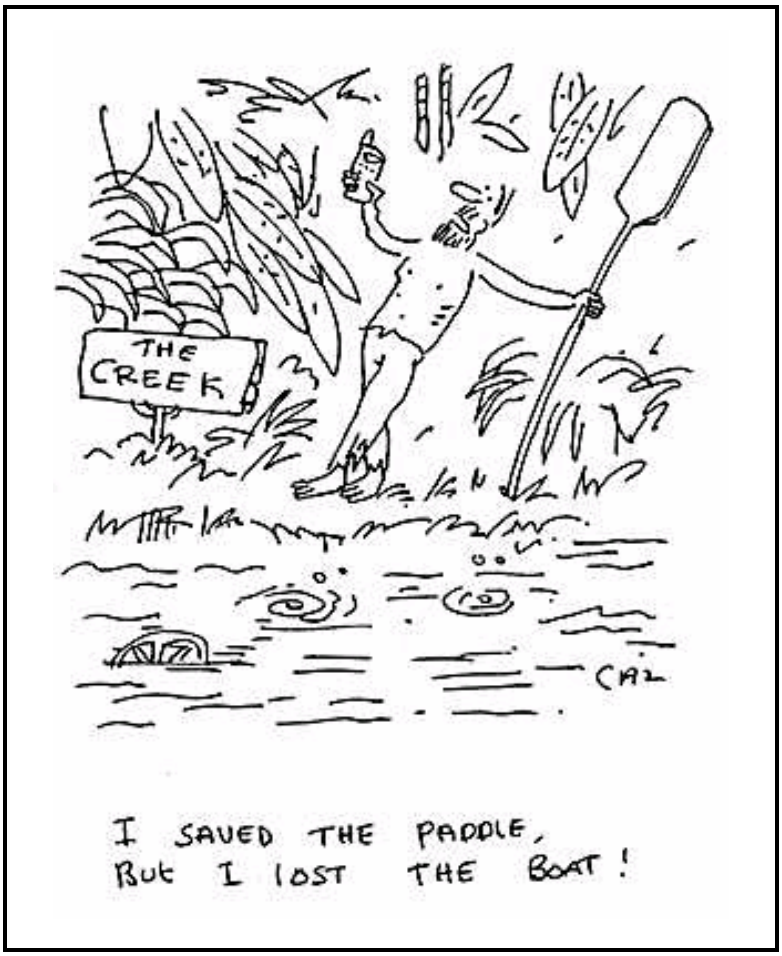
Southampton University Canoe Club



So...you want to know more about safety on the river?

You've come to the right place!

SUCC: River Safety Notes, Nov 2007

1. Choosing Personal Equipment – Things to Think About

1.1 Helmet

- Strong, composite helmet (Less likely to crack/break than plastic alternative)
- Padded to suit your head shape (Reduce shock from impact)
- Appropriate coverage (Forehead, temples, nape) (Consider sporting discipline)
- Peak (Possible protection or added risk? Sunlight/Water shield)? Ear coverage?
- Testing the fit – turn your head upside down.
- Adjust straps – take time to fit your helmet (no forward/backward movement)
- **Please try not to compromise on price – you only have one head, so look after it!**

1.2 Buoyancy Aid

- Minimum required flotation (50N buoyant force)
- Well fitted, freedom of movement
- Pockets with good accessibility
- Harness (live baiting), check release system is adequate
- 'Clean' – no loose straps/snag hazards

1.3 Wetsuit/Dry kit

- Wetsuit – keeps you warm when wet, can restrict movement
- No swimming, thermal/dry kit combos work well, if you do swim, can hold water and get cold quickly
- XP values in Palm equipment give waterproofing/breathability indicator
- Many options on the market, personal preference!

1.4 Shoes

- Must be able to run across bank with thorns/stones/slippy mud/ice
- Consider good soles with grip
- Laces – snag hazard
- Must fit in your boat!

2. Choosing Leadership Equipment – Things to Think About

2.1 Knife

- No stanley knifes/bread knives etc.!
- Flip knife - blade is protected, can you open this knife using one hand?
- Standard knives - sheaths to clip onto your BA for good accessibility.
- Blunt/sharp tipped knives?
- Always choose serrated blade, which will definitely cut a knife under tension
- Only use you knife for cutting rope (not for cutting up cheese for sandwiches!!)

2.2 Sling

- Durable, flat strap webbing
- Length of sling – what works for you?
- Sewn or knotted? Knotted sling can be easily adjusted
- If knotted, use Tape Knot (See Appendix A)
- Store in BA for quick accessibility (towing, pulley systems)
- Must be easy to release – do not put over head, tow from your shoulder.

2.3 Karabiners "Krabs"

- Good to nave a number of krabs
- Small krabs useful for clipping kit inside boat (i.e. first aid kit etc)
- Size – one large enough to clip over a paddle shaft (large, bent gate krab)
- Screw gate krab for pulley systems/live baiting (NEVER use snap gate for live bait)
- One snap gate krab should be kept on your sling
- Find out what works for you!

2.4 Throw Line

- Many options – flat nylon, round climbing
- Nylon – easier to pack, lighter to carry,
  BUT under tension stretch lots (cheesewire!), hot in friction scenarios.
- Length - choose a length you can throw? Or have extra 'm' slack?
- Check your rope floats
- Check throwline is properly knotted before use
- Ensure loop is not too large (hands get caught etc.)
- Remove plastic sheaths
- Look after your rope, check for damage, store properly
- Ensure metal krabs are removed before throwing (could injure a swimmer)
- Waist mounted options?

Throwing A Line

Depends on situation – overhanging trees etc.
Hold the end of the rope in one hand (do NOT wrap around your hand/arm), the bag in the other
Aim AT swimmer – do not try to judge river flow etc.

1. Underarm – often has better accuracy
2. Side – maybe useful if there are overhanging trees, less accurate
3. Overarm – generally less accurate
4. Javelin – for throwing down steep banks

Where are you going to pull the swimmer into? Useful eddy or bank? Unhelpful cliff or worse?!!
Be ready when rope goes taught, dynamic movement, move along bank/release a little slack (space?)
Don't cock up your throw – takes ages to repack or prepare for another throw
Time is important!
Rapid re-throw, try loops or rabbit ears. Can fill empty bag with water before you throw
Keep practicing!

<u>IMPORTANT NOTES:</u>

1. **NEVER COIL THE ROPE WHEN REPACKING.**
   Knots form in the bag, meaning you can't use your rope when you need it most.

2. **IF YOU CARRY A ROPE, ALWAYS CARRY A KNIFE.**

2.5 Leadership Kit

BARE ESSENTIALS:	OTHER:	
Airbags	Prussiks/Pulley	Swim chocs, nutty food e.g. cereal bars
First Aid Kit	Spare krabs	Spare Clothes
Group Shelter	Phone/cash (signal?)	Compass/Whistle
Fleecy Hat	Waterproof containers	Boat repair kit
Splits	Warm drink/cool water	

As the leader, you are responsible for choosing the correct equipment. You are not required to carry all of this yourself, distribute amongst the group. You must be able to improvise!

3. Terms You Think You Know!

3.1 River Features

Eddy: Counter current behind an obstruction (rock/bank)
Relative calm

Eddy line: Visible border between main flow and counter current of eddy

Standing Wave: Formed when fast flowing water hits still water
'Formed' wave has green surface, top of wave may curl over forming white water

Haystack: Type of standing wave, two standing waves meet to form a haystack
Maybe inconsistent, frequently changing

Hole, stopper: Fast water flowing over a drop needs to lose extra energy – a hydraulic jump!
Deep re-circulating – Quiet
Surface stopper – Noisy
- Smiling: Can be escaped at the sides
- Frowning: Sides of stopper feed back into main stopper

Towback: Water feeding upstream back into stopper
Can indicate how retentive the stopper is

Rooster tail: In steep, fast flowing river, a rock only just covered by water may be indicated by rooster tail

3.2 River Gradings

Very subjective! This can be used as a guideline (along with consequences):

Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6
Moving water, unobstructed and without technical difficulties. There may be small waves and riffles to challenge the paddler.	Waves, small stoppers and other minor obstructions to avoid. Eddies and cushion waves may be strong.	Waves, stoppers and technical difficulties are more severe. There may be drops and powerful constrictions. The main distinguishing factor of Grade 3 water is that the paddler will have to follow a recognisable route to avoid obstacles and hazards.	Severe waves, drops, stoppers and other obstructions. The route is not easily recognisable and will usually require careful inspection from the boat or bank. Encompasses a wide range of rivers, from those with pool-drop rapids to those with extended continuous rapids; so there is a huge variation in difficulty.	Extremely difficult rapids with precise and technically demanding routes to be followed. Stoppers, currents and waves will be powerful and inspection is essential.	All of the above carried to extremes. Grade 6 usually means unrunnable rapids, which may just be possible in certain conditions.

Just because you have paddled a certain grade of river, doesn't automatically mean that you can lead on it!

4. Principles of Safety

C	L	A	P
Communication	**Line of Sight**	**Avoidance is Better than Cure**	**Position of Maximum Usefulness**

Communication: Ensure your river signals, instructions and briefings are **clear** and **concise**
Never make assumptions that people understand
Point at where to go – NOT the hazard
Confirm understanding through repetition

Line of Sight: Never run anything blind
You can only choose a line and assess risk if you can see what's coming
All members of group should keep LOS with *at least* one other person in the group

Avoidance: Preparation and planning
Clean profiles
Assess risks, make YOUR OWN decisions, Ask the 'What if?' question
Shout, reach, throw, row go! (Next section)
Nothing a rescuer does should make the victim worse off

Position: Protecting rapid, cover area of highest risk (in boat/on bank, consider situation)
Preserve your own safety

5. What to do in an emergency

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In an emergency, the order of importance is:

1. **You** – quickly check you are ok and in a safe position to help.
2. **Team** – ensure that the other members of your group are safe.
3. **Swimmer** – Help the casualty when everybody else is safe – by adding more swimmers to the scenario, things can get out of hand very quickly.

Shout, Reach, Throw, Row, Go!

Shout: Call their name
Give calm, clear instructions
Tell them where to swim to

Reach: You may be able to reach the swimmer with your paddles
It can be very difficult to hold somebody in the flow, but it may be enough to pull them out.
Generally this isn't good, as the paddle is awkward to hold onto and needs a lot of strength. The person on the bank may also need an anchor man

Throw: Use throw bag, aim at the swimmer, not above/below
Be accurate – (so keep in practice!)
Be careful of others trying to help (too many ropes can risk entanglement)

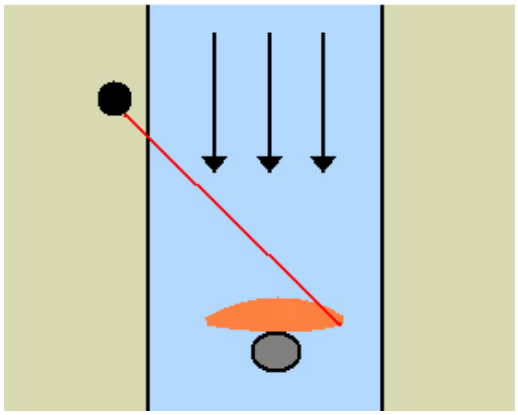
Row: You may be able to paddle out to help the swimmer
In this case, you must be confident in your ability, otherwise you can create more problems.

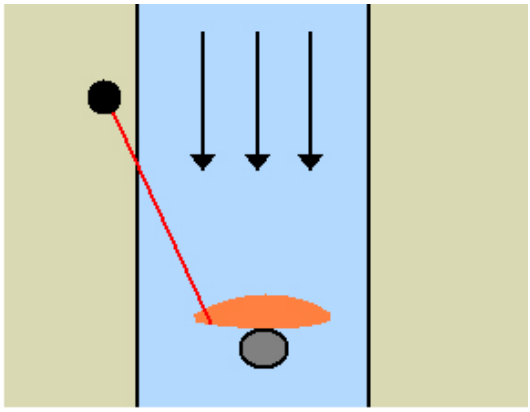
Go! Go in yourself and get the swimmer through live bait

THIS IS A LAST RESORT AS YOU PUT YOURSELF IN DANGER.

6. Rescue from Pin/Broach

Sometimes boats can get pinned sideways on rocks. Use the flow of the water to help you free the boat:





✓	Using the flow.

✗	Trying to pull against the flow.

The hardest part is clipping the rope to the boat. After that, force is needed to free the boat. Nine times out of ten, the 'Boy Scout Method' works – simply getting as many people on the end of line as you can to heave the boat free.

6.1 Vector Pull

Clip a krab to the tensioned line and pull to change the direction of force on the lodged kayak.

6.2 Pulley Systems

If this doesn't work, simple pulley systems can be used. Check that trees/fence posts used can actually take the load before you set up a pulley.

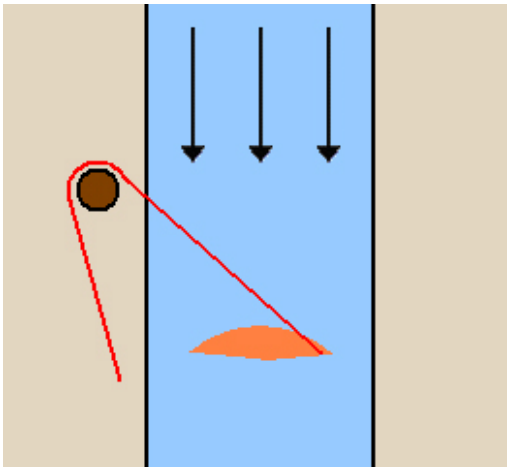


Fig 6.2a: First Stage in Setting Up Your Pulley

To give more purchase, 'z' systems can be used. By putting a knot into the throw line and looping the end of the rope through it, you can reduce the amount of force required to free the kayak (Fig 5.1b). There are a few problems with this – the knot can become very tight and difficult to undo, and the knot may end up reaching the tree before object is freed.

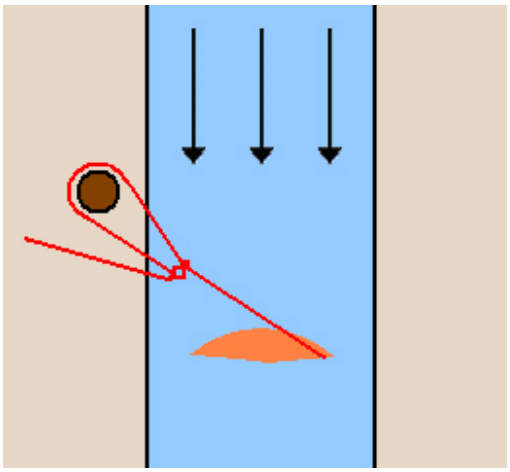


Fig 6.2b: Basic Pulley Using Knot in Throwline (lots of friction from tree and rope)

Alternatively a prussik can be used (See Appendix A for how to tie a prussik loop and different methods of fixing to a line). A prussik is essentially a small loop of rope that is wrapped around the throw line and holds on by friction. Attach a karabiner to the prussik loop and it can be used in a pulley system. The advantage is the prussik can be moved up and down the rope.

Fig 6.2c: Classic Prussik Knot

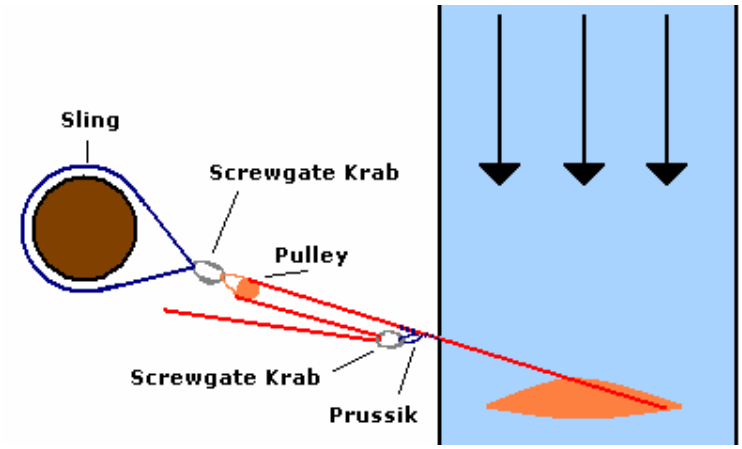


Fig 6.2d: Using a Prussik in a Pulley System

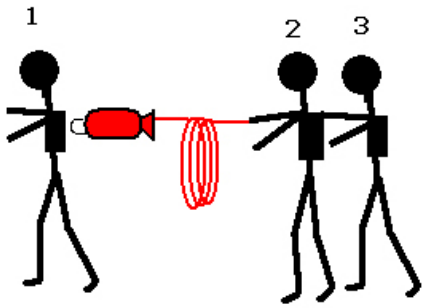
More 'z's in the pulley system can reduce the number of people required to free a boat from a pin. This only works up to a certain point, because at each 'z' friction is introduced making it harder to pull.

IMPORTANT NOTE:

ALWAYS HAVE A KNIFE READY TO CUT THE PULLEY SYSTEM.

Fancy methods often aren't the quickest way of solving the problem. Usually, the Boy Scout Method works before you need to start using your initiative!

7. Live Baiting



Live baiting is where one person (with bank support) dives into the water to retrieve a swimmer/casualty. Live baiting should only be used as a last resort - this is dangerous as you put yourself at risk too.

3 people are needed for a live bait. Use a karabiner to clip a throwbag to the harness ring of the live bait (1) - ensure that he is not connected to the rope in any other way and that the quick release system on his BA works. The live bait (1) holds a few loops of rope in his hand and the roper (2) holds the rest of the line (do not wrap the rope around your hands, you must be able to drop to rope and free yourself if necessary). (3) must hold onto (2) firmly by the BA and act as an anchor man. When everybody is ready, (1) jumps into the water, throwing the loops of rope behind him. Once the casualty has been retrieved, (2) can pull the swimmers to safety. It may be necessary to use a vector pull to get the swimmers into an appropriate eddy/safe place.

IMPORTANT NOTE:

Only ever use a screw gate krab for live baiting – snap gates can potentially clip onto other parts of the BA, meaning the quick release on the harness is useless. You must be able to free yourself from the rope immediately if necessary.

8. Foot Entrapments

Foot entrapments are potentially lethal. It is important that the victim is able to keep their head above the surface. It is important that the rescue team **communicates** well.

Two Bank Access

TAG/SUPPORT LINE:	Used to stabilise victim and keep head out of water
	May be able to free victim by pulling upstream
	Otherwise, first step in other methods of rescue discussed
SNAG LINE:	If current too powerful, can use snag line
	Heavy weight attached to line which is dragged upstream to unhook victim's foot
TWO LINE PULL:	Vector pull principle, See Fig. 8.1
TWO LINE CINCH:	Lines around victim's body to retrieve them, See Fig 8.2
	If necessary, one line can be thrown to other bank to pull in same direction
	Can tighten around victim's body
V LOWER:	Rescuer enters water upstream, lowered downstream to help victim, See Fig 8.3

One Bank Access

Involves another swimmer getting into the water to rescue. A RISKY BUSINESS.

HAND RAILING:	Anchor line; use several overhand knots to help keep hold of line (NO LOOPS)
	Wade to rescue victim. READ RIVER WELL.
ONE BANK TAG/CINCH:	Swimmer sets up tag/cinch lines via strong swimmer/live bait methods

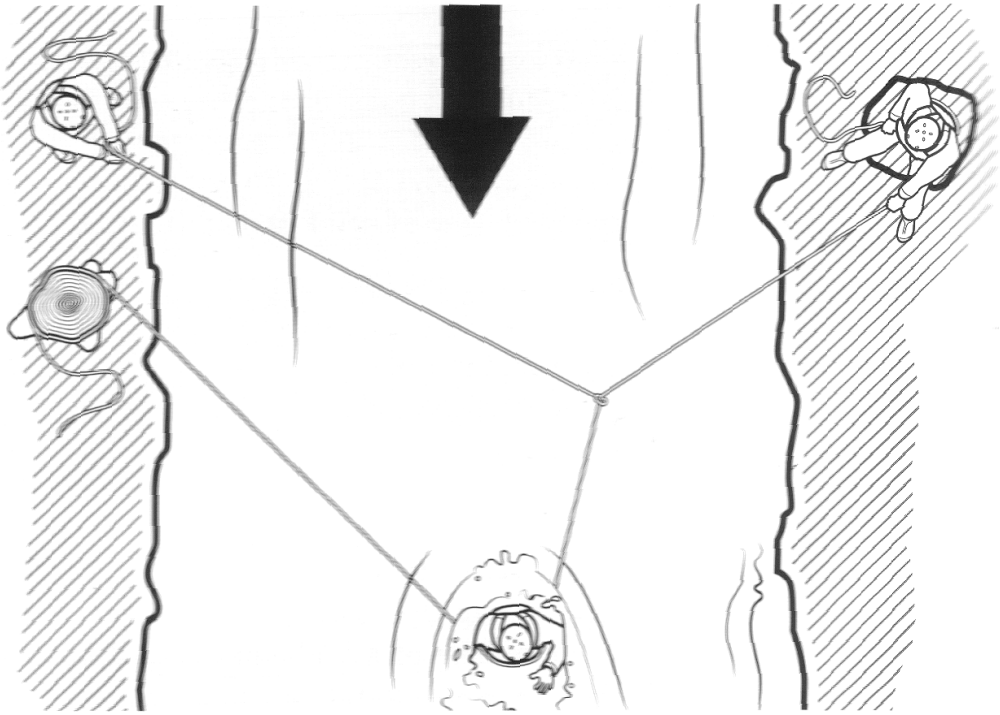


Fig 8.1: Two Line Pull

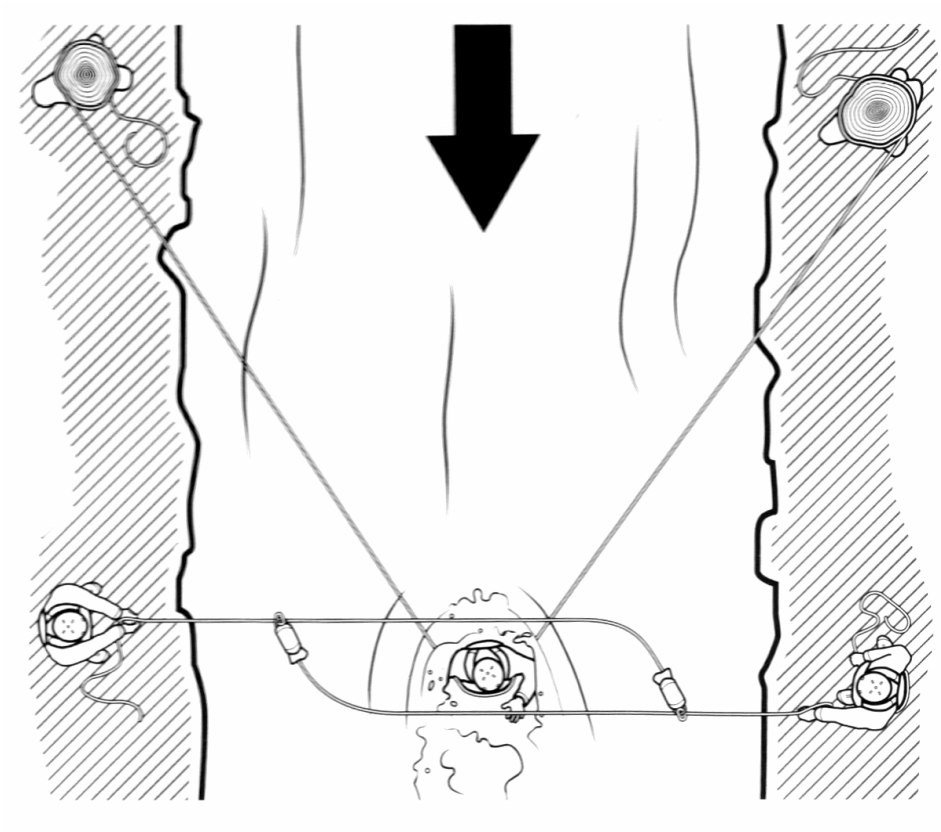


Fig 8.2: Two Line Cinch

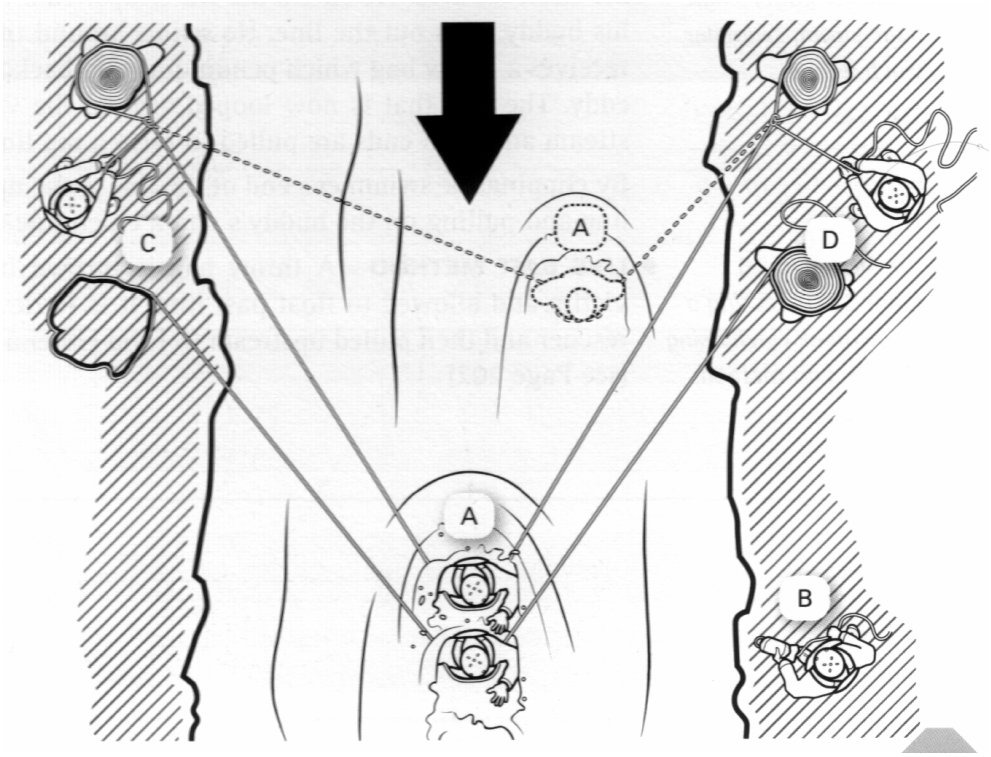


Fig 8.3: V Lower

9. Improvisation

I will not be covering any First Aid issues in this course.
It is your responsibility to ensure that you have received professional first aid training and are up to date.

It is also important to realise that you may not have all the medical equipment necessary to make a casualty comfortable. Here are some examples of improvisation:

Sling:	Made from gaffer tape, spraydeck or polythene
Splint/neck brace:	BA foam, boat foam, airbag could be used as padding * Be very careful with head/neck/back injuries *
Blister plaster:	Electrical tape
Waterproofing:	Plastic bags/cling film
Fractures:	Sling/gaffer tape can be used to immobilise injuries

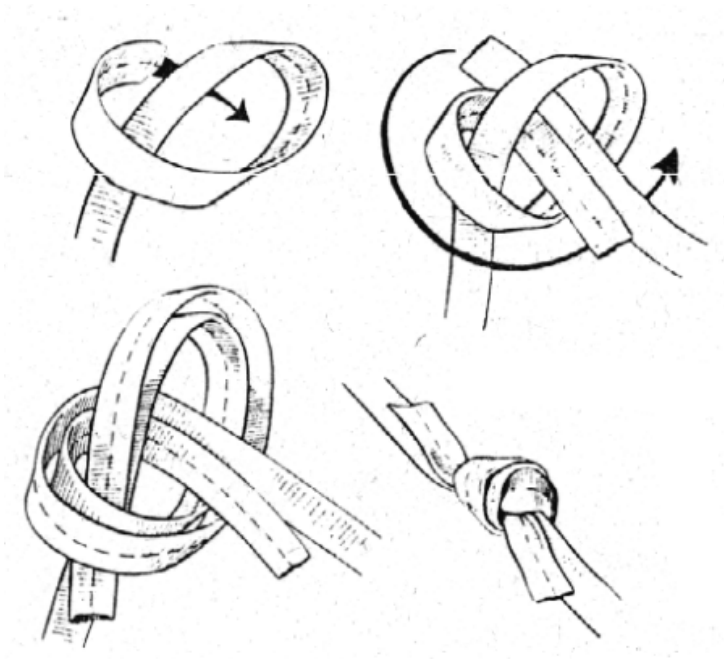
Improvised harness.

FINAL NOTE:

These are personal notes taken from my own experiences so far. Please understand that they are not to be taken as gospel! Much of the white water safety and rescue skills that you will need will come from your own experience and by simply finding out what works for you. A lot is down to personal preference and compromise (particularly with kit) and there are no hard and fast rules! I hope you find this helpful anyway, even if it just gets you thinking! :)

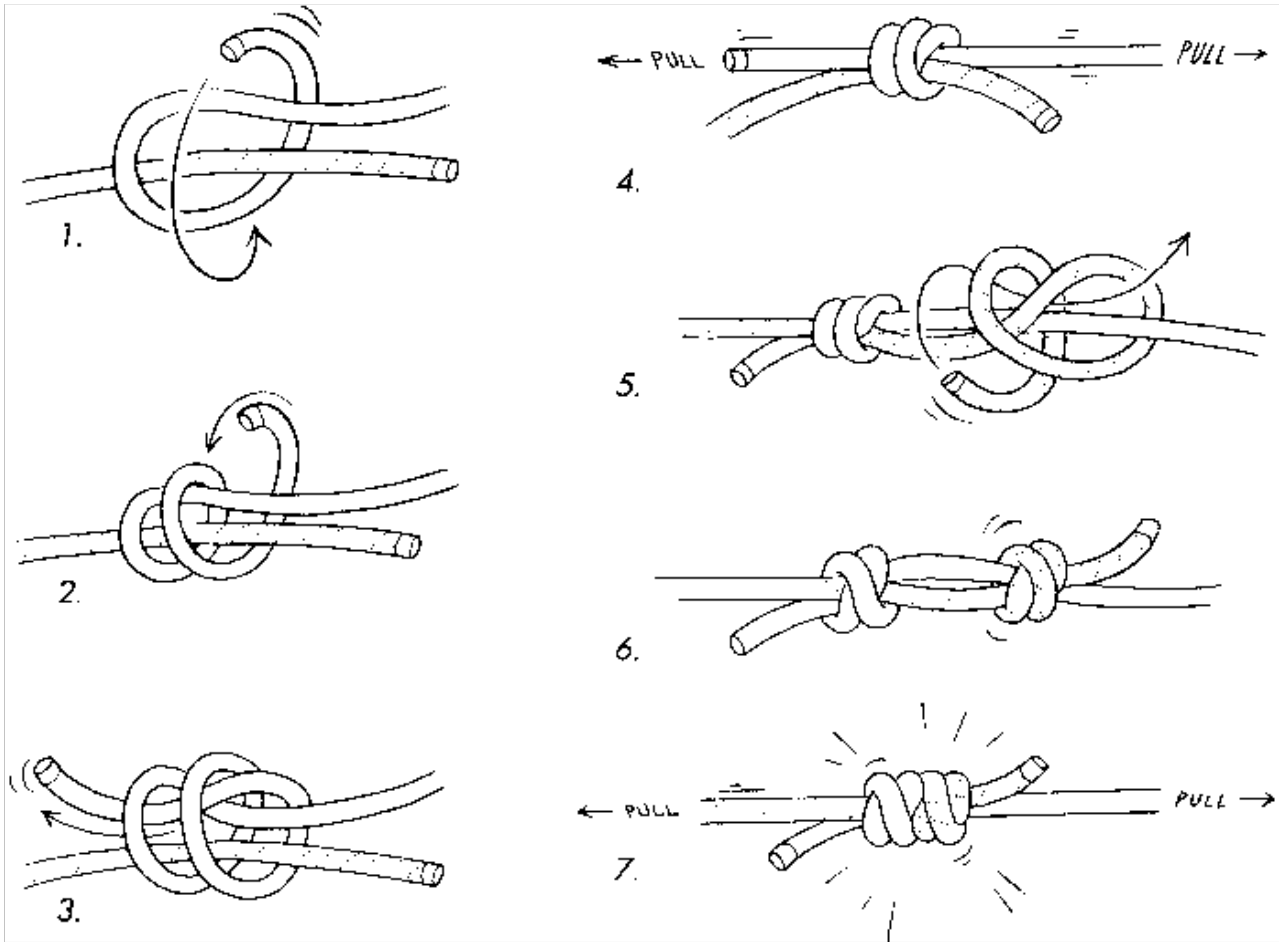
APPENDIX A

Tape Knot (Waterman's Knot) - Good knot to tie for sling ends.



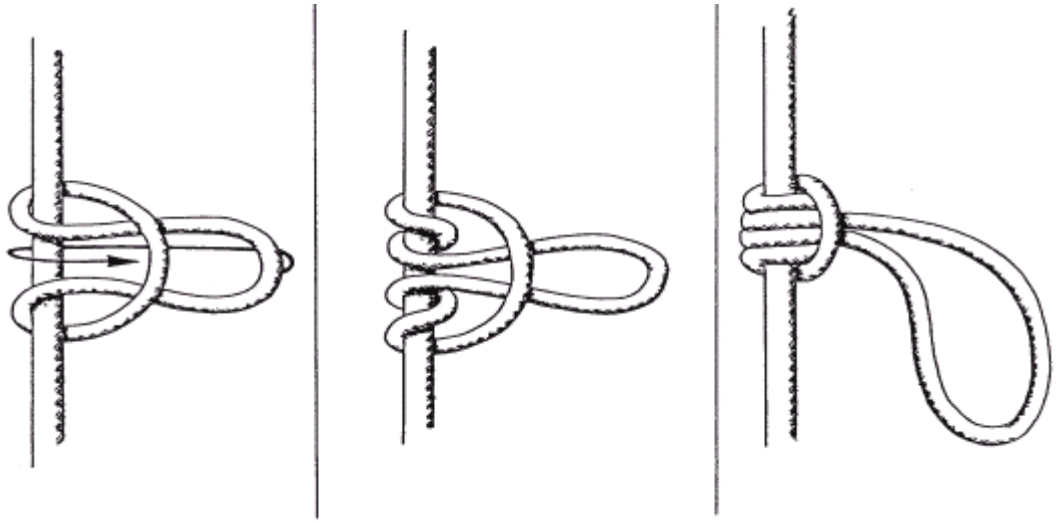
Double Fisherman's Knot

- Strong way to join two ropes
- Used to tie prussik loops
- Can be used to tie ropes of unequal diameter



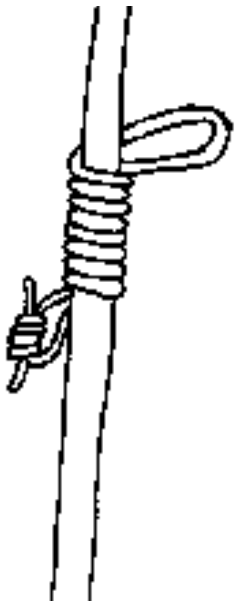
Classic Prussik

- Wraps around the rope, then pull the remainder through the loop.
- Cannot be released under tension.



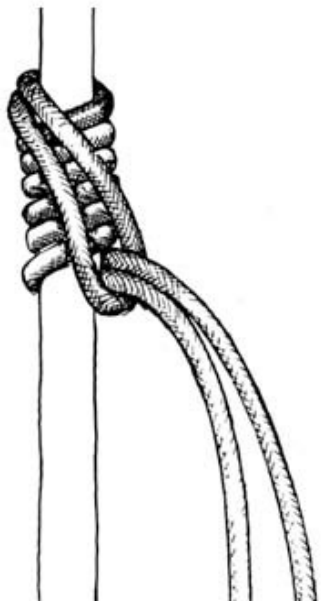
French Prussik

- Super simple!
- Wrap prussik around rope several times and clip ends of loop together with karabiner
- Can be released, even under tension (good/bad?)



Klemheist

- Cannot be released accidentally
- Frees easier than Classic



Where ropes are wet or icy, it may be worth putting extra turns to compensate for the lack of friction.