participants as they reach the top of the climb, then guides them to the next station of the program. In some cases, that means simply untying them from the climbing rope and directing them to a path that leads to the top of a rappel route.

At sites where participants will travel near the edge of a cliff, an instructor clips them to a safety line while they are still on belay. After they are protected by the safety line, the belayer releases the climbing rope so that a climber can untie the figure eight follow-through and proceed to the next station.

(At sites where climbers are to be lowered by belayers on the ground, instructors monitor the climber's upward progress, acknowledge the climber's arrival at the top of the climb, and then supervise the climber and belayer in exchanging the correct signals to commence lowering.)

## **F. Rappelling**

① Instructors demonstrate tie-in techniques, verbal signals, belaying, and rappelling methods. Include the right way to hold the rappel rope, the appropriate stance, and the control of the rappel rope to make a slow, steady descent that will not put unnecessary strain on anchors or belayers. Use correct form in all demonstrations, following standard belaying methods.

② Before participants begin to rappel, instructors station themselves at the top and bottom of the rappelling route.

③ All rappellers must be protected by an independent belay line, have the participant secure the belay rope by passing it through the climbing harness and then tying it with a figure eight follow-through backed up with a safety knot. (A participant who is protected by a safety line stays attached to that line until the belay rope has been secured to the harness and the belayer is on belay.)

- ① Guide the participant in positioning the rappel device on the rappel rope and then attaching it to the harness.
- ② Double-check the security of the harness, the belay rope, and the way the rappel rope is set up with the rappel device. Make a quick visual check of the anchoring system. Be sure the rappeller is wearing leather-palmed gloves.
- ③ Monitor the exchange of verbal signals between the rappeller and the belayer, insisting that they use the correct signals in the correct order.
- ④ Protected by the belay, the rappeller proceeds down the cliff. Instructors observe the entire rappel and are ready to assist in any way necessary.
- ⑤ A rappeller keeps the *guide hand* above the rappel device, relying on that hand only for balance. The *brake hand*, which never leaves the rope, grasps the line and pulls it snugly against the hip and buttock to control the speed of descent.
- ⑥ An instructor greets each participant reaching the end of a rappel, helps free the participant from the belay and rappel ropes, gathers the rappel device, and directs the participant to a safe waiting area.
- ⑦ To minimize the danger from falling rocks or pieces of hardware, waiting participants and other bystanders stay away from the immediate area below rappelling and climbing routes.

#### **G. Closing a Program**

Instructors expedite the process of ending a day's activities with the following steps.

- ① See that all participants are accounted for, and that they leave the area with appropriate leadership.
- ② Send participants away with a feeling of accomplishment. Give them a sense of achievement for having tried something that may have been new to them, and for having pushed themselves beyond their expectations.
- ③ Take down the ropes, remove any knots, and make an inch-by-inch inspection for signs of damage or wear. Coil or bag ropes for storage.
- ④ Remove anchoring systems from anchor points. Inspect all webbing and hardware for signs of damage or excessive wear.
- ⑤ Stow webbing and hardware in tubs, bags, or other storage units in such a way that everything will be easy to find and set up at the beginning of the next program day.
- ⑥ Gather helmets and harnesses, and check them for signs of damage or excessive wear. Fill out the record books tracking the use, history, and condition of each rope, helmet, and harness.
- ⑦ Retire from use any equipment that shows signs of damage or excessive fatigue.
- ⑧ Place climbing/rappelling program equipment in a locked, weatherproof storage facility.



#### **H. Inclement Weather Activities**

Inclement conditions may prevent groups from climbing and rappelling. The itineraries of units attending summer camps may not allow them to reschedule the program. Rather than disappointing them, instructors may provide Scouts with a modified version of the climbing/rappelling experience using one or more of the following activities, carried out at a site sheltered from the weather.

- ❶ Expand knot-tying practice to include a wide range of climbers' knots.
- ❷ Demonstrate and discuss equipment climbers use, and give an overview of the history of climbing.
- ❸ Present a video or slide show about climbing. Pick one or tailor it to entertain the age group of the participants.
- ❹ If there is a climbing wall or a bouldering area not affected by precipitation, teach participants the basics of spotting and bouldering—including the use of verbal signals—then guide them as they practice their climbing moves without going higher than shoulder height above the ground.

# Chapter 12

## Incident Resolution, First Aid, and Emergency Response

### Incident Resolution

The philosophy of rescues has changed within the industry. There has been a shift toward "incident resolution" to prevent the old style of physical "hero" rescues. The implementation of good setup practices, proper participant progression, and strong planning and decision making will prevent the need for physical rescues. Pickoff and cutaway rescues are reserved for professional rescue personnel and are not a part of the BSA climbing, rappelling, or COPE programs.

Avoid using the word "victim," and substitute it with "participant," "climber," or "rappeller." Avoid using the word "rescue," and substitute it with "incident resolution," "assist," or "technical response." Many situations requiring a rescue could have been prevented with proper planning.

In the past, most rescues fell in one of two categories:

- Hair, clothing, or something else became stuck in the rappel device.
- A participant was put into a situation which he or she was not ready to attempt.

To help prevent putting participants and rescuers into a potentially risky situation, follow these points:

- Use a dynamic or slingshot belay so that a person can be lowered to the ground if necessary. Using a static belay (in which a participant is self-belayed using webbing or multilines) should be discouraged. If a person slips or falls while using a static belay, the rescue is risky—and it could have been avoided. This is more common in a COPE program. But since many directors and instructors are trained in both, it is worth mentioning here.
- Use a releasable rappel on static rappel lines.
- Properly prepare participants for the activity, both emotionally and physically. Address warm-up, equipment, and clothing preparation.

### Order of Resolution

The BSA aquatics program follows an "order of rescue"—reach, throw, row, go—aimed at resolving a rescue situation in the safest, quickest, and easiest manner. The aquatics procedure has been adapted for climbing/rappelling, as well as for Project COPE scenarios, with the goal of allowing a participant to finish the activity with as little intervention as possible.

Most rescue-type situations can be assessed as

- A technical issue, such as a jammed figure-eight descender
- A medical issue, such as an injury to a participant
- An emotional issue, such as a scared climber

Proper planning and preparation would consider the following:

#### **Technical**

- All participants are top-rope belayed.
- Proper belay technique has been taught and put into practice.
- A backup belayer is strongly recommended.
- Rappel ropes are set up as releasable in order to easily clear a jammed rappel device.
- Equipment and setup are appropriate for the activity, and proper instruction has been given in its use.

#### **Medical**

- Things to consider that may result in medical issues include: bees; loose or slippery rock; poor trail conditions to, from, and at the site; environmental conditions; and food and water.
- Check with the medical officer or review the participant medical forms prior to the activity, and be aware of any special needs.

#### **Emotional**

- Assess that the participant is physically, mentally, and emotionally ready for the activity or challenge.
- Is the activity age-appropriate for the participant?
- Are there options within the activity to accommodate the varying needs of participants?
- Has the participant been prepared for the activity with skill progressions?
- Has the proper challenge-by-choice environment been established? (There should not be pressure from parents, peers, leaders, or staff forcing the participant into uncomfortable situations.)

#### **Stay Calm**

If a situation develops, stay calm and assess it. You will implement the appropriate course of action following this order of rescue:

**C**—Communicate with the participant.

**A**—Assist the participant.

**L**—Lower the participant.

**M**—Move to the participant.

**E**—Evaluate the situation.

**R**—Rehearse.

### **Communicate**

Communication is used in every scenario. In an emotional situation, a climber/rappeller may be frozen on a rock face, tower, or high-course event. Make eye contact, if possible. Communication with eye contact is more personal and reassuring. Talk to the person in a calm voice.

An emotional concern might be remedied by talking the person through the situation using simple, clear, concise, and reassuring words. Ask the participant how he or she feels and what you can do to help. Remember, BSA activities are "challenge by choice," so the participant plays the key role in deciding what to do next. Participants should never be pressured into continuing against their will.

### **Assist**

Assisting the participant is most often necessary when there is a technical issue. Using a sling, prusik cord, or etrier with a friction knot or an ascending device, the participant may be able to lift his or her weight and clear a jammed device. A releasable rappel could be used here to take the weight off one rope at a time. A pulley system also could help clear a snagged rappel device.

### **Lower**

A dynamic belay is used to simply lower the participant to the ground. A releasable rappel or pulley system can also be used to lower the person to the ground while still on the initial belay.

### **Move**

As a last resort, a staff person might have to climb or rappel to the participant. The rescuer may help the participant verbally while allowing the participant to remedy the problem, or the rescuer might have to offer physical assistance to release a jammed rappel device.

Pickoff and cutaway rescues add additional risk because they remove the participant from the primary belay system. These procedures are reserved for professional rescue personnel and should not be taught, practiced, or performed as part of the BSA climbing/rappelling or COPE program.

### **Evaluate**

After the resolution, debrief the situation with staff members. Were procedures in effect that were overlooked? Would a change in procedure help prevent this situation from happening again?

### **Rehearse**

Once you have evaluated the incident and determined its resolution, you might need to change your procedures. Any changes should be documented and rehearsed by the entire staff so they become familiar with the updated procedures.

Almost all rescues could be avoided with better course design and/or procedures implementation. Planning, smart setups, and proper preparation could have helped prevent a large percentage of rescues.

## **First-Aid Certification**

Every BSA climbing/rappelling activity must have on-site at least one person who holds American Red Cross Standard First Aid certification (a 6½-hour course), or who has completed a course of equivalent length and content from the Red Cross or another nationally recognized organization. The 16-hour Wilderness First Aid Basic course is also recommended. That person should take the lead in treating injury or illness. He or she may draw upon the knowledge of others in the vicinity, involving them in caring for those in need and in ensuring the continued safety of other participants and bystanders.

## **First-Aid Emergencies**

### **Head Injuries**

Anyone who suffers an injury to the head should be taken to a medical facility for evaluation and treatment as soon as possible. Depending on the symptoms, some evacuations are urgent, while others can be delayed.

A **delayed evacuation** means the person is taken to a medical facility expeditiously but without the use of an ambulance or helicopter. In this category are patients who fit the following description.

- Have had a relatively trivial injury
- Have not lost consciousness
- Have been unconscious for less than 30 seconds before regaining a full and normal level of alertness
- Have no history of bleeding disorders or the use of medications such as aspirin or blood thinners that might increase the risk of bleeding

Candidates for delayed evacuation must be constantly monitored for any change in symptoms that would indicate the need for urgent evacuation.

**Urgent evacuation** employing an ambulance, helicopter, or other rapid medical response is mandatory for anyone who has suffered a blow to the head or face that results in one or several of the following symptoms.

- Loss of consciousness for more than two minutes or of responsiveness
- Debilitating headache
- Drowsiness
- Disorientation
- Unusual irritability
- Persistent nausea or vomiting
- Bruising behind and below the ears or around the eyes
- Loss of coordination
- Abnormal vision
- The appearance of clear fluid (possibly cerebrospinal fluid) from the nose and/or ears
- Seizures
- Relapse into unconsciousness

### **Sprains and Contusions**

When a person suffers a sprain or contusion as the result of a fall, it is always proper to use the RICE technique of management: Rest, Immobilize, Cold, Elevate. If pain is severe, enhance resting the limb by using a splint. When a long bone is involved, extend the splint to immobilize the joints above and below the injury. If a joint is injured, apply the splint so that it immobilizes the bones immediately above and below the joint.

Avoid undue manipulation and splint an injured limb as it lies (except when the injury results in angulated deformity of a limb; in that case, gently straighten the limb to reduce the possibility of circulation or nerve damage). Monitor circulation before and after splinting by comparing the pulse in the injured limb with that of an uninjured limb. Checking the capillary refill capacity on the side of an injury furthest from the heart may also prove useful for evaluating circulation.

### **Spinal Injuries**

Someone who falls is in danger of suffering cervical spine injuries. Suspicions should be high if the victim has fallen more than a few feet, is unconscious, or has suffered a blow to the head. Staff trained to do so should immediately assess the airway and provide mechanical stabilization by holding the head and neck to prevent movement. Stabilization should be maintained until either the patient is stabilized in a rigid litter and cervical collar (if the caregiver is trained) or when relieved by qualified medical personnel.

Guard against undue movement of the spine until the possibility of spinal injury has been explored. If such an injury is suspected, do not attempt to move the victim unless there is potential danger at the scene—imminent avalanche, rock fall, etc. Get qualified medical personnel to the site as quickly as possible.

All rock-climbing programs should have a first-aid kit present that matches the training level of the caregiver. It should contain all the supplies necessary to meet the needs of possible injuries. (Cervical collars, litters, and backboards should only be included if staff is trained to use them.) Supplies should include SAM Splints™ to immobilize bone or joint injuries.

A person injured while climbing or rappelling may well have landed on the ground where treatment can begin immediately. If, however, the person is still suspended on the climbing/rappelling face by a rope, quickly assess the situation and devise a workable plan for getting the person down. It may be possible simply to lower the injured person by using the belay rope to which the victim is attached. In cases of more serious injury or if a participant is tangled in the rope in such a way that direct lowering is not an option, it may be appropriate for an instructor to rappel down to the participant and assist in getting the person to safety.

Whatever the situation, remember the first rule of emergency aid—survey the situation before acting, and then proceed in ways that do not create more casualties. If the decision is made for an instructor to rappel down to assist a suspended victim, the instructor's rappel rope must be attached to a secure anchoring system. Setting up a rappel rope for a rescue can be done quickly, but be sure to take the time to do it right. Double-check the security of the anchor, the connections, the instructor's harness, and the way in which the instructor is tied in. Do not allow haste to cause injury to a rescuer.

- Once on the ground, assess the injured person's condition, determine a proper course of action, and carry it out.
- Throughout a rescue, no matter how minor, monitor the other members of the group and be ready to deal with their actions, concerns, and locations. If possible, assign an instructor or group leader to keep



*Always have a well-equipped first-aid kit close at hand.*



participants and bystanders out of the way of the rescue, to reassure them, and to safeguard their security. Those waiting at the top of a climb may be tempted to approach the edge of a cliff to get a better view; instructors should see to it that they remain in safe locations, that they are tied in to safety lines if that is appropriate, and that they move in an orderly manner to a place of known safety.

- Before resuming climbing or rappelling activities, inspect all belay systems, harness tie-ins, and other equipment. If a serious accident has occurred, cease further activity after managing the emergency response, and arrange for a critical incident stress debriefing session for everyone. Seek out a qualified team to conduct this debriefing session.

### **Hypothermia**

The chilly weather and exposed settings sometimes present during BSA climbing/rappelling activities can set the scene for hypothermia, especially if participants are unprepared. Instructors, directors, group leaders, and program participants should all take responsibility for preventing hypothermia, and for treating it if someone does fall victim.

### **Preventing Hypothermia**

- Dress for warmth. Best of all are layers of clothing that can be adjusted to changing conditions. Rain gear will help people keep dry.
- Eat plenty of food and drink enough water. For a day of climbing and rappelling, that may mean having a good meal before arriving at the program area, and then bringing along filled water bottles, a lunch, and nutritious snacks.
- Keep busy. Muscular activity generates heat. Participants allowed to stand or sit idle for long periods are more likely to suffer both hypothermia and boredom. Belayers and instructors should also be on guard against chilling caused by their own low levels of physical activity.
- If weather, energy reserves, or participant preparation are such that hypothermia is a perceivable danger, instructors and/or group leaders must take steps to correct the situation immediately, most often by calling a halt to activities and moving everyone to a more appropriate setting.
- On overnight outings, always change clothes before going to bed and put on dry clothes for sleeping. Clothing becomes damp from body moisture during the day and, if worn to bed, will lower body temperature in sleeping bags.

### **Treating Hypothermia**

- Place the victim out of the wind in the best shelter possible (a building, a warm vehicle, a tent, etc.). Insulate the victim from the ground with sleeping pads, clothing, or other gear.
- Replace wet clothing with dry garments. Wrap the victim in sleeping bags or blankets.
- If the victim is conscious and able to swallow, give warm drinks, especially those high in carbohydrates and sugar. Do not give the person caffeine or alcohol.
- Get the victim under the care of a physician.
- Throughout an emergency involving hypothermia, monitor all group members to prevent others from becoming victims, too.

(For more on preventing and treating hypothermia and other first-aid emergencies, see the *Boy Scout Handbook* or *First Aid* merit badge pamphlet.)

### **Dehydration**

Water is essential for nearly every bodily function, including digestion, respiration, brain activity, producing heat, and staying cool. Moisture is lost through breathing, sweating, digestion, and urination. Losing more water than is taken in can affect people in different ways, including

- Tiredness
- Headache and body aches
- Confusion

Heat exhaustion, heatstroke, and hypothermia may all be caused in part by dehydration.

Climbers protect themselves from dehydration by drinking plenty of fluids. That's easy to do on hot summer days when they're thirsty. It is just as important in cool weather when they might not feel like drinking. They should drink enough so that their urine stays clear.

### **Heat Emergencies**

In hot weather, a person's body adjusts to maintain comfort. Climbers can help their bodies do that by drinking plenty of fluids and resting in the shade when they feel too warm. During sieges of hot weather, it may be wise to conduct climbing/rappelling programs in the early morning and evening hours instead of the middle of the day when the temperature is highest. Participants should wear light-colored clothing and, when they aren't wearing climbing helmets, shade their heads with hats.

### **Heat Exhaustion**

Heat exhaustion occurs when the body's cooling system becomes overworked. Think of it as an air conditioner running wild. Heat exhaustion may affect a person outdoors or in a hot room. Symptoms can include:

- Skin pale and clammy from heavy sweating
- Nausea and tiredness
- Dizziness and fainting
- Headache, muscle cramps, and weakness

### **First Aid for Heat Exhaustion**

- ① Have the victim lie in a cool, shady place with the feet raised. Remove excess clothing.
- ② Cool the victim's body by applying cool, wet cloths and by fanning.
- ③ Let a victim who is fully alert sip cool water or a sports drink.

Recovery should be rapid. If symptoms persist, call for medical help.

### **Heatstroke**

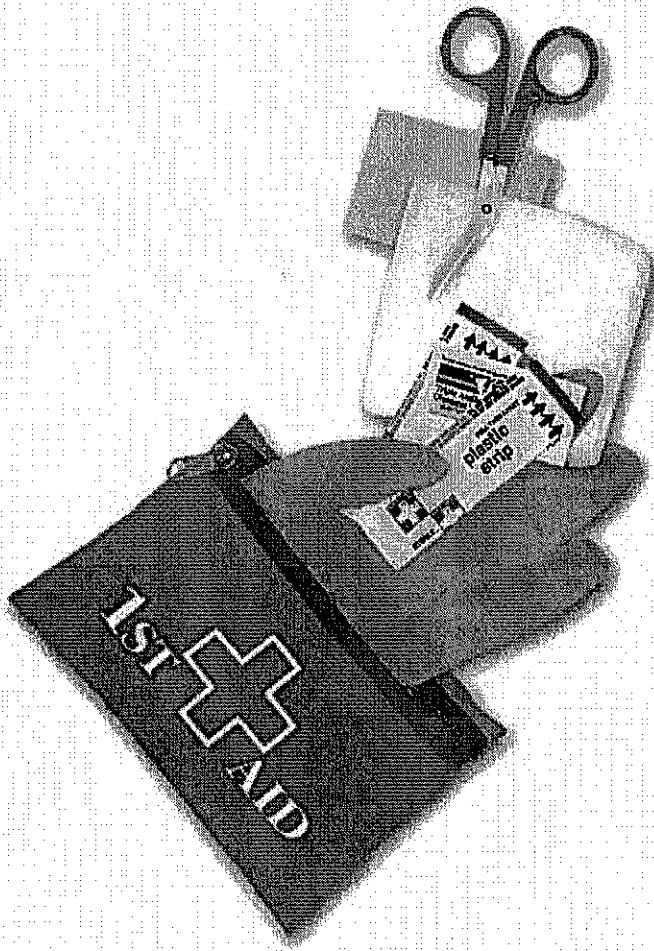
Heatstroke happens when a victim's cooling system is so overworked that it stops functioning. In simple terms, the body's air conditioner breaks. The victim's temperature soars to life-threatening extremes. Symptoms of heatstroke may include:

- Skin very hot
- Skin red and either dry or damp with sweat
- Pulse rapid and quick; breathing noisy
- Confusion and irritability; victim may fight against being treated
- Unconsciousness

### **First Aid for Heatstroke**

The victim is in danger of dying, so call for medical assistance immediately. Then work quickly to cool the victim.

- ① Move the person to a cool, shady spot.
- ② Lower body temperature any way you can. Remove outer clothing and sponge the victim with cold water. Cover the victim with wet towels, wet clothing, or whatever else is handy, and enhance the cooling effect by fanning. Place the person in a stream, in a bathtub filled with cold water, or in front of an air conditioner running full blast in a house or car. Use combinations of all available treatments.
- ③ Keep the victim lying down and comfortable with head and shoulders slightly raised.
- ④ Monitor closely until help arrives. Body temperature may go up again. The victim may vomit, and may require rescue breathing.



### **Abrasions, Cuts, and Scratches**

For climbers indoors or outdoors, short falls can lead to minor bruises or skinned knuckles and knees. Wash abrasions and minor cuts with soap and water. Applying antiseptic may help prevent infection. Keep the wound clean with an adhesive bandage. On camping trips, clean and rebandage small wounds daily.

### **Rope Burns**

Rope burns, or friction burns, can occur when climbers allow rope to slide too quickly through their hands or when any part of the body comes in contact with a fast-moving rope. A rope burn is characterized by raw, red skin and sometimes blistering. The best protection against rope burns is, of course, to wear climbing gloves, but if a burn does occur, clean the area with mild soap and water to help prevent infection.

## Emergency Response Plan

BSA climbing directors and instructors should prepare an emergency response plan for each site that will be used for climbing, rappelling, or bouldering activities. The plan should include the following information.

- ❶ Location of the nearest telephone: \_\_\_\_\_
- ❷ Telephone numbers for
  - Local emergency response system: *(usually 911)*
  - Nearest hospital: \_\_\_\_\_
  - Nearest police/sheriff's office: \_\_\_\_\_
  - BSA local council Scout executive: \_\_\_\_\_
- ❸ Directions and perhaps a map detailing how to reach the nearest clinic, hospital, or life flight service.

## Summoning Aid

Put this in your first-aid kit for ready reference.

### Reporting Aid

When calling for outside assistance, either by dialing 911 or by sending responsible individuals to summon help, inform authorities of the following.

- ☐ Identify the exact location and community or coordinates where the incident occurred, and determine how to direct emergency units to the accident site, including mileage from a known location.
- ☐ Give a description of the injured parties, including name, age, height, weight, and vital signs if they can be easily determined.
- ☐ Explain that there has been an accident and that you need help with a rescue.
- ☐ Describe what happened.
- ☐ Describe the height of a fall.
- ☐ Tell how many people need help and give a brief summary of their situations.
- ☐ Give vital signs (body temperature, pulse rate, respiration rate, blood pressure if known).
- ☐ Describe responsiveness and sensation to touch. Do not move a person who has fallen (wait for emergency medical service personnel).
- ☐ Explain what is being done for the victim(s).
- ☐ Indicate whether an ambulance is needed.
- ☐ Tell who is presently with the injured parties and what you know of their general level of first aid and rescue training.
- ☐ If you have called in the report, don't hang up until help arrives or those you have called give you other instructions. Be sure to give a call-back phone number when you do hang up.

### **What to Do If a Climbing/Rappelling Accident Results in an Injury**

- ☐ Make certain no one else is in danger.
- ☐ Administer first aid. Treat for shock.
- ☐ Assess the situation and, depending on the seriousness of the injury, do one of the following:
  - ☐ Call for assistance (police, fire department, rescue team, etc.).
  - ☐ Arrange for safe transport of the injured to a local medical facility or the participant's home.
  - ☐ Have the injured person sit out the remainder of the day's activities and return home with the group.
  - ☐ Allow the person to resume participation in climbing/rappelling activities.
- ☐ Keep an accurate log of an injured participant's condition, starting at the time of the accident. Include pulse, respiration rate, skin color, and level of consciousness, and note any changes in the participant's status.
- ☐ Write down an accurate record of the treatment given to an injured person and the overall handling of the incident. Get names, addresses, and phone numbers of eyewitnesses. As soon as it is appropriate, ask each witness independently to write down his or her account of the event.
- ☐ If injuries were serious, contact your local council Scout executive.

### **What to Do If a Climbing/Rappelling Accident Results in a Fatality**

- ☐ Ensure the safety of the rest of the group. Do not allow the stress of the situation to compound the emergency.
- ☐ Do not disturb the body. Investigating authorities will determine when and how it will be moved.
- ☐ Do not disturb the area immediately around the body. Legal authorities will make a careful investigation of the site. Leave all ropes, anchors, and hardware as they were at the time of the incident.
- ☐ Notify the council Scout executive, who will, in turn, contact other appropriate authorities and report what has happened.
- ☐ Make an accurate written record of the incident. Get names, addresses, and phone numbers of eyewitnesses. Have every willing witness immediately write a longhand narrative report describing the specifics of the incident. Be sure each person signs and dates the report.

#### **ONLINE REPORTING PROCEDURE FOR INJURY OR ILLNESS**

Complete an Incident Report inside the Resources tab at MyBSA. Effective in 2010, all injuries, illnesses, and incidents requiring the intervention of a medical provider beyond basic Scout-rendered first aid shall be reported using this system. Camps with limited or no Web access will need to capture the information using the reporting folder or forms and establish a method to enter the incidents within five working days. Near misses in Project COPE, climbing/rappelling programs, or in pilot programs shall also be reported using this method. If an incident involves a fatality or multiple serious injuries, please follow the crisis communication plan included in the reporting folder.

## What to Do in Any Accident or Emergency Situation

- ☐ Do not contact news media.
- ☐ Do not make any statements to news media. Refer all inquiries for comment to the local council Scout executive.

### AFTER AN EMERGENCY

At the conclusion of an incident resolution or the treatment of an injured person, it may be wise to discuss the events with the other participants and allow them to ask questions and share their feelings. Arrange for a post-traumatic debriefing by a capable provider for the benefit of youths and adults who were present during any phase.

Instructors and directors who have witnessed close calls or who have been involved in responsive efforts, especially if the injuries were severe or the scene was traumatic, may benefit from further discussions with qualified adults who can help them understand and deal with the emotions they are experiencing.

Soon after the incident, the climbing director, instructors, and other appropriate personnel of the camp, district, council, or council high-adventure base should review the events, determine the cause of the accident, and develop strategies for preventing a recurrence.

## Emergency Response Equipment

Site-specific equipment for possible course emergencies must be available at the climbing site. The type of equipment will be decided by the on-site director or lead instructor. Consulting the local camp or council medical officer can help to determine what specific equipment might be necessary.

A climbing area should have on hand enough rope and hardware to set up a separate system to allow a director or instructor to rappel down to aid a participant who cannot be easily and safely lowered to the ground. The backup rope and hardware should be located at the top of the face near the anchors. In many cases, it will be possible to secure the backup rope to an anchor ahead of time, and then stow the rope so that it is out of the way but immediately available in an emergency.

A typical rescue bag might include:

- Rope (When used to belay two people, a rope must be rated for a two-person load.)
- Several slings
- Extra webbing
- Prusik cords
- Belay/rappel device
- Shears
- Locking carabiners
- Prusik-minding pulleys
- Leather gloves



*Climbing instructors should be trained and practice responding quickly to emergencies.*



CLIMBING INSTRUCTORS SHOULD  
LEAVE COMPLICATED RESCUES  
TO PROFESSIONALS OR BECOME  
TRAINED IN HIGH-ANGLE  
RESCUE TECHNIQUES. EVERY  
INSTRUCTOR SHOULD BE AWARE  
OF PERSONAL LIMITATIONS.

### **Emergency/Technical Response Practice**

No participant/instructor should be put in a practice scenario that places them in danger of becoming an emergency situation. Practicing these techniques should take place a few feet off the ground. Many accidents have occurred throughout the world when instructors attempted to practice incident resolutions that went beyond their level of training.

Using one or more volunteer "victims," mock assist scenarios can introduce instructors to a variety of incidents and problem-solving situations. Here are some pointers for conducting successful mock assists.

- Encourage instructors to consider a variety of solutions such as talking a participant down, using a belay to lower a participant to safety, and going to the participant.
- Take into account all the resources at hand for use in an assist—for example, rope and hardware for a second belay system, and a pulley system, or an extension ladder. Other resources may include the option of calling in a fire department or search-and-rescue unit.
- In practice as in real emergencies, ensure the safety of everyone involved. Stop a practice session if you observe unsafe procedures. Check the "victims" often to be sure they are comfortable and not in any danger, especially if they are suspended on the climbing face.
- Be as realistic as possible, including "victim" behavior.

Evaluate the practice for the following:

- Was it effective? Was the person safely returned to the ground? Was appropriate first aid provided in the correct sequence?
- Was it safe? Did the "rescuers" monitor their own security and that of others. Was the technique appropriate for the incident? Could there have been an easier technique?
- Was the assistance prompt? Without jeopardizing safety, how could it have been done more quickly?
- Was it sufficiently simple and well-considered?
- Was it organized? Did everyone involved, including the "participant," know what was going to happen?
- What could have been done to prevent the need for a rescue?

Finally, instructors should give serious consideration to what they will do differently the next time they are confronted with a mock or real emergency.

# Chapter 13

## Staffing and Instructor Training

The success and safety of a BSA climbing/rappelling program is directly related to the quality of the people leading it. The staff for the climbing/rappelling program of a BSA council, district, or council high-adventure base is, at a minimum, made up of a currently trained BSA climbing director or lead instructor and several currently trained BSA climbing instructors. Staff members may be either employees or volunteers of the BSA. The roster may also include one or more instructors-in-training (IITs).

### **BSA Climbing Director**

The director is the primary authority in the climbing/rappelling program of a district, council, or council high-adventure base. He or she oversees the selection of program staff, the training of instructors, the selection of program areas, and the safe operation of activities involving climbing/rappelling. Ideally, the climbing/rappelling committee of a council is chaired by a climbing director.

A BSA climbing director must hold a current certificate of completion of BSA climbing/rappelling training. He or she should have been an active participant in a BSA climbing/rappelling program at least once within the past 12 months. Directors who have not been active during the previous year should serve under a currently trained BSA climbing director to refresh their expertise and to be reactivated.

The qualities expected of a BSA climbing director include, but are not limited to, the following:

- Minimum age 21
- Currently registered member of the Boy Scouts of America
- Current BSA Annual Health and Medical Record, No. 34605, and a careful review by a licensed health-care practitioner of limitations that may preclude full participation in this activity.
- Good judgment
- Ability to teach and to lead
- Ability to work with youth
- Appropriate first-aid and CPR training as required by current Project COPE and Climbing/Rappelling Standards (No. 430-008)

- Awareness of safety procedures and the risks inherent in climbing/rappelling activities
- Proficiency in instructing and performing standard climbing/rappelling rescue techniques
- Working knowledge of the material and concepts in *Topping Out: A BSA Climbing/Rappelling Manual*
- Understanding of BSA Climbing merit badge requirements
- Knowledge of the climbing/rappelling area where activities will occur, or access to local authorities able to provide all necessary background information
- Working knowledge of the BSA's "challenge by choice"
- Successful completion of National Camping School Climbing section training for climbing directors

(Climbing directors, in turn, provide a three-day training course to qualify instructors to lead climbing and rappelling activities.)

### **BSA Climbing Instructor**

Instructors of BSA climbing/rappelling activities are capable, safety-conscious teachers. They are the on-site personnel (either staff or volunteer leaders) who instruct and manage the climbing/rappelling activities of a district, council, or council high-adventure base. They must exercise good judgment and dependability, and relate well to youth and to adults. By fulfilling the following requirements under the supervision of a currently trained climbing director, candidates may receive a certificate of completion of training good for two years as climbing instructors. They must obtain a certificate of completion of training every two years. The qualities expected of a BSA climbing instructor include, but are not limited to, the following:

- Minimum age 18 (But a *lead* instructor must be at least age 21.)
- Currently registered member of the Boy Scouts of America
- Appropriate first-aid and CPR training as required by current Project COPE and Climbing/Rappelling Standards (No. 430-008)
- Current BSA Annual Health and Medical Record, No. 34605
- Good judgment
- Ability to work with youth
- Proficiency in the techniques of climbing, rappelling, belaying, and spotting
- Working knowledge of *Topping Out: A BSA Climbing/Rappelling Manual*
- Understanding of BSA Climbing merit badge requirements
- Completion of three-day climbing/rappelling staff training

## **BSA Climbing Instructor-in-Training (IIT)**

BSA climbing instructors-in-training gain valuable knowledge and experience as they assist instructors in the many responsibilities of running climbing and rappelling activities. Whenever they assist participants engaged in any events at a climbing/rappelling area, instructors-in-training must be under the direct supervision of a trained BSA climbing director or lead instructor who is at least 21 years of age.

The qualifications expected of a BSA climbing instructor-in-training include, but are not limited to, the following:

- Minimum age 16
- Currently registered member of the Boy Scouts of America
- Current BSA Annual Health and Medical Record, No. 34605
- Good judgment
- High maturity level
- Ability to work with youth
- Trained in climbing, rappelling, belaying, and spotting (may have completed the three-day instructor training course)

### **ADDITIONAL TRAINING**

To prepare themselves for their responsibilities, climbing directors and instructors are encouraged to receive training from a recognized college or university climbing program, or from a nationally recognized organization such as the following (see the resources section for addresses, etc):

- American Mountain Guide Association (AMGA)
- Eastern Mountain Sports (EMS)
- The Mountaineers
- National Outdoor Leadership School (NOLS)
- Outward Bound (OB)
- Wilderness Education Association (WEA)
- National Speleological Society (NSS)

Directors and instructors are also encouraged to complete an anchoring course of several days' duration sponsored by a nationally recognized organization such as those listed above.

## **Staff Training**

The National Standards for Cub Scout/Boy Scout Resident Camps (No. 430-111, current year) specifies that when a climbing/rappelling program is offered through a camp, climbing instructors must complete a minimum of three days of specialized training. Three days is the minimum length of training for a few climbing instructors; larger groups will require a longer period, depending upon their climbing knowledge and skills. This training is usually incorporated into the camp's normal summer camp training, with a specific climbing/rappelling schedule developed around the general needs of the camp. Hold the specialized training at the climbing/rappelling sites the camp will use during its summer operations.

If BSA climbing/rappelling activities will occur at other areas within a district, council, or council high-adventure base, or during other times of the year, conduct similar intensive training for staff members who will be involved as BSA climbing instructors during those events.

In a program of such high excitement, the director must avoid the problems that can arise if instructors on the climbing staff consider themselves to be somehow superior to other members of the climbing/rappelling camp staff. To defuse this behavior, the director might coordinate with the camp director to develop opportunities during training for all camp staff members to participate in climbing and rappelling activities. That can foster higher morale throughout the entire camp staff and a greater sense of teamwork.

Each climbing instructor must complete all portions of the training to ensure that he or she has a full understanding of the standards demanded for the safe operation of a BSA climbing/rappelling program. Take care when training the climbing staff to avoid any shortcuts that could jeopardize anyone's comprehension of, or respect for, safety guidelines and procedures.

### **Learning Objectives**

By the end of the three-day training, each instructor should be able to

- Explain the purpose of a climbing/rappelling program and discuss how it relates to the aims and methods of Scouting and the personal development of participants.
- Describe the responsibilities that a BSA climbing instructor must assume before, during, and after the use of a climbing/rappelling site.
- Demonstrate a mastery of belaying, climbing, rappelling, spotting, and any other activities the instructor will teach and oversee.
- Identify each piece of equipment used in a BSA climbing/rappelling program. Show how each piece is inspected, used, inventoried, and stored. Explain the importance of keeping records of the use of each rope and piece of gear, show how that recording is done, and discuss when and how an item of gear is to be retired.
- Tie the knots and hitches to be used during a BSA climbing/rappelling program. If commercial seat harnesses will be used during the program, show how to match or adjust them to fit participants of various sizes. If tied harnesses will be used (tied-seat or knotted leg-loop), show how they are to be tied.
- Demonstrate an understanding of anchor points and anchoring systems, and their proper uses.
- Prepare the climbing/rappelling area for participant activities.
- Discuss safety and first aid.
- Demonstrate rescue procedures used for climbing and rappelling.
- Explain the use of the buddy system during BSA climbing/rappelling activities.
- Work well as a team member with other members of the BSA climbing staff.
- Lead a group through a climbing/rappelling experience.
- Evaluate one's own performance as an instructor on the course, and make needed corrections.

### Training Schedule for BSA Climbing Instructors

A BSA climbing/rappelling training program for instructors, lead instructors, and instructors-in-training is organized and led by a BSA climbing director using *Topping Out: A BSA Climbing/Rappelling Manual* as the primary resource. The director should make arrangements to have a Scouting group on-site for day three of training so that instructor candidates can teach and be evaluated under realistic program conditions.

The schedule that follows may be altered to fit specific situations facing each district or council, but every component must be covered during a three-day training program.

#### LEARNING BY DOING

To the greatest degree possible, staff training should be a hands-on experience. Plan presentations so that instructors learn by doing—that is, they actively engage in the subjects they are learning rather than sit passively, listening to a lecture. Instructor candidates will have more fun, teaching will be more effective, and directors will find their own involvement more satisfying.

#### Day One

- ❶ Welcome participants with team-building activities and present the philosophy of BSA climbing/rappelling.
- a. This will be the first opportunity for the climbing staff to work together as a team within the larger camp staff. Depending on how well staff members know one another, the director can kick off the training with some get-acquainted activities that encourage cooperation and problem solving. (For ideas, see the *Project COPE* manual, No. 34371.)
- b. Review the council, district, or council high-adventure base philosophy of climbing/rappelling activities. Discuss the purpose of these activities in the overall summer camp program.
- c. Define and discuss the following:
  - **Fear.** Stress that there is nothing wrong with being afraid. A goal of BSA climbing/rappelling activities is to help participants recognize what they fear, then encourage them to deal with those fears by understanding them and proceeding in spite of them. Count every bit of progress by a participant in a fearful situation as a success.
  - **Group support.** Climbing instructors help participants understand the importance of supporting one another during climbing/rappelling activities. Applaud every achievement: "Way to go!" "Look how far you got!" "Good effort!" Do not tolerate negative comments and put-downs, and make it understood that all participants who try their best are successes.
  - **Buddy system.** Explain that participants taking part in BSA climbing/rappelling activities use the buddy system to help ensure their safety and enhance their experience. Buddies offer encouragement and assistance to each other; double-check their partner's harness, knots, and belay or rappel devices; and continually watch out for their buddy's best interest.
  - **Scout Oath and Scout Law.** Use the Scout Oath and Scout Law as the basis for establishing an appropriate environment for participation in BSA climbing/rappelling activities. Encourage participants to approach activities with the idea of doing their best, of being helpful, friendly, kind, cheerful, and brave.



- **Leave No Trace.** Explore the principles of Leave No Trace as they relate to climbing/rappelling sites and activities. Discuss the many ways that instructors can practice Leave No Trace methods as they set up and run each day's program, and how they can impart to Scouts an enthusiasm for adopting Leave No Trace methods in their own experiences. Leave No Trace guidelines are appropriate for sites on BSA property and for those on public and private lands.
- ② Discuss the responsibilities of BSA climbing instructors.
  - a. Climbing instructors are responsible for conducting safe, rewarding experiences for all participants.
  - b. Instructors maintain and follow safe procedures. They must be on guard against any unsafe situation and take corrective action. They can never assume that someone else will take care of it.
  - c. Instructors guide participants toward realizing how climbing and rappelling experiences can help them deal with problems, build self-esteem, and foster group spirit. Instructors do this in part by being good role models.
  - d. Instructors should be conscious of their communication skills and work to improve the ways in which they present information to participants.
  - e. Instructors must know how to set up and take down anchoring systems, belay ropes, and other elements required for climbing and rappelling activities. They must possess the ability to inspect the equipment and the site before each day's activities, log equipment use, remove any equipment that is of questionable quality, monitor environmental conditions, and report problems or concerns to the director.
  - f. Instructors must be prepared to assist in cases of accident and/or injury.
  - g. Instructors must know what their specific duties are each day. That ability comes from their overall understanding of the program, from the director's care in making assignments, and from each instructor's initiative.
  - h. Instructors must be aware of risks inherent in climbing and rappelling, and understand ways to minimize those risks.
- ③ Review methods to be used for determining participant health conditions.
  - a. Any participant taking part in a BSA climbing/rappelling activity must hold at least a current BSA Annual Health and Medical Record (a health history form completed by a parent or legal guardian and a licensed health-care practitioner). Reviewing the medical record should alert directors and instructors to health matters that may require adjusting the level of a person's participation in the day's activities.
  - b. In addition, the current state of health of each person is important to his or her enjoyment and safety while climbing and rappelling. A participant who is not feeling well or has a condition that may hinder performance should be cautioned to continue only to the degree that the individual feels capable of attempting.

- c. In hopes of being allowed to climb and rappel, participants with real conditions of concern may sometimes argue that there is nothing wrong with them. On the other hand, healthy but fearful participants may feign illness or injury. Whenever instructors have questions about a participant's fitness or the truthfulness with which that person has described health conditions, they should closely monitor the participant's performance and be ready to adjust the level of activity to keep everyone within safe and comfortable parameters.

④ Teach instructor candidates how to evaluate the climbing/rappelling site they will be using. Review environmental concerns, perhaps with the help of a local authority familiar with the area.

⑤ Review equipment that may be used at the climbing/rappelling site.

- a. Discuss and examine the first-aid kit and any other emergency gear (litters, neck braces, etc.) associated with the climbing/rappelling site. Go over the proper uses of all first-aid and rescue items, and the procedures for dealing with injuries and illnesses common to climbing/rappelling activities. Explain the emergency response plan and provide each instructor with a written copy.
- b. Explain the use and care of each piece of equipment including rope, webbing, carabiners, rappel devices, helmets, gloves, harnesses, belay devices, and proper clothing.
- c. Demonstrate proper techniques for inspecting equipment to be used while opening and closing climbing and rappelling activities, including maintaining records of use.
- d. Specify the kinds of rope approved for use at BSA climbing/rappelling sites. Assist instructor candidates in learning how rope is identified, transported to and from activity sites, measured, logged, and stored. Where appropriate, show how rope is cut and retired. Provide candidates with segments of damaged rope so that they will know what to look for when inspecting rope.
- e. Demonstrate correct storage of all climbing and rappelling equipment.
- f. Review the knots used in climbing and rappelling, including situations when each knot should be used. Assess each instructor candidate's ability to tie the knots that should be learned. Note where skills are weak, help individuals correct any mistakes being made, and encourage them to practice on their own until they have an absolute mastery of the required knots.
- g. Review coiling ropes and stowing ropes in bags. Allow individuals time to try various methods.
- h. Do an inventory of the equipment to be used for upcoming climbing and rappelling activities. Note any recommendations for repairing or replacing any items.

ALL TECHNIQUES TAUGHT DURING  
INSTRUCTOR TRAINING SHOULD  
CONFORM WITH METHODS AND  
PRINCIPLES DESCRIBED IN THE  
BSA'S *TOPPING OUT* MANUAL.

### **Day Two**

The second day of training takes place at the climbing/rappelling site. Instructor candidates should report to the site properly dressed for climbing and rappelling, and with food, water, and any other personal supplies they will need for the duration of the day's events.

- ① Ask instructor candidates to remove rings, jewelry, watches, bulky items from pockets, and anything else that might catch on equipment or cause injury. Have a system in place to store these personal belongings, and inform instructors how they are to use and secure the storage system while participants are busy climbing and rappelling. Provide elastic bands for those who need to secure long hair or loose clothing that could otherwise tangle in a belay or rappel system.
- ② Teach and practice several warm-up and stretching exercises, and discuss with participants the importance of warming-up and stretching before they begin climbing and rappelling activities.
- ③ Explain the principles of spotting and when it must be used. Engage the instructor candidates in several spotting activities to highlight the importance of proper technique when participants who are not belayed are climbing no more than 6 feet above the ground.
- ④ Discuss the principles of anchoring systems. Demonstrate the various kinds of anchor points and anchoring systems, pointing out the strengths and weaknesses of each.
- ⑤ With the director's guidance, have each instructor candidate set up the anchoring systems that will be used at the climbing/rappelling site. Safety procedures may include using a safety line to protect anyone approaching the edge of a cliff.
- ⑥ Demonstrate the principles of belaying and the signals to be used. Allow each individual to act as a belayer for top-rope climbing and as a belayer for rappellers. (At sites where belaying will be done both from the ground and from the top of a route, have each person practice belay techniques from both locations.)
- ⑦ Review steps for conducting rescues of climbers or rappellers. Set up a mock emergency and engage instructor candidates in the rescue of a person acting as an injured rappeller. Include the steps for securing the belay rope so that a belayer can be released from the system.
- ⑧ Define and explain the common classifications of climbing difficulty. Demonstrate various climbing techniques and holds, and help instructor candidates refine their ability to explain climbing classifications and methods to participants.
- ⑨ Set up a rappel system and demonstrate correct rappelling technique. Monitor and evaluate individuals as they rappel and help them correct any flaws in their technique.
- ⑩ Conclude day two by reviewing techniques and terminology used up to this point during training.

### **Day Three**

The training on day three is built around a group of Scouts or other participants taking part in a typical BSA climbing/rappelling experience. Activities should be set up and run by instructor candidates who are being trained to oversee similar activities in the course of their upcoming duties.

Everything that occurs during the third day of training takes place under the careful watch of a BSA climbing director. Instructor candidates should do the following:

- ① Ensure that the emergency response plan is available and understood by all instructors, and that the first-aid kit and any other emergency gear is on hand.
- ② Prepare the climbing/rappelling site for the day's activities.
  - a. Perform opening inspections of the site and of equipment to be used in the day's activities.
  - b. Set up the anchoring systems for the day's program.
- ③ Plan and carry out the day's climbing and rappelling activities.
  - a. Demonstrate climbing knots and rope procedures to participants.
  - b. Instruct participants in the proper techniques for spotting, belaying, climbing, and rappelling, and supervise them as they take part in any or all of these activities.
- ④ Assist group members as they evaluate their experience.
- ⑤ Close the program site for the day. Perform closing inspections of the site and of equipment used in the day's activities.

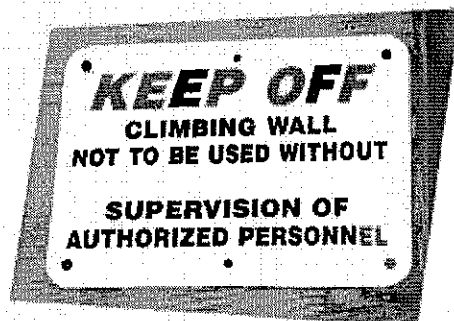
At the end of day-three activities, the director should lead instructor candidates in self-evaluation and then provide personal insight regarding each instructor's performance, strengths, and ways to address areas in need of improvement.

The final phase of training for BSA climbing instructors is made up of practical testing of skills covered during the first three days, including those involving knots, equipment, anchors, and techniques. The BSA climbing director should conduct the testing in a relaxed environment, using the opportunity to continue staff development and skills assessment.

Review ways in which the staff members of a climbing/rappelling program can work together to enhance the experience and safety of participants. Point out specific instances from day three when staff cooperation was evident. If appropriate, encourage a discussion of any issues that may be preventing instructors from taking full advantage of their various talents.

Discuss some of the challenges the instructors may face in the near future, including difficult group leaders, groups with participants who have various levels of skill, and groups with unreasonable expectations.

It is often appropriate to close the training with a completion ceremony to recognize the achievement of those who have gone through the training and are now BSA climbing instructors or instructors-in-training.



# Resources

# **CHALLENGE COURSE AND CLIMBING/RAPPELLING HEALTH HISTORY AND CONSENT FORM ADULT OR CHILD**

You are about to take part in a challenge ("ropes") course experience and or climbing/rappelling ("activity") offered through the \_\_\_\_\_ Council BSA ("local council") on \_\_\_\_\_ (date).

While participating in the activity you will undertake a wide variety of physical and mental challenges that are comparable to activities with which you may be more familiar. Much of the time, you will be engaged in activity of "moderate exertion," which is comparable to normal walking, golfing on foot, raking leaves, calisthenics, or slow dancing. For short periods of time, you will be engaged in activity of "vigorous exertion," which is comparable to fast walking, slow jogging, heavy gardening, or shoveling snow.

If any of the above activities are difficult for you, discuss your participation in the activity with your physician. If these are activities in which you regularly engage without difficulty, you should be fit for participation in the program.

Following are specific medical conditions about which participants should always seek the advice of a physician before participating in the activity:

- Pregnancy (climbing harness can injure uterus)
- Kidney or liver transplant (climbing harness can injure transplanted organ)
- Healing fracture or joint injury (should be cleared by treating physician)
- Recent surgery (should be cleared by treating physician)
- Down syndrome (should have x-ray check for neck instability, as per recommendation of the Special Olympics)

If you or your physician has any questions about the physical requirements of the activity, feel free to contact the local council.

## **HEALTH HISTORY**

Name:			
First	Middle	Last	
Telephone:			
Home	Work		
Personal physician		Telephone:	
Name			
In case of emergency, please contact:		Telephone:	
Name			
Special dietary considerations:			
List known allergies:			
List required medications:			
If you are allergic to insect stings, do you have an insect sting kit (e.g., EpiPen)?			
Do you wear contact lenses?		Are you pregnant?	
Have you had or do you now have (circle if yes):		Heart attack	Diabetes
Angina	Epilepsy	Chest pains	Asthma
Drug reactions	High blood pressure	Heart murmur	
If you answered "yes" to any of the above, explain and include date:			
Do you have any other medical conditions that we should be aware of?			



### HOLD HARMLESS AGREEMENT

I understand that participation in the activity involves a certain degree of risk that could result in injury or death. In consideration of the benefits to be derived, after carefully considering the risk involved, and in view of the fact that the Boy Scouts of America is an organization in which membership is voluntary, I have carefully considered the risk involved and have given consent for myself (or my son or daughter) to participate in the activity, and waive all claims I or we may have against the Boy Scouts of America, the local council, the activity coordinators, and all employees, volunteers, related parties, or other organizations associated with the activity.

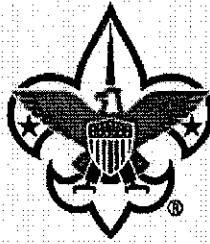
I am not under the influence of any chemical substance, including alcohol. Understanding that any physical activity involves a risk of injury, I understand that my participation in the activity is entirely voluntary. I release the Boy Scouts of America, the local council, the activity coordinators, and all employees, volunteers, related parties, or other organizations associated with the activity from any and all claims or liability arising out of this participation. This release does not, however, apply to any harm caused by negligence or willful misconduct of the local council or its employees.

In case of emergency involving my child, I understand every effort will be made to contact me. In the event I cannot be reached, I hereby give my permission to the physician selected by the adult leader in charge to secure proper treatment, including hospitalization, anesthesia, surgery, or injections of medication for my child.

Participant's signature\* \_\_\_\_\_ Date \_\_\_\_\_

\*If the participant is under age 18, his or her parent or guardian must also sign below:

Parent's or guardian's signature \_\_\_\_\_ Date \_\_\_\_\_



## BOY SCOUTS OF AMERICA

National Office  
1325 West Walnut Hill Lane  
P.O. Box 152079, Irving, Texas 75015-2079  
972-580-2000

To: Scout Executives

October 1, 2008

From: Mark L. Dama,  
Director, Insurance and Risk Management

SUBJECT: NON-SCOUT USE OF SCOUT FACILITIES

Many councils receive requests from non-Scouters or outside organizations to use council facilities such as Scout camps. The Risk Management Service has developed a procedure and letter of agreement which includes a release and indemnity/hold-harmless agreement for use by outside organizations. The agreement can be printed by accessing MyBSA and then clicking on Resources. Click on the Risk Management Notebook and then open up tab 23.

If an individual or organization comes to you wanting to use your facilities, you should require this letter of agreement, which describes the duties and responsibilities of each party. The outside individual/group must provide the council with a certificate of insurance evidencing coverage in effect (including contractual liability) for this event. This certificate of insurance must state that the limits of liability are at least \$2 million combined single limit.

## NON-SCOUTING RELEASE AND INDEMNITY/HOLD-HARMLESS AGREEMENT

I understand that use of facilities on \_\_\_\_\_ owned by \_\_\_\_\_ Council, BSA, involves a certain degree of risk that could result in injury or death. In consideration of the benefits to be derived, after carefully considering the risk involved, and in view of the fact that the Boy Scouts of America is a not-for-profit organization:

### RELEASE AND INDEMNIFICATION

I hereby release and waive any and all claims that I may have against Boy Scouts of America, \_\_\_\_\_ Council, BSA and Scouting's chartered organization and any of their affiliates, agents, servants, employees, officers, directors and volunteers.

\_\_\_\_\_ shall indemnify, hold free and harmless, assume liability for, and defend the Boy Scouts of America, \_\_\_\_\_ Council, or Scouting's chartered organizations, and any of their affiliates, agents, servants, employees, officers, volunteers, and directors from any and all costs and expenses, including but not limited to, attorneys' fees, reasonable investigative and discovery costs, court costs, and all other sums that the Boy Scouts of America, \_\_\_\_\_ Council, or Scouting's chartered organizations, and any of their affiliates, agents, servants, employees, officers, volunteers, and directors incur as a result of any demand for claim or assertion of liability under any municipal, state or federal law or cause of action, including any action under the Americans with Disabilities Act, arising or alleged to have arisen out of any act or omission of, or any use of real or personal property belonging to, the Boy Scouts of America, \_\_\_\_\_ Council, or Scouting's chartered organizations, and any of their affiliates, agents, servants, employees, officers, volunteers, and directors.

Property and period to be used: \_\_\_\_\_

Organization: \_\_\_\_\_

\_\_\_\_\_  
Signature Telephone Number Date

**If signatory is less than 18 years of age, this must also be signed by a parent or guardian.**

\_\_\_\_\_  
Parent's Signature Telephone Number Date

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Telephone Number

\_\_\_\_\_  
Date

### Sample LETTER OF AGREEMENT FOR CAMP USE

This letter of agreement is for the purpose of establishing the use of Camp \_\_\_\_\_  
by \_\_\_\_\_ for the purpose of \_\_\_\_\_  
This is a Boy Scout Camp and is used first and foremost by members of Boy Scouts of  
America.

1. \_\_\_\_\_ is to use the \_\_\_\_\_ Scout Reservation from  
\_\_\_\_\_ beginning at \_\_\_\_\_ AM/PM to \_\_\_\_\_ at \_\_\_\_\_ AM/PM.
2. Agrees to provide the \_\_\_\_\_ Council with the following documents by  
\_\_\_\_\_
  - a). A certificate of liability insurance with a minimum of \$2,000,000 CSL  
(combined single limit) with the \_\_\_\_\_ Council, Boy Scouts, and Boy  
Scouts of America, names as additional insured, ten (10) day written notice  
of cancellation, and the period of time involved.
  - b). A hold harmless agreement, (Copy attached)
  - c). A certificate showing non-profit and/or tax exempt status.
  - d). A roster showing the names of all youth and adults participating in this  
activity.
3. Agrees to pay \$ \_\_\_\_\_ for the use of Camp \_\_\_\_\_  
which sum is payable by \_\_\_\_\_.
4. A deposit of \$50.00 is required to be paid at the signing of this agreement. This is  
non-refundable, but is a part of the total fee.
5. Be responsible for any and all damages to Camp property which may reasonably  
be attributed to the actions of the said group and agrees to promptly pay any and  
all reasonable damage claims when presented.
6. While Scouting makes every effort to accommodate all persons with disabilities, it  
is a charitable, private organization not subject to the ADA, and any group who  
uses the property is responsible for ADA compliance and any accommodations  
necessary for its participants and visitors.
7. No alcoholic beverages or illegal drugs of any kind are permitted to be used on  
the premises.
8. Agrees that you will provide at least one adult leader (defined as 21 years of age  
or older for purposes herein) for every ten (10) members of the party present in  
camp below the age of 21 years; that at least on the said adult leaders must be  
present with the group at all times while the group is in camp.
9. Agrees that the group will abide by any and all of the camp operating rules and  
instructions of the Camp Ranger.

\_\_\_\_\_ Council, Boy Scouts of America

Organization

By \_\_\_\_\_

By \_\_\_\_\_

Title Title

Date Date

Note: Please return the original and one copy along with other required documents and  
the deposit to the \_\_\_\_\_ Council, Boy Scouts of America.

#### SCOUT OATH

On my honor I will do my best  
To do my duty to God and my country  
And to obey the Scout Law;  
To help other people at all times;  
To keep myself physically strong,  
Mentally awake, and morally straight.

#### SCOUT LAW

A Scout is trustworthy, loyal, helpful,  
friendly, courteous, kind,  
obedient, cheerful, thrifty, brave,  
clean, and reverent.

# **Project COPE/Climbing Safety CHECK**

**C**LOTHING—No baggy clothing or loose jewelry; hair is tied up or tucked in.

**H**ARNESSES/HELMETS—Properly fitted helmets; ropes properly attached; buckles on harnesses properly secured.

**E**NVIRONMENT—Keep all program areas safe, free from hazards and obstructions.

**C**ONNECTIONS—Check and double-check—make sure anchor points are rigged properly, participants are properly connected, and carabiners are screwed down and locked.

**K**NOTS—check that knots are properly tied, dressed, and backed up with a safety knot.

**T H E  
RISK  
ZONE**



BOY SCOUTS OF AMERICA®

## **Additional Resources**

### **Scouting Literature**

*Boy Scout Handbook*; *Rock Climbing and Rappelling* activity pamphlet; *Project COPE* manual; and *Backpacking, Camping, Climbing, First Aid, Geology, Hiking, and Wilderness Survival* merit badge pamphlets

### **Instruction and Guidebooks**

- Allen, Linda B. *High Mountain Challenge: A Guide for Young Mountaineers*. AMC Books, 1989.
- Ashton, Steve. *All Action Climbing*. Lerner, 1993.
- Carline, Jan D., Martha J. Lentz, and Steven C. MacDonald. *Mountaineering First Aid: A Guide to Accident Response and First Aid Care*, 5th ed. The Mountaineers, 2004.
- Cox, Steven M., and Kris Fulsaa, eds. *Mountaineering: The Freedom of the Hills*, 7th ed. Mountaineers Books, 2003.
- Evans, Jeremy. *Hiking and Climbing*. Crestwood House, 1992.
- Fasulo, David J. *Self Rescue*. The Globe Pequot Press, 1996.
- Fawcett, Ron, et al. *The Climber's Handbook: Rock, Ice, Alpine, Expeditions*. Sierra Club, 1987.
- Frank, James. *CMC Ropes Rescue Manual*, 3rd ed. CMC Rescue, 1998.
- Frank, James A., and Donald E. Patterson. *CMC Rappel Manual*, rev. 2nd ed. CMC Rescue, 1997.
- Gerrard, Layne. *Rock Gear: Everybody's Guide to Rock Climbing Equipment*. Ten Speed Press, 1990.
- Hargrove, Jim, and Sylvia A. Johnson. *Mountain Climbing*. Lerner, 1983.
- Hyden, Tom, and Tim Anderson. *Rock Climbing Is for Me*. Lerner, 1984.
- Lewis, S. Peter. *Toproping*. Morris Book Publishing, 1998.
- Long, John, and Bob Gaines. *Climbing Anchors*, 2nd ed. Falcon, 2006.
- Long, John. *How to Rock Climb!* 4th ed. Falcon, 2003.
- Loughman, Michael. *Learning to Rock Climb*. Random House, 1982.
- Martin, Tom. *Rappelling*, 2nd ed. Search, 1988.
- Mellor, Dan. *Rock Climbing: A Trailside Guide*, rev. ed. W. W. Norton & Company, 2003.
- Moynier, John. *The Basic Essentials of Mountaineering*. ICS Books, 1991.
- Roper, Steve, and Allen Steck. *Fifty Classic Climbs of North America*. Sierra Club, 1996.
- Skinner, Todd, and John McMullen. *Modern Rock Climbing: Beyond the Basics*. ICS Books, 1993.
- Smith, Bruce, and Padgett, Alan. *On Rope*, 2nd ed. National Speleological Society, 1997.
- Smith, Howard Everett. *The Complete Beginner's Guide to Mountain Climbing*. Doubleday, 1977.
- Vines, Tom, and Hudson, Steve. *High Angle Rescue Techniques*. Mosby, 2004.
- Warild, Alan. *Vertical*. Speleological Research Council Ltd., 1994.



### **History and Biography**

- Bonington, Chris. *Mountaineer: Thirty Years of Climbing on the World's Great Peaks*. Sierra Club, 1996.
- Curran, Jim. *K2: Triumph and Tragedy*. Houghton Mifflin, 1997.
- Fraser, Mary Ann. *On Top of the World: The Conquest of Mount Everest*. Henry Holt, 1991.
- Jones, Chris. *Climbing in North America*. Mountaineers Books, 1997.
- Krakauer, Jon. *Eiger Dreams: Ventures Among Men and Mountains*. Anchor Books, 1997.
- . *Into Thin Air: A Personal Account of the Mount Everest Disaster*. Anchor Books, 1998.
- Messner, Reinhold. *The Crystal Horizon: Everest—The First Solo Ascent*. The Mountaineers Books, 1998.
- Osius, Allison. *Second Ascent: The Story of Hugh Herr*. Stackpole Books, 1991.
- Rosen, Mike. *The Conquest of Everest*. Bookwright Press, 1990.

### **Videos**

- The following videos are available by contacting Chockstone Press Inc., P.O. Box 3505, Evergreen, CO 80439-3505; telephone toll-free 800-337-5012; fax 303-670-9190.
- The Art of Leading*. Chockstone Press, 1988.
- Basic Rock Climbing*. Chockstone Press, 1988.

### **Organizations**

Contact these national climbing organizations for information on climbing groups located near you.

#### **The Access Fund**

P.O. Box 17010  
Boulder, CO 80308  
Telephone: 303-545-6772  
Website: <http://www.accessfund.org>

#### **American Alpine Club**

710 10th St., Suite 100  
Golden, CO 80401  
Telephone: 303-384-0110  
Fax: 303-384-0111  
Website: <http://www.americanalpineclub.org>

#### **American Mountain Guides Association**

1209 Pearl St., Suite 14  
Boulder, CO 80302  
Telephone: 303-271-0984  
Fax: 303-271-1377  
Website: <http://www.amga.com>  
E-mail: [info@amga.com](mailto:info@amga.com)

#### **Eastern Mountain Sports Climbing School**

Toll-free telephone: 800-310-4504  
Website: <http://www.emsclimb.com>

**The Mountaineers**

7700 Sand Point Way NE  
Seattle, WA 98115  
Telephone: 206-521-6000  
Fax: 206-523-6763  
Website: <http://www.mountaineers.org>

**National Outdoor Leadership School**

284 Lincoln St.  
Lander, WY 82520-2848  
Toll-free telephone: 800-710-6657  
Fax: 307-332-1220  
Website: <http://www.nols.edu/NOLS.html>

**Outward Bound**

Telephone: 845-424-4000  
Website: <http://www.outwardbound.com>

**Sierra Club**

85 Second St., 2nd Floor  
San Francisco, CA 94105  
Telephone: 415-977-5500  
Fax: 415-977-5799  
Website: <http://www.sierraclub.org>

**Wilderness Education Association**

1900 E. 10th Street  
Bloomington, IN 47406  
Telephone: 812-855-4095  
Website: <http://www.weainfo.org>

**Internet Resources**

The Climbing directory in the popular Yahoo index (go to <http://www.yahoo.com/recreation/outdoors/climbing>) is a good place to start looking for World Wide Web sites, newsgroups, and other Internet resources that contain information on climbing.

*Climbing* magazine's online version has the latest news about record-breaking climbs, conservation, gear, and listings of events in the climbing world. You can also write a letter to the editor, subscribe to the magazine, or browse the magazine's index for other articles by going to *Climbing's* Web address, <http://www.climbing.com>.

# Glossary

**aid climbing.** Using rope and other gear to give the climber something to hang from or pull up on; using any means other than hands and feet to get up a climb. This type of climbing falls beyond the scope of BSA activities and is not permitted unless protected by a top-roped belay. (See "free climbing.")

**anchor.** Ropes, runners, and other pieces of equipment set up to secure a climber, rappeller, or belayer to an anchor point.

**anchor point.** A well-rooted tree, rock protrusion, properly installed bolt, or other convenient location for attaching carabiners, runners, or rope for belay and rappel systems.

**ascending.** Moving upward.

**belay.** The protection provided a climber or rappeller tied to a belay rope. The rope is managed by a belayer in such a way that the fall of a climber or rappeller will be arrested almost immediately.

**belay device.** A piece of hardware used for belaying; it simplifies the process of locking the rope to stop the fall of a climber or rappeller.

**belayer.** The person who manages the rope and is responsible for stopping the fall of a climber or rappeller.

**bight.** A bend in the rope. A bight is important for tying certain knots used for belaying, and for securing ropes into rappel or belay devices.

**bolt.** An artificial anchor point formed by driving a special bolt into a hole drilled into a rock face. This should only be done by a skilled climber. A carabiner may be clipped into the hanger attached to the bolt.

**bouldering.** Climbing on boulders or other steep faces without going more than shoulder height off the ground, usually protected by spotters rather than a rope belay.

**BSA climbing director.** A person who is at least 21 years of age and has successfully completed the Climbing section of a weeklong National Camping School.

**BSA climbing instructor.** A person who is at least 18 years of age and has successfully completed three days of training by a BSA climbing director.

**carabiner.** A steel or aluminum ring with a spring-loaded gate. Carabiners are used to connect pieces of climbing equipment and to secure rope to webbing, anchor points, and protection devices.

**chimney.** A crack large enough to accommodate a climber's body.

**chimneying.** Ascending by pressing the hands and feet against opposite sides of a large crack.

**chock.** Climbing hardware comprising removable protection.

**Climb On Safely.** The BSA's eight points for effectively and safely managing unit climbing and rappelling activities.

**climbing.** A challenging sport that always involves the skills of ascending and belaying or spotting, and may also include rappelling and bouldering.

**cling.** A handhold involving one or more fingers bent over a hold.

**counterbalance.** A combination hold that involves the entire body, requiring the climber to use position and weight distribution—for instance, applying pressure with the feet or hands in opposite directions—to make the most of minimal holds.

**descending.** Moving downward by rappelling or down-climbing.

**down-climbing.** Using hands and feet for balance while descending a moderate or steep face.

**dynamic rope.** Rope that stretches 6 percent to 10 percent to absorb the energy of a fall.

**edge.** The brink of a ledge or a small horizontal hold on a rock face.

**edging.** Standing on a nub or narrow ledge of rock with the side of the climbing shoe.

**etrier.** A ladder made from webbing.

**face.** A surface suitable for climbing, usually a natural rock formation. (See "wall.")

**fall zone.** The area beneath a climbing site where an object could fall, bounce, or ricochet.

**figure-eight descending device.** The hardware most often used by rappellers to control the speed of their descents.

**foothold.** A knob of rock, a crack, an edge, or some other feature of a climbing surface where a climber can place a foot while ascending or descending.

**free climbing.** Using only the hands and feet on natural features of the rock; rope and hardware are not used directly to help the climber scale a surface, but only for safety in case the climber falls. (See "aid climbing.")

**handhold.** A knob of rock, a crack, a ledge, or some other feature of a climbing surface that a climber can hold onto while ascending or descending.

**hard fall.** An instance when a climber or rappeller falls far enough to place significant stress on the rope, webbing, or hardware. Records of hard falls must be noted in the written histories of the rope and gear involved, and factored into equipment retirement decisions.

**harness.** Webbing either tied or commercially sewn to fit around the hips and legs. Harnesses allow climbers, rappellers, and belayers to attach themselves to belay systems and rappel ropes.

**instructor-in-training (IIT).** A person who is at least 16 years of age and who has received training in climbing, rappelling, belaying, and spotting from a BSA climbing director or instructor.

**jamming.** Placing a hand or foot into a crack and wedging it so that it will not slip out.

**kernmantle.** Strong, synthetic rope composed of a woven outer sheath surrounding an inner core. Kernmantle rope is the only rope that should be used for BSA climbing, rappelling, or belaying activities.

**kiloNewton.** Commonly used to measure the impact force and breaking strength of climbing ropes (1 kiloNewton = 224.8 pounds).

**lead climbing.** When climbers establish points of protection as they ascend by inserting chocks, nuts, or other hardware into cracks in the rock, and clipping the belay rope to them with carabiners. This type of climbing may be practiced during council or district activities only with a top-rope belay.

**Leave No Trace.** The BSA's methods and commitment to caring for the outdoors; the seven principles of Leave No Trace extend to climbing areas and the routes leading to them.

**lieback (layback).** A climbing hold accomplished by pulling against a crack or an edge with the hands while pressing on rock with the feet.

**locking carabiner.** A carabiner fitted with a mechanism that can be screwed or set to hold the carabiner gate closed. A double locking carabiner is preferred for BSA climbing and rappelling activities.

**mantle.** A climbing maneuver for hoisting oneself onto a ledge.

**mountaineering.** Climbing mountains. In addition to rock climbing ability, mountaineering may require the skills of route finding, wilderness camping, and ascending snow and ice.

**nose-over-toes.** A well-balanced position used to make descents on gentle slopes.

**pockets.** Holes in rock that may be used as holds.

**protection.** A piece of equipment used as an anchor point sometimes shortened to "pro."

**protection system.** The rope, hardware, webbing, and anchors used together to belay a climber or rappeller.

**rappel device.** A piece of hardware such as the figure-eight descending device that helps rappellers control the speed of a rappel.

**rappelling.** Descending by a controlled slide down a rope that is anchored at the top of a route.

**rest step.** A way of settling the weight onto the skeletal system to let muscles recover during a climb.

**rock gym.** An indoor climbing facility.

**rope bag.** A bag or pack designed for stowing and carrying a climbing rope.

**rope drag.** Friction or resistance created when a rope runs over rock or through pieces of protection.

**rope stretch.** The amount of "give" in a dynamic climbing rope.

**runner (sling).** A loop of commercially prepared webbing used for various purposes including setting up anchors, placing protection, and connecting pieces of climbing equipment.

**safety knot.** A knot tied in addition to the main knot to keep the main knot from untying or slipping. Also called a "backup" knot or "stopper" knot.

**sewing machine leg.** The shaking phenomenon sometimes experienced by a climber when muscles tire.

**shock loading.** The sudden, sharp force or stress on a rope and an anchoring system when a climber hits the end of the belay rope after falling a considerable distance. (See "hard fall.")

**slingshot belay.** A top-rope belay featuring a belayer on the ground. The rope runs from the belayer up to an anchor at the top of the climb, then down to the climber, forming the shape of a slingshot.

**smearing.** Pressing the sole of a climbing shoe against a surface and using the friction created to ascend a face.

**spotter.** A person on the ground who provides protection to a boulderer to help prevent injury to the boulderer in case of a fall.

**spring-loaded camming device (SLCD).** A specialized adjustable anchor designed to put pressure on both sides of a large crack. SLCDs come in a range of sizes.

**static rope.** Rope with minimal stretch. Static kernmantle rope can be used for top-rope belays and for rappelling.

**Sticht plate.** A simple belay device that, like all belay devices, relies on friction.

**tail.** The free end of a rope or piece of webbing after a knot has been tied. A safety knot is often tied in the tail to help protect the primary knot.

**three-point stance.** A stable position for a climber. One hand and both feet are on good holds on the rock, or two hands and one foot, freeing the other limb to move.

**top-roping.** Belaying a climber with an anchor at the top of a climb. The belayer may be anchored at the bottom of a climb (see "slingshot belay"), or at the top. All BSA climbing activities more than 6 feet above the ground must be protected with a belay.

**traversing.** Moving sideways on a face without gaining or losing much elevation.

**tubular webbing.** Nylon straps used to rig anchors, to form seat harnesses, to make runners, and for other purposes.

**tying in.** Attaching a rope to a climber's harness.

**undercling.** A kind of hold with the palms facing up, usually under a rock formation.

**wall.** A vertical climbing surface, often found at climbing gyms and constructed outdoor climbing facilities. Very high rock faces are also known as walls.



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