

# Rock climbing

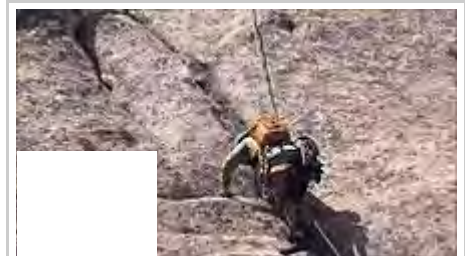
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**Rock climbing** is an activity in which participants climb up, down or across natural rock formations or artificial rock walls. The goal is to reach the summit of a formation or the endpoint of a usually pre-defined route without falling. Due to the length and extended endurance required and because accidents are more likely to happen on descent than ascent, Rock Climbers do not usually climb back down the route. It is very rare for a climber to downclimb, especially on the larger multiple pitches (class III- IV and /or multi-day grades IV-VI climbs). Professional Rock climbing competitions have the objectives of either completing the route in the quickest possible time or attaining the farthest point on an increasingly difficult route. Scrambling, another activity involving the scaling of hills and similar formations, is similar to rock climbing. However, rock climbing is generally differentiated by its sustained use of hands to support the climber's weight as well as to provide balance.

Rock climbing is a physically and mentally demanding sport, one that often tests a climber's strength, endurance, agility and balance along with mental control. It can be a dangerous activity and knowledge of proper climbing techniques and usage of specialised climbing equipment is crucial for the safe completion of routes. Because of the wide range and variety of rock formations around the world, rock climbing has been separated into several different styles and sub-disciplines.<sup>[1]</sup>



A rock climber



Rock Climbing

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## History

Paintings dating from 200 BC show Chinese men rock climbing. In early America, the cliff-dwelling Anasazi in the 12th century were thought to be excellent climbers. Early European climbers used rock climbing techniques as a skill required to reach the summit in their mountaineering exploits. In the 1880s, European rock climbing become an independent pursuit outside of mountain climbing.<sup>[2]</sup>

Although rock climbing was an important component of Victorian mountaineering in the Alps, it is generally thought that the sport of rock climbing began in the last quarter of the nineteenth century in various parts of Europe. Rock climbing evolved gradually from an alpine necessity to a distinct athletic activity.

Aid climbing, climbing using equipment that acts as artificial handhold or footholds, became popular during the period 1920-1960, leading to ascents in the Alps and in Yosemite Valley that were considered impossible without such means. However, climbing techniques, equipment and ethical considerations have evolved steadily. Today, free climbing, climbing using holds made entirely of natural rock while using gear solely for protection and not for upward movement, is the most popular form of the sport. Free climbing has since been divided into several sub-styles of climbing dependent on belay configuration.

Over time, grading systems have also been created in order to compare more accurately the relative difficulties of the rock climbs.

## Style

In *How to Rock Climb*, John Long notes that for moderately skilled climbers simply getting to the top of a route is not enough; how one gets to the top matters.<sup>[3]</sup> In rock climbing, style refers to the method of ascending the cliff. There are three main styles of climbing: on-sight, flash, and redpoint. To on-sight a route is to ascend the wall without aid or any foreknowledge. It is considered the way to climb with the most style. Flashing is similar to on-sighting, except that the climber has previous information about the route including talking about the beta with other climbers. Redpointing means to make a free ascent of the route after having first tried it.<sup>[4][5][6]</sup>

## Types of climbing

Most of the climbing done in modern times is considered free climbing—climbing using one's own physical strength, with equipment used solely as protection and not as support—as opposed to aid climbing, the gear-dependent form of climbing that was dominant in the sport's earlier days. Free climbing is typically divided into several styles that differ from one another depending on the choice of equipment used and the configurations of their belay, rope and anchor systems.

As routes get higher off the ground, the increased risk of life-threatening injuries necessitates additional safety measures. A variety of specialized climbing techniques and climbing equipment exists to provide that safety. Climbers will usually work in pairs and utilize a system of ropes and anchors designed to catch falls. Ropes and anchors can be configured in different ways to suit many styles of climbing, and roped climbing is thus divided into further sub-types that vary based on how their belay systems are set up. Generally speaking, beginners will start with top roping and/or easy bouldering and work their way up to lead climbing and beyond.

### Aid climbing

Still the most popular method of climbing big walls, aid climbers make progress up a wall by repeatedly placing and weighting gear that is used directly to aid ascent and enhance safety.

### Free climbing

The most commonly used method to ascend climbs refers to climbs where the climber's own physical strength and skill are relied on to accomplish the climb. Free climbing may rely on top rope belay systems, or on lead climbing to establish protection and the belay stations. Anchors, ropes and protection are used to back up the climber and are passive as opposed to active ascending aids. Subtypes of free climbing are trad climbing and sport climbing. Free climbing is generally done as "clean lead" meaning no pitons or pins are used as protection.<sup>[7]</sup>

### Bouldering



Quelle: Deutsche Fotothek

Climbing in Germany, circa 1965. Note the lack of intermediate protection points and the potentially unsafe tie-in method, which demonstrate the maxim of the day: "The leader must not fall."

Climbing on short, low routes without the use of the safety rope that is typical of most other styles. Protection, if used at all, typically consists of a cushioned bouldering pad below the route and a spotter, a person who watches from below and directs the fall of the climber away from hazardous areas. Bouldering may be an arena for intense and relatively safe competition, resulting in exceptionally high difficulty standards.

## Solo climbing

### Deep-water soloing (DWS)

Deep-water soloing (or psicobloc) is similar to free soloing in that the climber is unprotected and without a rope, but should the climber fall, it is into deep water instead of onto the ground.

### Free soloing

Free soloing, referred to as "soloing" in the UK, is single-person climbing without the use of any rope or protection system whatsoever. If a fall occurs and the climber is not over water (as in the case of deep water soloing), the climber is likely to be killed or seriously injured. Though technically similar to bouldering, free solo climbing typically refers to routes that are far taller and/or far more lethal than bouldering. The term "highball" is used to refer to climbing on the boundary between free soloing and bouldering, where what is usually climbed as a boulder problem may be high enough for a fall to cause serious injury (20 ft. and higher) and hence could also be considered to be a free solo.

### Roped solo climbing

Solo climbing with a rope secured at the beginning of the climb allowing a climber to self-belay as they advance. Once the pitch is completed the soloist must descend the rope to retrieve their gear, and then re-climb the pitch. This form of climbing can be conducted free or as a form of aid climbing.

## Lead climbing

Lead climbing is a climbing technique. The lead climber ascends with the rope passing through intermittent anchors that are below them, rather than through a top anchor, as in a top-roped climb. A partner belays from below the lead climber, by feeding out enough rope to allow upward progression without undue slack. As the leader progresses he or she clips the rope into, using a runner and carabiners, intermediate points of protection such as active cams, or passive protection such as nuts; this limits the length of a potential fall. The leader also may clip into pre-placed bolts. Indoor gyms might have short runners pre-attached to fixed anchor points in the wall.

Unlike top-rope climbing where the climber is always supported by an anchor located above the climber, lead climbing often has scenarios where the climber will be attached to a point under him or her. In these cases, if the climber were to fall, the distance fallen would be much greater than that of top-rope and this is one of the main reasons lead climbing can be dangerous. The fall factor is the ratio of the height a climber falls and the length of rope available to absorb the fall. The higher the fall factor, the more force placed on the climber as the ropes decelerates them. The maximum fall factor is 2. It is often advised that climbers who are interested in lead climbing should learn from experienced climbers and participate in training sessions before actually lead climbing on their own.



Bouldering in Joshua Tree National Park, United States.

## Multi-pitch climbing

The climbing rope is of a fixed length; the climber can only climb the length of the rope. Routes longer than the rope length are broken up into several segments called pitches; this is known as multi-pitch climbing. At the top of a pitch, the leader, the first climber to ascend, sets up an anchor and then belays the second climber up to the anchor; as the second climber follows the route taken by the leader, the second climber removes (cleans) the carabiners and anchors placed along the way in order to use them again on the next pitch. Once both climbers are at the top anchor, the leader begins climbing the next pitch and so on until the top of the route is reached.

In either case, upon completion of a route, climbers can walk back down if an alternate descent path exists, or rappel (abseil) down with the rope.

## Sport climbing

Unlike traditional rock climbing, sport climbing involves the use of protection (bolts) placed with power drills or on rappel or permanent anchors which are attached to the rock walls. This is separate from bolted trad face climbing.

## Traditional climbing

Traditional or *trad* climbing involves rock climbing routes in which protection against falls is placed by the climber while ascending, or bolts placed on lead. Gear is used to protect against falls but not to aid the ascent directly. Traditional bolted face climbs are different than sport climbs. Trad bolted climbs use either a hand drill and or are bolted on lead. This means there are far fewer bolts and they are spaced out farther than sport climbs.

## Bottom rope climbing and top rope climbing

### Bottom rope climbing

Commonly known as "Top Roping": belaying a climber from the ground or the base of the route. A belay system resembling a pulley in which an anchor has been created at the top of a climb, through which the rope runs through from the belayer on the ground, to the climber on the ground (*position before starting the climb*). The rope is "taken-in", to clear up the slack as the climber moves upwards, so in the event of a fall the climber falls the shortest distance possible. The length of a fall is normally no more than a meter, but can vary depending on the length of the route (the longer the rope, the more stretch the rope will undergo when weighted) and the weight of the climber compared to that of the belayer, among other things.

### Top rope climbing

Also known as "seconding," or belaying a climber from the top of a route, bringing them up to walk off or continue on to next pitch. A similarly safe system of climbing a route, except the belayer has set the anchors at the top of the climb (normally after leading a route) to belay the climber either indirectly (belayer is part of the



Leader belays the second on *Illusion Dweller* in Joshua Tree National Park, United States.

system and can be vulnerable when exposed to unexpected directions of pull and loading of the rope) or directly (belayer is not part of the system and belaying is done direct from the anchors using either an Italian / Munter Hitch or adapted use of a belay device), up the route from the top. If bolts have been clipped or traditional gear placements have been made, it is the job of the climber to collect and clean the route.

## Via ferrata

A method of fairly easily ascending a route, heavily dependent on permanent protection rather than using natural rock features to proceed.

## Climbing techniques

Different types of rock require different techniques to successfully climb.

### Crack climbing

Crack climbing is a type of rock climbing that ascends cracks and uses specialized climbing techniques. Cracks used in climbing vary in size from the width of a finger to those that fit an entire body. Climbers use techniques such as jamming, laybacking, and stemming. Some climbers use gloves made out of athletic tape to protect their hands.

### Face climbing

Face climbing is a type of climbing where climbers use features and irregularities in the rock such as finger pockets and edges to ascend a vertical rock face.

### Slab climbing

Slab climbing is a type of rock climbing where the rock face is at an angle of less steep than vertical. It is characterized by balance- and friction-dependent moves on very small holds.

### Simul climbing

When two climbers move at the same time. The pseudo-lead climber places gear that the pseudo-follower collects. When the leader runs low on gear they construct a belay station where the follower can join them to exchange gear. The stronger climber is often the pseudo-follower since a fall by the follower would pull the leader from below towards the last piece of gear—a potential devastating fall for the leader. In contrast, a fall from the leader would pull the follower from above, resulting in a less serious fall. Most speed ascents involve some form of simul climbing but may also include sections of standard free climbing and the use of placed gear for advancement (i.e. partial aid or pulling on gear).



Top roping *Balthazar* (12), in the Morialta Conservation Park near Adelaide, South Australia. Top roping is the most accessible style of climbing for beginners.



climber with climbing aids attached at his waist

## Via ferrata

A method of fairly easily ascending a route, heavily dependent on permanent protection rather than using natural rock features to proceed.

## Grading systems

Climbing communities in many countries and regions have developed their own rating systems for routes. Ratings, or grades, record and communicate consensus appraisals of difficulty. Systems of ratings are inherently subjective in nature, and variation of difficulty can be seen between two climbs of the same grade. Hence, there may be occasional disagreements arising from physiological or stylistic differences among climbers. The practice of rating a climb below its actual difficulty is known as sandbagging.

The most commonly used rating systems in the United States are the Yosemite Decimal System and the Hueco V-scale bouldering grade. The current ranges for climbing routes are 5.0 for easy beginner routes to 5.15 being world class and V0 - V16, respectively. As the limit of human climbing ability has not yet been reached, neither grading system has a definite endpoint and is thus subject to revision.<sup>[8]</sup>

The ratings take into account multiple factors affecting a route, such as the slope of the ascent, the quantity and quality of available handholds, the distance between holds, ease of placing protection and whether advanced technical maneuvers are required. Typically the rating for the hardest move on the wall will be the rating for the whole climb. While height of a route is generally not considered a factor, a long series of sustained hard moves will often merit a higher grade than a single move of the same technical difficulty. For example, a climb with multiple 5.11 moves with no rests may thus be rated a 5.12.

## Terminology

As climbing routes or problems increase in difficulty, climbers learn to develop skills that help them complete the climbs clean. There are several techniques for hands and feet as well as terms for motions that combine the two. For indoor gyms, route setters visualize and create routes for climbers, placing different kinds of holds in specific parts of the wall at particular angles because they intend climbers to use certain techniques.

## Environments

### Indoor climbing

Indoor climbing occurs in buildings on artificial rock structures. This permits for climbing in all types of weather and at all times of day. Climbers climb indoors to improve their skills and techniques, as well as for general exercise or fun. Indoor climbing gyms typically provide rope setups and ensure that new climbers know safe techniques.

### Outdoor climbing

	Sierra (USA)	British (UK)	French	UIAA (Central Europe)	Austr-alian	GDR (Eastern Europe)
Advanced	5.4					
	5.5	4a	vs			
	5.6	4b				
	5.7	4c		5a	5+	15
	5.8		hvs	5b	6-	16
	5.9	5a		5c	6	17
	5.10a		E1	6a	6+	18
	5.10b	5b			7-	19
	5.10c		E2	6b	7	20
	5.10d	5c			7+	21
	5.11a		E3	6c		22
	5.11b				8-	23
	5.11c	6a	E4	7a	8	24
	5.11d				8+	25
5.12a		E5	7b		26	
Difficult	5.12b	6b		E6	7c	9-
	5.12c		E6		9	27
	5.12d	6c		E7	9+	28
	5.13a		E7	8a		29
	5.13b				10-	
	5.13c	7a		8b	10	30
	5.13d		E8		10+	31
	5.14a			8c		32
	5.14b	7b			11-	
	5.14c		E9		11	33
Extreme	5.14d	7c		9a	11+	

Climbing grades simplified. There are many other grades but these are the most used.

Outdoors, climbs usually take place on sunny days when the holds are dry and provide the best grip, but climbers can also attempt to climb at night or in adverse weather conditions if they have the proper training and equipment. However, night climbing or climbing in adverse weather conditions will increase the difficulty and danger on any climbing route.

## Equipment

Most climbers choose to wear specialized rubber climbing shoes which are often of a smaller size than their normal street shoes in order to improve sensitivity towards foot placements and use the tightness to their advantage. Climbing chalk ( $\text{MgCO}_3$ ) is commonly used as a drying agent to minimize sweating of the hands. Most other equipment is of a protective nature. Rock climbing is inherently dangerous, so to minimize the potential consequences resulting from a fall, climbers use protection. The most basic protective equipment is a climbing rope.

Climbing pioneers would attach the rope to themselves; in the event of a fall, the rope would usually cause injury to the climber in the hope that it prevented death. With advances in technology came the development of specialized harnesses, carabiners which are used for clipping into belay and rappel anchors and connecting gear, and belay devices which are used to catch a falling climber, hold or lower a climber and for rappelling. Eventually, the placement of bolts with the use of quickdraws led to the rise of sport climbing. Traditional climbers developed the spring-loaded camming device, which increased safety over chocks, hexes, and pitons. Some climbers choose to wear a specialized climbing helmet to protect them from falling rocks or equipment or head injuries from crashing into rocks.<sup>[9]</sup>

## Injuries

Injuries in rock climbing are mainly sports injuries that occur due to falls or overuse. Injuries due to falls are relatively uncommon; the vast majority of injuries result from overuse, most often occurring in the fingers, elbows, and shoulders.<sup>[10]</sup> Such injuries are often no worse than torn calluses, cuts, burns and bruises. There are a number of skincare products specifically for climbers available in the market. However, overuse symptoms, if ignored, may lead to permanent damage especially to tendons, tendon sheaths, ligaments, and capsules. Injuries from lead climbing are common.

Planning your climb, knowing your partner, talking about your climb, checking your equipment and the conditions of the rocks, checking the weather, using good judgement and always paying attention minimize the risk of injury.<sup>[11]</sup>

## Access to climbing areas

### Indigenous culture considerations

Some areas that are popular for climbing, for example in the United States and Australia, are also sacred places for indigenous peoples. Many such indigenous people would prefer that climbers not climb these sacred places and have made this information well known to climbers. A well-known example is the rock formation that Americans have named Devils Tower National Monument.<sup>[12]</sup> Native American cultural concerns also led to



An indoor climbing wall.



complete climbing closures at Cave Rock at Lake Tahoe,<sup>[13]</sup> Monument Valley, Shiprock and Canyon de Chelly.<sup>[14]</sup>

Climbing activities can sometimes encroach on rock art sites created by various Native American cultures and early European explorers and settlers. The potential threat to these resources has led to climbing restrictions and closures in places like Hueco Tanks, Texas,<sup>[15]</sup> and portions of City of Rocks National Reserve, Idaho.

In Australia, the monolith Uluru (Ayers Rock) is sacred to local indigenous communities and climbing is banned on anything but the established ascent route (and even then climbing is discouraged).

Indigenous peoples are not the only cultures that object to climbing on certain rock formations. Professional climber Dean Potter kicked off a major controversy when he ignored long-accepted convention to scale Delicate Arch in 2006, resulting in strict new climbing regulation in Arches National Park.<sup>[16]</sup>

## Climbing on private property

Many significant rock outcrops exist on private land. Some people within the rock climbing community have been guilty of trespassing in many cases, often after land ownership transfers and previous access permission is withdrawn. In the U.S. the climbing community responded to access closures by forming the Access Fund. This is an "advocacy organization that keeps U.S. climbing areas open and conserves the climbing environment. Five core programs support the mission on national and local levels: public policy, stewardship and conservation (including grants), grassroots activism, climber education and land acquisition."<sup>[17]</sup> In the U.K. the British Mountaineering Council represents climbers and their interest of public access to crags, cliffs and boulders.

## Environmental impact

Although many climbers adhere to "minimal impact" and "leave no trace" practices, rock climbing is sometimes damaging to the environment. Common environmental damages include: soil erosion, breaking rock features, chalk accumulation, litter, abandoned bolts and ropes, human excrement, introduction of foreign plants through seeds on shoes and clothing, as well as damage to native plant species (especially those growing in cracks and on ledges as these are often intentionally removed during new route development through a process commonly referred to as *cleaning*).

Clean climbing is a style of rock climbing which seeks to minimize some of the aesthetically damaging side effects of some techniques used in trad climbing and more often, aid climbing by avoiding using equipment such as pitons, which damage rock.

Climbing can also interfere with raptor nesting, since the two activities often take place on the same precipitous cliffs. Many climbing area land managers institute nesting season closures of cliffs known to be used by protected birds of prey like eagles, falcons and osprey.<sup>[18]</sup>

Many non-climbers also object to the appearance of climbing chalk marks, anchors, bolts and slings on visible cliffs. Since these features are small, visual impacts can be mitigated through the selection of neutral, rock-matching colors for bolt hangers, webbing and chalk. The use of certain types of climbing gear is banned altogether at some crags due to the risk of damage to the rock face. In such cases, climbers use knotted slings and ropes for climbing protection.

Blowtorching is another climbing induced impact that effects the rocks themselves. Blowtorching is when a

climber uses a blowtorch to dry holds on a wet route. This mainly happens in areas that tend to have wet climbing conditions. Blowtorching is not only detrimental to the rock itself and can have permanent damage but it also leaves a very large burn mark that most non-climbers would object to the appearance of.

## Vandalism

The most significant form of vandalism directly attributable to rock climbers is alteration of the climbing surface to render it more climber-friendly.

With the advent of hard, bolted sport climbing in the 1980s, many routes were "chipped" and "glued" to provide additional features, allowing them to be climbed at the standard of the day. This attitude quickly changed as the safer sport climbing technique allowed climbers to push hard without much risk, causing the formerly more-or-less fixed grades to steadily rise. Altering routes began to be seen as limiting and pointless.

Unlike traditional climbing which generally uses protection only as a backup in case of falls, some forms of climbing—like sport climbing, canyoneering or, especially, aid climbing—rely heavily on artificial protection to advance, either by frequent falls or by directly pulling on the gear. Often these types of climbing involve multiple drilled holes in which to place temporary bolts and rivets, but in recent years an emphasis on clean techniques has grown.

Today, the charge of vandalism in climbing is more often a disagreement about the appropriateness of drilling and placing permanent bolts and other anchors. Although new fixed anchors are rarely placed by climbers, their dependency on the existing fixed anchors results in the difference between life and death. But the existing anchors remain on the climbing structure for long periods of time, changing the dynamic of the structure itself. Due to the permanent impact of the fixed anchors in wilderness areas, it was prohibited by the Wilderness Act. However, in 1990, there was a movement by the Forest Service and the Task Group to change the regulations to where fixed anchors would be allowed but still regulated in wilderness areas. These improvements lead to protection for both the climbers and the Wilderness Act.<sup>[19]</sup> Typically in the USA, the first ascensionists decide where to place protection on a new route and later climbers are supposed to live with these choices. This can cause friction and retro-bolting when the route is perceived to be dangerous to climbers who actually lead at the grade of the climb, since the first ascensionists often lead at a higher grade and therefore don't require as much protection. Failing to properly design a new route at its grade is considered arrogant and very poor form. Even in strongholds of rock-climbing tradition like Yosemite National Park, many routes are being gradually upgraded to safer standards of protection.

## See also

- Lists and glossaries
  - List of climbers
  - List of climbing topics
  - Deaf climbers
  - Climbing organisations
  - Glossary of knots common in climbing
- Related activities
  - Outdoor education
  - Salto del pastor (aboriginal rock gymnastic sport of Canary Islands)
  - International Federation of Sport Climbing

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## Further reading

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