

HANDBOOKS

MOUNTAIN ESSENTIALS®

An introduction to **SPORT CLIMBING**

Sébastien CONSTANT



This handbook cannot be considered a substitute for practical training.

INTRODUCTION

TABLE OF CONTENTS

I - TECHNICAL INFORMATION

1-1 GEAR

- Climbing shoes
- Chalk bags/Bouldering mats
- Harnesses/Ropes/Rope bags
- Karabiners and quickdraws
- Belay devices/Cow's tails
- Fixed anchors
- Slings/Helmets
- Packing your rucksack
- Other gear/First-aid kit

1-2 ROCK TYPES AND ROCK FEATURES

- Rock types
- Rock features
- Types of hold

1-4 MOVING OVER ROCK

- Footholds
- Handholds
- Lowering your centre of gravity
- Swapping hands/Crossing hands
- Swapping feet
- Egyptians/Heel hooking
- Bridging/Back and footing/Chimneying
- Laybacking/Jamming
- Rock overs/Mantling

1-3 KNOTS

- Overhand knot on the bight/Lark's foot
- Double figure of eight
- Tying on with a double figure of eight
- Making a cow's tail
- Tape knot
- Double fisherman's knot
- French prusik (Machard)
- Clove hitch/Italian hitch/Coiling a rope

1-5 STAYING SAFE

- Spotting
- Clipping
- Belaying
- Threading a belay and lowering off
- Top roping

II - GOING CLIMBING

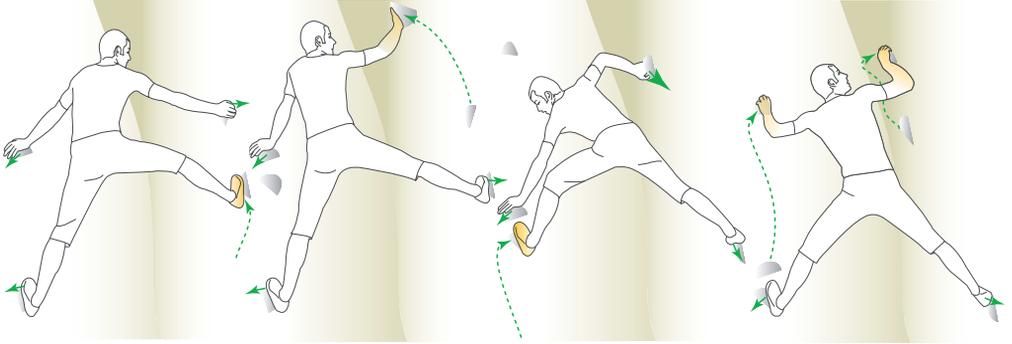
p. 2		
p. 3	2-1 FROM DANGER TO RISK TAKING	p. 36
	- Danger	p. 36
	- Risk	p. 36
p. 4	- Risk taking	p. 36
p. 4		
p. 5	2-2 PREPARING A DAY'S CLIMBING	p. 37
p. 6	- Have multiple objectives	p. 37
p. 7	- Technical difficulty and styles of ascent	p. 38
p. 8	- Decision-making and motivation	p. 39
p. 9	- What to do in the case of an accident	p. 41
p. 10	2-3 CLIMBING STRATEGIES	p. 42
p. 10	- Bouldering strategies	p. 42
p. 11	- Starting a route	p. 43
p. 12	- The belayer's job	p. 44
p. 12	- Communicating	p. 44
p. 13	- Reading the rock	p. 45
p. 14	- Rhythm, breathing and resting	p. 46
p. 15	- Managing rope drag	p. 47
p. 15	- Falling	p. 47

III - SCENARIOS

p. 18	3-1 Bouldering requires a mat	p. 49
p. 19	3-2 The leader hasn't tied on properly	p. 49
p. 19	3-3 The belayer isn't giving enough slack	p. 50
p. 20	3-4 The belayer is too light	p. 50
p. 21	3-5 The belayer is standing in the wrong place	p. 51
p. 22	3-6 Resting	p. 51
p. 23	3-7 Positioning the rope	p. 52
p. 24	3-8 Having a bad day? Time to do something else	p. 53
p. 24	3-9 A fall could be dangerous: choose a different route	p. 53
p. 25	3-10 Unable to finish a route	p. 54
p. 25	3-11 The route is not straight up	p. 54
p. 26	3-12 Retreating	p. 55
p. 26	3-13 An abseil descent	p. 56
p. 26	3-14 You want to improve	p. 57
p. 27	3-15 A helping hand on a boulder problem	p. 58
p. 28	3-16 Learning by watching other climbers	p. 58
p. 28	3-17 One hold, one hand on a route you know	p. 59
p. 29	3-18 Improving your footwork	p. 59
p. 30	3-19 Down-climbing a route on a top-rope	p. 59
p. 33	3-20 Working routes	p. 60
p. 35	MY ROUTE LIST / NOTES	p. 62
	USEFUL INFO	p. 63
	INDEX	p. 64

BRIDGING

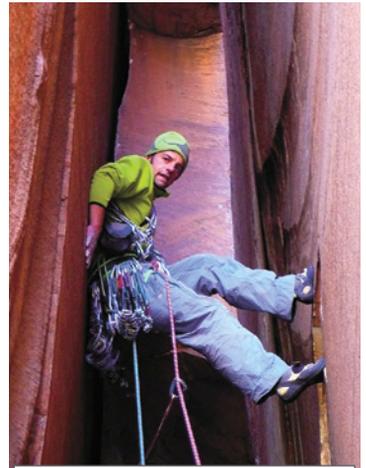
Climbing with one hand and one foot on each side of a groove, corner or chimney is called **bridging**. Once in the bridging position, you can work your way upwards by moving one hand or one foot at a time, pushing against the opposite walls of the corner/chimney with the remaining limbs. Sometimes there will be handholds and footholds you can use, but you can also bridge just by pushing on the walls of the corner/chimney with the flat of your hands or feet.



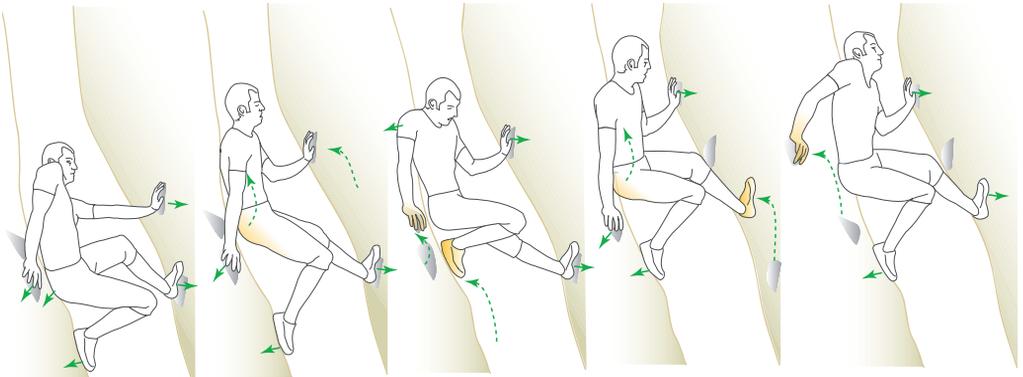
BACK AND FOOTING/CHIMNEYING

If a chimney is too narrow to climb by bridging, you can place your back against one side and your feet or knees on the other side, and then work your way up the chimney by using your hands to alleviate the pressure on your back and then your hands/knees. Your connection with the rock will mostly be through friction, rather than through positive handholds and footholds, so it is usually possible to move only one hand or one foot at a time when climbing a chimney (in contrast with slab climbing, where it is often possible to move a hand and a foot at more or less the same time).

Chimneying requires a large amount of inventiveness, as you have to adjust your movements to the width and form of the chimney. There is no set method that suits all situations, so adaptability and creativity are needed to climb chimneys efficiently and elegantly. Without these two qualities, you are likely to find every chimney desperately strenuous and mentally exhausting.



Sandstone chimney. Note, rope badly positioned (see p.52).



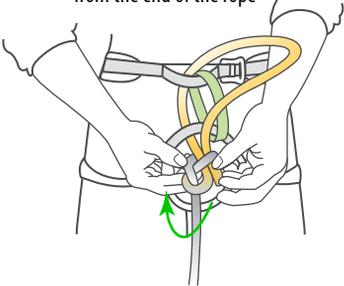
TYING ON WITH A DOUBLE FIGURE OF EIGHT

The figure of eight is the most important knot for tying on to a harness and a knot that every climber must be able to tie with ease.

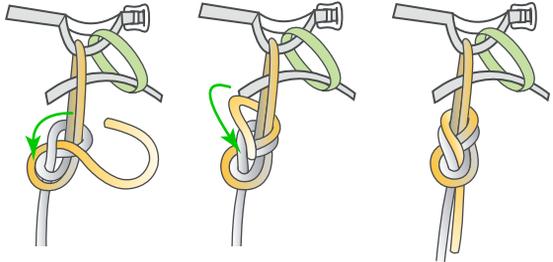
- It is the simplest to tie.
- It is the easiest to check.
- It is the safest.

When tying on to a harness, the rope must go through both tie-in points on the harness, unless the harness only has a single tie-in point (and therefore no belay loop).

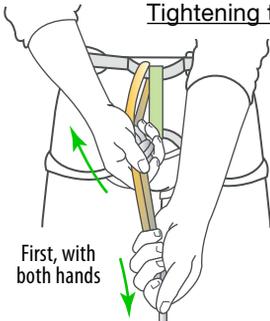
Tie a standard figure of eight into the rope, approximately 60 cm from the end of the rope



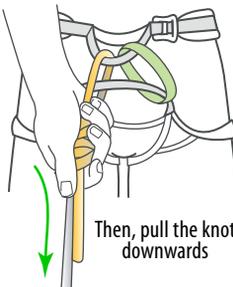
Thread the rope back through the knot, following the line of the grey rope.



Tightening the knot in two stages

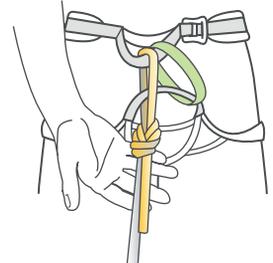


First, with both hands



Then, pull the knot downwards

It is essential to tighten the knot carefully to make sure it cannot come undone!



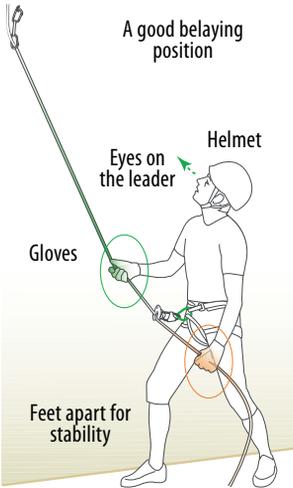
MAKING A COW'S TAIL

There are several ways to make a cow's tail. Here, it is tied using a length of rope (8.6 mm dynamic rope that will absorb shock loads). Between 1.5 and 2.2 m of rope are needed, depending on the type of harness you have and the length of your arms.

- Attach one end of the rope to the tie-in points on your harness using a double figure of eight.
- Tie a double figure of eight to the other end of the rope, making the "eye" of the rope as small as possible. Clip a safety karabiner (which can be made directional using a Béal Pinch or a piece of bicycle inner tube) to the eye of the cow's tail.

Both knots must be thoroughly tightened. Regularly check that they are not coming undone. The cow's tail karabiner is clipped to the harness in a position that will not get in the way of your quickdraws (usually the rear gear loop).



BELAYING

Upper hand
on
the live rope

Lower hand
on
the control rope

Belaying means ensuring the safety of the person climbing a route by paying out rope when necessary and locking the rope should the climber fall. This is done using a mechanical braking device attached to the belay loop on the belayer's harness. In order to describe the various techniques used in belaying, I have adopted the following colour code for the different terms and symbols: The belayer's **upper hand** holds the **live rope** (goes to the climber); the **lower hand** holds the **control rope** (below the belay device).

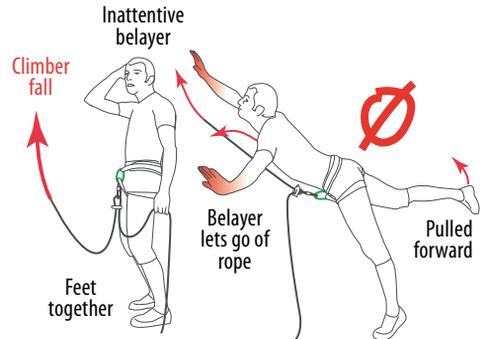
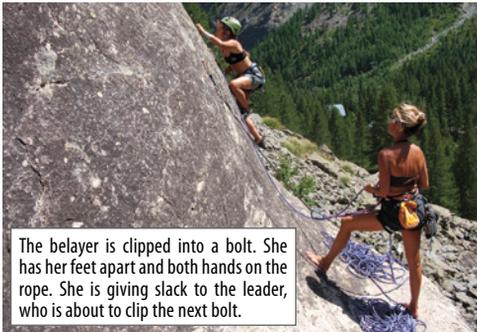
The climber may be **leading** (climbing the route and clipping protection points) or **top-roping** (climbing the route with the rope already passing through the belay at the top).

Belaying correctly can be a matter of life and death, so it is essential to do it correctly and for novices to practice in safe situations. The principles are the same whether you are using a classic or self-locking belay device, although self-locking devices require more care.

Belaying involves several manoeuvres:

- Paying out or taking in the control rope while your partner is climbing (leading or top-roping);
- Locking off the rope;
- Braking and stopping a fall;
- Lowering a climber down from a route;
- Finding the best position for belaying close to the foot of the cliff, if possible, in line with the direction the rope will pull should the climber fall (avoid being pulled forwards).

No one rule can be applied in all circumstances. Be flexible.

Locking off the rope

First, grip the **live rope** with your **upper hand** and the **control rope** with your **lower hand**. Once the rope is locked off, move your **upper hand** so both hands are on the **control rope** (below the belay device) and "sit" in your harness so your weight is on the rope. NB. The term "locked" is misleading in the case of classic belay devices, as the rope is only locked if you hold the **control rope** under tension. Consequently, you must never let go of the **control rope**. You may have to lock off the rope in a number of situations:

- The climber wants to rest in the middle of a route (hanging from the rope).
- The leader slips off (harness below the last protection point).
- The climber falls when top-roping.
- Just before lowering the climber down from the belay.



III - SCENARIOS

Situation	
	LOW RISK
	CAUTION
	INCIDENT
	ACCIDENT

The levels of risk associated with a number of common climbing scenarios have been colour-coded as follows:

Green: Situation in which the **risks** have been **minimised**.

Amber: Situation in which special care is required to minimise the risks. Such situations include starting a route, clipping gear, negotiating a crux, threading a belay, top roping, etc.

Red: Potentially **dangerous situations** that could easily lead to an accident. When still in the “beginner stage” it is better to avoid this type of situation.

Black: Situations in which inattention, poor decisions or mistakes by the climber(s) have led to an **accident**. No one can predict the outcome of an accident.

The scenarios described in this handbook are designed to help you make judicious decisions in a number of common climbing situations, so you don't fall into traps of your own making. Their aim is to reduce the risks involved in climbing, whether you are bouldering or doing routes outside or on a climbing wall. Each scenario highlights a potential danger and describes one or more possible solutions for minimising this danger. These solutions must not be seen as one-size-fits-all responses; rather, they are possible methods that can be applied or adapted as circumstances dictate.

I like the parallel between the challenge of climbing and a game of chess. The first two parts of this handbook (Technical Information and Going Climbing) can be thought of as the bouldering or climbing equivalents of the rules of chess and the way chess pieces can move. We now look at how these rules can be best applied to ensure the game has a successful outcome.

It takes time to build the experience needed to instinctively make the best decisions when climbing and to progress from “**beginner**” mode to “**expert**” mode. The following scenarios describe preventive measures that allow you to back off or throw in the towel if you realise you are getting out of your depth and don't yet have the expert skills needed to safely deal with a certain situation. As a general rule, beginners and very occasional climbers will not gain anything by trying to top rope a route that is far harder than the routes they are capable of leading (e.g., a 5b leader trying to top rope a 6c).



When climbing, you have to be able to make your own decisions. If you are not sure which decision to take (where a route goes, whether you can get down from a boulder problem, whether you will find a decent belay) it is probably best to choose a different objective and come back to the original project another time when you have more information and/or better skills. Do not base your decisions on what you see experienced climbers doing, as they will have the knowledge and abilities to deal safely with situations that would be very dangerous for beginners.

If you feel that none of the methods described in these scenarios is suited to the situation you have created, think about how a method could be adapted to the circumstances. If you do not have the skills to climb a route safely, come down: you will get much more from your climbing if you learn to know your limits and when and where to push yourself.

Bouldering can be enjoyed by all the family

3-1 BOULDERING REQUIRES A MAT

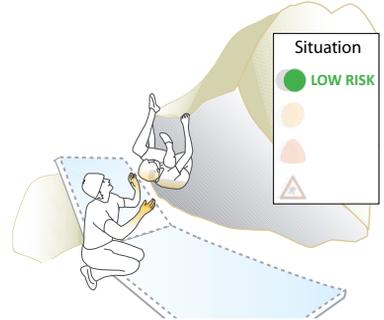
Dave has decided to try a boulder-problem traverse with a sharp rock below the start. A situation that should be **Green** immediately becomes **Red**  and could lead to an **accident** , as Dave will almost certainly hit his head and/or back on the rock if he falls.

To ensure the situation remains **Green** , even if the boulder isn't very high, Dave should ensure:

- There are enough bouldering mats to protect him from the sharp rock;
- If they don't have enough mats to protect the entire traverse, Dave's partner, Sophie, should move the mats along the traverse as Dave climbs;
- Sophie spots him in order to protect his head and upper back.

Climbers frequently forget to spot their companions either through negligence or because they haven't considered the consequences of a fall. Before starting a boulder problem, you should:

- Position the mats;
- Ask someone to spot you.



3-2 THE LEADER HASN'T TIED ON PROPERLY

Dave starts up a route and clips the second bolt. As he is about to clip the rope, he realises (a little late) that he has only tied on to one of the tie-in points on his harness. This is a **Red situation** .

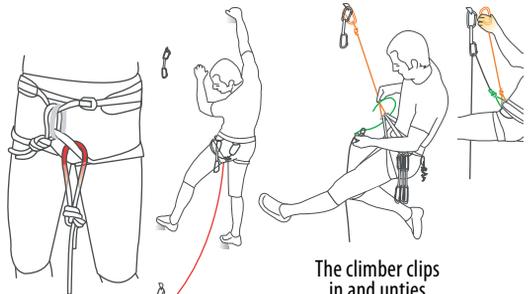
- Only tied on to one tie-in point;
- Figure-of-eight knot too far from the harness.

This situation could lead to an **accident**  at any moment. To get back to a safe situation (**Green** ) , Dave should:

- Clip into the bolt with a cow's tail, ensuring the cow's tail is clipped above the quickdraw in the bolt, so it is easier to unclip when he starts climbing again. He then pulls up a loop of slack, ties a knot in the loop and clips it to his harness.

- He can now untie from the rope (**Red** ) and tie on correctly without risking dropping the rope. Once he has tied on again, he clips the rope into the quickdraw, so he will be protected when he unclips the cow's tail and starts climbing.

- Before starting to climb, Dave gets his belayer, Sophie, to check the knot is tied correctly and in the right place, even though she is below him.



The climber clips in and unties



Rope tied on incorrectly



It is easy to avoid this type of situation by ensuring your belayer systematically checks your knot before you start climbing.

Some climbers tend to leave the end of the rope too long (40/50 cm) when they tie on ①. This can cause confusion between the live rope and the loose end of the rope when clipping gear and thereby lead to an **accident** .

3-20 WORKING ROUTES



Working a route is an excellent way of pushing your limits and progressing.

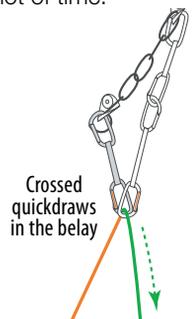
Whatever grade you are climbing at, to get the most from working a route it is essential to choose a feasible project, that is, a route you are likely to be able to do once you have worked out the moves and a strategy for linking the various sequences. However, working a route does not mean pushing your limits at all costs. It merely means achieving an objective that you have set yourself. Each climber must take into account all the parameters that govern their objectives and combine them into a suitable strategy (diagram on the left). By doing this, you should be able to choose a project that meets these criteria. Here are three examples:

❶ Sophie tries to flash a 6c+ on a steep wall. She falls at the end of the crux because of a poor choice of foothold. As long as the fall is not violent, she accepts this type of **incident** (falling) as part of the game. She feels she is very close to doing the route.

- She has a good rest (the time needed will depend on the route and the climber).
- She has memorised the most crucial parts of the route (resting places, crux, difficult clips).
- She calmly gathers her thoughts.
- She mentally and physically visualises the parts of the route she found most difficult.
- The way she climbs will depend on this visualization and memorization phase.
- She **redpoints the route on her first attempt**.

❷ Dave has chosen a route to work. He wants to improve and he accepts **falling** as part of his approach to climbing. He knows he is going to need **several attempts to redpoint the route** (6b+), which is at the limit of his current redpointing abilities.

- He first climbs the route from bolt to bolt, without trying to link the different sequences of moves. This allows him to climb every section of the route without getting too physically or mentally tired, and to check out the whole route in order to identify the sections that are likely to require the most “work”.
- When he gets to the belay, he clips the rope to the chain using **two quickdraws back to back**. This avoids having to thread the rope after every attempt and thereby saves a lot of time.
- He lowers off, leaving the quickdraws in the route.
- He top ropes the route and links all the moves.
- He rests (the time needed will depend on the route).
- He then repeats the route (on the lead or on top rope) practicing moves and trying to find the most efficient ways of climbing the more difficult sections. It can take numerous attempts to find the best method, in which case, he might have to do the route several times.
- Once he has found a workable sequence (which may take a day, a week, a season, etc.) he tries to redpoint the route.
- He finally achieves his redpoint.



INDEX

- Abseiling p. 56
- Accessory cord p. 10
- Arête p. 13
- Backing off p. 14, 55
- Belay p. 9, 33-34
- Belay device p. 8
- Belayer's job p. 44
- Belaying a leader p. 30, 44, 50-51
- Bolt p. 9
- Bolt hanger p. 9
- Bouldering p. 4-5, 28, 42
- Bouldering mat p. 5, 28, 49
- Bridging p. 20-22
- Chalk (bag) p. 5
- Checks p. 43
- Chimney p. 13, 21
- Climbing shoes p. 4
- Climbing strategies p. 42-47
- Climbing techniques p. 15-23
- Climbing wall p. 4
- Clipping p. 13, 29
- Clipping in p. 8, 25, 51
- Commitment and exposure p. 38
- Communication p. 37, 44
- Corner p. 13, 21
- Cow's tail p. 8, 25
- Crack p. 13-14, 16, 22
- Crag p. 4
- Crimp (finger hold) p. 17
- Crossover p. 19
- Danger p. 36, 53
- Decision-making p. 39
- Down clothing p. 11
- Down-climbing p. 59
- Dynamic fall arrest p. 32
- Edge/crimp p. 14, 15, 17
- Egyptian p. 19, 20
- Expansion bolt p. 9
- Failing p. 54-55
- Fall p. 28, 30, 32, 40, 47, 49, 52-53
- First aid kit p. 11
- Fixed anchors p. 9
- Flake p. 13
- Flash p. 39
- Footholds p. 15, 18-19, 58-59
- Friction p. 15
- Frogging p. 18
- Gear p. 4-11
- Glue-in bolt p. 9
- Grade p. 38
- Handholds p. 16-19, 58-59
- Harness p. 6
- Heel hook p. 16, 20
- Helmet p. 10
- Holds (types of) p. 14
- Improving p. 57
- Jamming p. 16, 22
- Jams p. 16-17, 22
- Jug p. 14, 16
- Karabiner p. 7
- Karabiner (clipping) p. 29, 47
- Knot - Clove hitch p. 27
- Knot - Figure of eight p. 24
- Knot - Fisherman's p. 26
- Knot - French prusik p. 26
- Knot - Italian hitch p. 27
- Knot - Lark's foot p. 24
- Knot - Overhand p. 24
- Knot - Tape p. 26
- Layback p. 22
- Leading p. 30
- Lowering off p. 54
- Mantling p. 23
- Memorisation p. 58
- Motivation p. 39-40
- On sight p. 39
- Overhang/roof p. 13
- Pinch p. 14, 16
- Piton p. 9
- Preparing to go climbing p. 37, 44
- Quickdraw p. 7
- Reading the rock p. 45
- Rescue p. 41
- Resin p. 5
- Rest p. 46, 50, 51
- Rhythm p. 46
- Risk taking p. 36
- Rock over p. 23
- Rock types p. 12
- Rope p. 6, 29, 52
- Rope (coiling) p. 27
- Rope bag p. 6
- Rope drag p. 47
- Rucksack p. 11
- Runners p. 9
- Safety karabiner p. 7
- Scenarios p. 48-61
- Shaking out p. 46
- Slab p. 13
- Slack (give, take in) p. 31, 50
- Slings p. 10
- Sloper p. 14, 15, 16
- Solution pocket p. 14
- Spotting p. 28, 49, 58
- Styles of route p. 13
- Swapping feet/hands p. 18, 19
- Take in (rope) p. 31
- Threading the belay p. 33-34
- Top rope p. 35, 54, 59
- Top roping p. 35, 44
- Tufa p. 14
- Tying on with a figure-of-eight on the bight p. 25, 49
- Using a belay device p. 8, 30
- Visualisation p. 46, 57-58
- Wall p. 13
- Weather p. 63
- Working a route p. 39