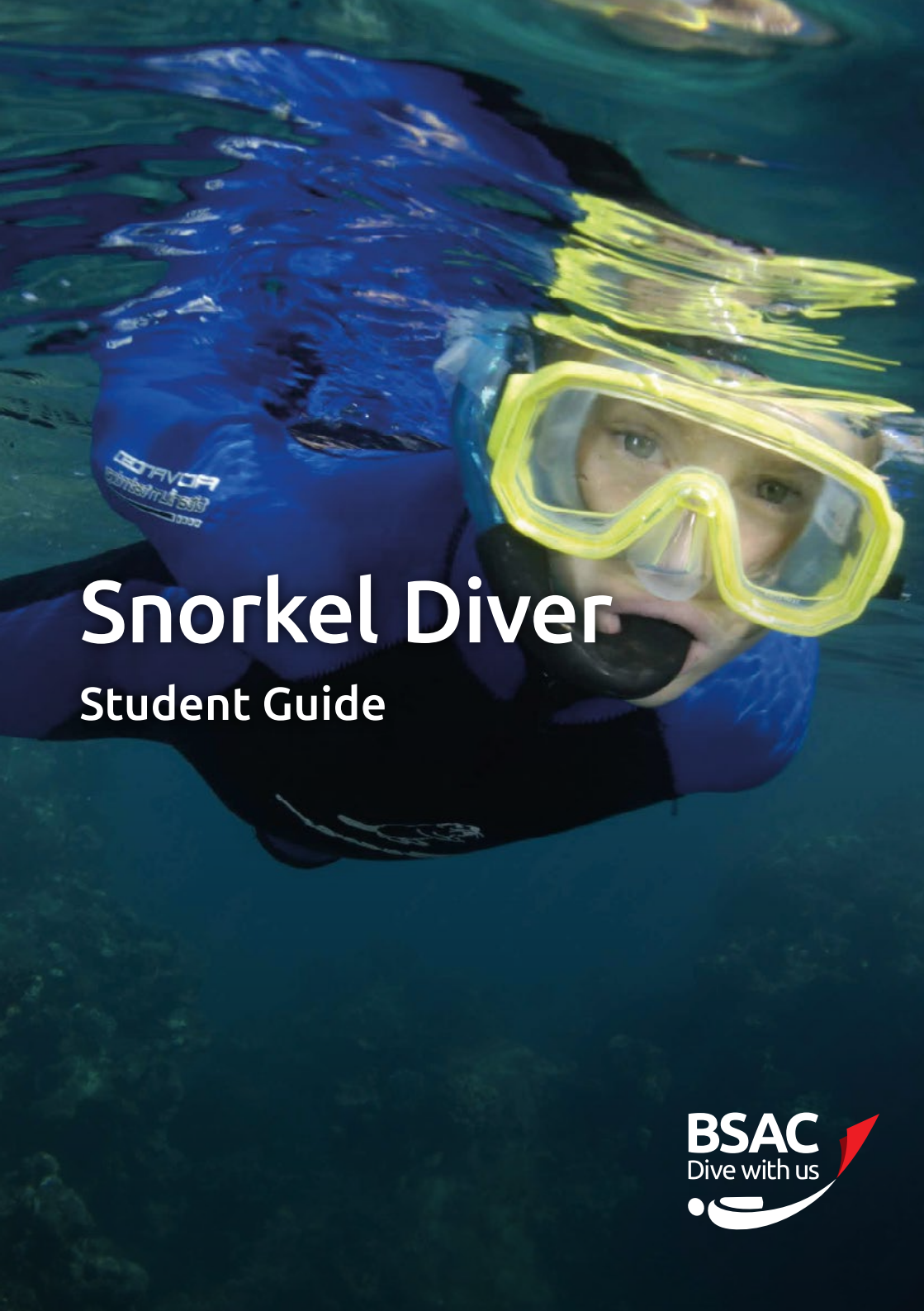


A person is shown from the chest up, swimming underwater. They are wearing a blue wetsuit with "BEAVER" and "1000" printed on the sleeve, and a yellow snorkel mask. Their eyes are visible through the mask. The background is dark blue water with some light reflections.

Snorkel Diver

Student Guide



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A person wearing a black snorkel mask and blue goggles is floating in the ocean. The person's head is above water, and their reflection is visible in the dark blue water. In the background, there is a small, dark, rocky island under a clear blue sky with a few wispy clouds.

Introduction

Check out your eLearning video

Introduction

Sophie Heptonstall will take you through this module.

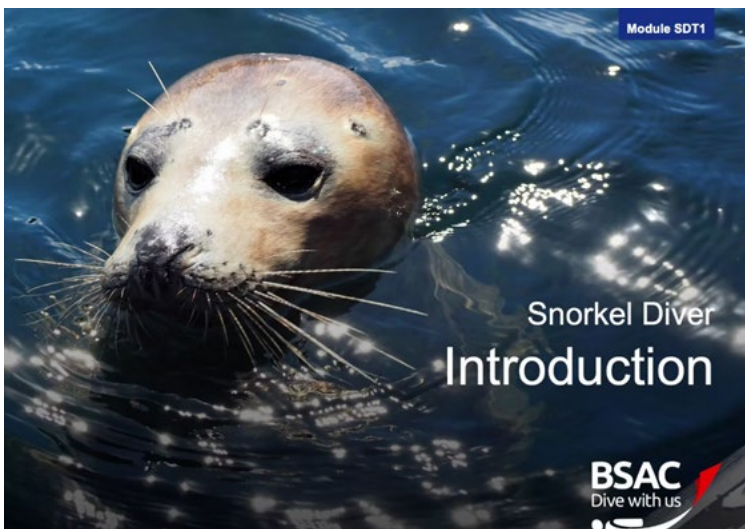
This video will cover:

- **BSAC clubs and centres**
- **Benefits of BSAC membership**
- **Benefits of BSAC training**
- **What will it cost?**
- **Snorkel Diver Training**

Remember if you need to discuss any of the theory e-mail or call your instructor at your club or centre.

Video time length | 06:17 mins.

Click the image below to start watching the video.



Introduction

This module outlines how your club or snorkelling centre is part of a large organisation - the British Sub-Aqua Club (BSAC).

Module content

- **BSAC clubs and centres**
- **Benefits of BSAC membership**
- **Benefits of BSAC training**
- **What will it cost?**
- **Snorkel Diver Training**

Benefits of BSAC membership

Largest diving and snorkelling club in the world

The British Sub-Aqua Club (BSAC) is the national governing body for snorkelling and scuba diving in the UK. As well as at home we have a network of clubs and centres overseas with the same

core values of excellence in training, safety and growing the sport. We are the largest diving and snorkelling club in the world.



If you need to move from your club or centre, there is always the opportunity to continue training and enjoy snorkelling at one of the many other club or centres – in the UK and around the world. Your Snorkel Diver qualification is recognised internationally and you will be welcomed.

BSAC magazine SCUBA (Full members only)

SCUBA is BSAC's fantastic member magazine, bringing you all the latest news on UK and BSAC club diving and snorkelling – as well as all the important developments in our sport – every month.

Full BSAC members get a 10-issue subscription to SCUBA magazine worth £45 every year delivered directly to their door monthly as part of their membership package. As the official magazine of Britain's biggest dive club, SCUBA is YOUR magazine and we are keen to include your stories and ideas.

Third party insurance (world wide)

Public Liability – provides cover for your legal liability to pay compensation (including legal costs) for death or bodily injury, or damage to third party property arising in the course of your activities as a BSAC member or a BSAC Instructor, provided that you are operating within your BSAC or other agency qualification. There is an extension for 'Member to Member' liability included within the policy should you injure/cause the death of another BSAC member. There is an additional extension for 'Indemnity to Principals', which covers damage to any premises you may hire from a third party.



For full details go to <https://www.bsac.com/membership/member-insurance/>

BSAC Shop

Through the BSAC shop members get up to 50% discounts rates on varoius products such as club clothing, diving equipment etc...

Plus...

BSAC members have the security of third party insurance and special 'BSAC member rates' with various companies through the BSAC Plus scheme and saving money on holidays with BSAC Travel Partners. BSAC Plus enables members to save money in their daily lives on items such as high street shopping, insurance, utilities, and home and lifestyle purchases.

Benefits of training

Regular contact

Training nights are a great social and you get regular contact with other snorkel members and instructors that can develop your snorkel training. This can happen on the club pool night and its a great opportunity to share experience and ideas with other divers and snorkellers. There can be snorkel training programmes run by the club or snorkel centre and also snorkelling trips which enable you to go and develop your snorkelling skills and also look at the marine life around the UK.



Club resources

There is also the opportunity to use the clubs resources so many of our diving and snorkelling clubs have access to kit and also access to boats.



What will it cost?

You will pay a yearly BSAC membership fee, you can see the current prices at <https://www.bsac.com/membership/rejoin-bsac-today/>. Club membership is normally paid yearly, but some clubs offer monthly payments. All your training packs and eLearning can be purchased from the BSAC Shop which you will find in your 'MyBSAC' dash board. Club trips are generally charged on an individual basis depending on location.



Snorkel Diver Training

Aim of the Snorkel Diver course

The main aim of this course is to train a snorkeller who can Snorkel



in sheltered water conditions under the supervision of a Snorkel Dive Manager or Lead Instructor.

The Snorkel Diver course

This course contains 4 theory modules within your eLearning course or alternatively it can be run in a classroom face-to-face. You are continually being assessed in the theory with some 'test yourself' questions in each module. There is video and reading sections to look at. Once you are happy and feel confident you have learnt enough in each module there is the 'End of module exam'. There are 5 multiple choice questions to answer, to achieve a pass you just need to get 4 out of the five correct. If you don't succeed first time go back to your materials and revise.



There are 5 practical modules which will be carried out with direct supervision by your instructor in the swimming pool or sheltered water.

You will need

With this course you will get a Snorkel Diver Student Guide which will be a downloadable PDF. With the eLearning you can access your student guide by clicking on the document icon in the top left of your course menu.



For the practical elements you will need a mask, fins and snorkel. Additional equipment such as a snorkel vest, shortie or wet suit would be advantageous. All this kit might be provided by your club or centre or you bring your own.

Snorkelling Progression

Once qualified as a Snorkel Diver you can progress with further training to the next level of Advanced Snorkeller and Snorkel Dive Manager. There are other skill development courses too for snorkellers to attend to expand your knowledge and experience.

Dolphin Snorkeller (Optional)

Snorkel Diver

- Snorkel in conditions already experienced

Advanced Snorkeller

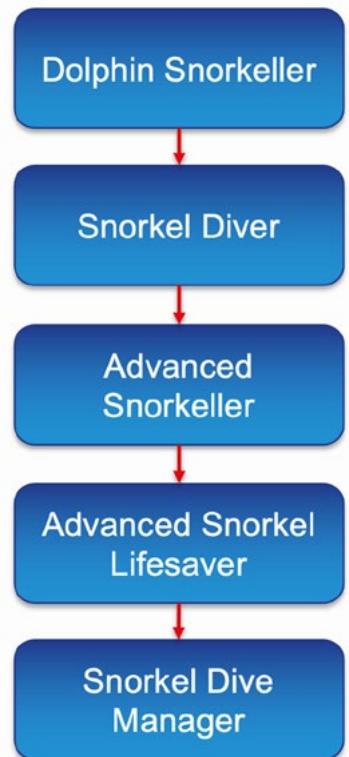
- Lead junior snorkellers and expand experience
- Includes Snorkel Lifesaver

Advanced Snorkel Lifesaver (ASL)

- Open water lifesaving

Snorkel Dive Manager (SDM)

- Safely manage group snorkelling



Snorkel Skill Development Courses (SDCs)

Summary

- ✓ BSAC clubs and centres
- ✓ Benefits of BSAC membership
- ✓ Benefits of BSAC training
- ✓ What will it cost?
- ✓ Snorkel Diver Training

Equipment and signals

Check out your eLearning video

Equipment and signals

Sam Clarke will take you through this module.

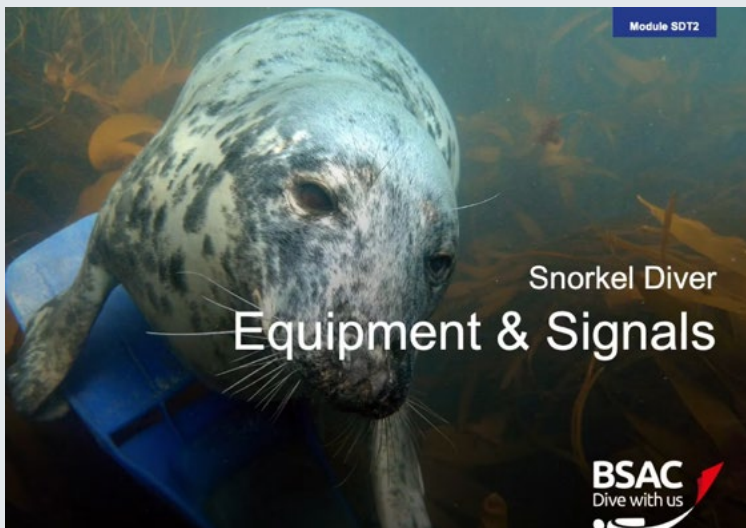
This video will cover:

- Basic equipment mask, snorkel & fins
- Additional equipment
- Signals

Remember if you need to discuss any of the theory e-mail or call your instructor at your club or centre.

Video time length | 13:46 mins.

Click the image below to start watching the video.



Equipment and signals

Module content

- Why we need equipment
- Features
- Basic equipment
- Ancillary equipment
- Care of equipment
- Why we need signals
- Types of Signals

Snorkelling Equipment - Basic Equipment

Mask, Snorkel & Fins

To move easily through the water and to see what is below the surface or to dive underwater and have a closer look at the marine life, you need basic snorkelling equipment – a mask, a snorkel and a pair of fins.



Snorkelling Equipment - Mask

If you open your eyes underwater, everything is blurred because our eyes are designed to work in air, not water. A diving mask provides an air pocket and the eyes can focus on the underwater scenery and marine life.

However, when looking at something underwater, it will appear a lot bigger than it actually is and this is because light bends, or is refracted, between water and air. You may have noticed this refraction when looking at a straw in a glass of water or clear juice – we know it is straight but it looks bent.



Features

Diving masks were originally made of black rubber with metal frames to hold the lens in place. Nowadays, masks are constructed using plastic frames and silicone which makes them lighter in weight. The silicone can either be semi-transparent or coloured. Semi-transparent silicone allows a lot of light into the mask whereas coloured silicone reduces that light level and some snorkellers, particularly photographers prefer this, as they feel it concentrates their focal range through the lens. Some masks are referred to as 'high volume' and this is where the air space between the eyes and the lens is bigger than a 'low volume' mask, where the lens is closer to the eyes.

Most masks have a rigid frame that holds the glass lens, or lenses, in place with the silicone surround forming a nose pocket.

Masks are available in a range of sizes, colours and designs but whatever style you choose it is important that the mask fits your face and feels comfortable

There are also designs of mask that are 'frameless', where the mask achieves stability by the silicone skirt moulded to and around the lenses.

There are some key points to look for if buying, borrowing or hiring a mask:

- **For safety reasons the mask lens or lenses must be tempered glass**

A tempered glass symbol or words should be stamped on the glass. Rather like car windscreens, if it breaks it will do so into large, rounded fragments rather than sharp splinters.

- **A mask frame should be rigid to hold the glass or, with a frameless mask, the size and strength of the lens holds the mask shape when worn on the face**

For snorkellers who normally wear glasses, or are worried about losing their contact lenses, some masks can be fitted with prescription lenses although they will add to the cost of the mask.

Whether using a mask with or without a frame, there are features that are common to both styles.

- **The mask should have a flexible seal or 'skirt' that moulds easily to the shape of your face. Most seals are made of soft silicone rubber.**

- **The mask ‘skirt’ must enclose your nose (unlike swimming goggles) and there are two important reasons for this:**

The first reason is that the pocket of air in a mask (that you need to allow your eyes to focus underwater) will, if you snorkel dive underwater, be compressed by the water pressure. The water pressure is a lot more than the air pressure around you on the surface. This extra pressure can ‘squeeze’ the mask onto your face and may become uncomfortable and, if not resolved, can cause red ‘mask squeeze’ marks around the eyes. However, this is very easy to resolve underwater by breathing a little more air through the nose into the mask and ‘equalizing’ the pressure.

The second reason is that water can sometimes seep into the mask, either because stray hairs have broken the seal or you smile, because you are enjoying your snorkelling, and your smile lines break the seal. The seal inside the mask’s skirt, under the nose pocket, is designed so that if water enters the mask, breathing gently out through the nose will expel the water from the mask (how to do this is covered later in ‘Practical Skills’). Some masks include a self-drain valve in the bottom of the nose pocket which helps in draining any water from the mask.

- **The mask strap holds the mask onto the head and should be easy to adjust using the strap retainer clips on either side of the mask.**

Fit

However, the most important thing to consider if you buy, borrow or hire a mask is that it fits your face, feels comfortable and does not pinch or squeeze anywhere.

How do you find the right mask for you? You can check the fit of a

mask by clearing any hair out of the way and holding the mask on your face but do not pull the strap over your head. Breathe in through your nose, let go of the mask and it should stay on your face. It is advisable to hold your hands just below the mask to catch it in case it doesn't fit properly and drops off as you breathe in.

When you buy a mask, it generally comes in its own plastic storage box that you can use to protect the mask when travelling.

Snorkelling Equipment - Snorkel

Allows surface breathing

Wearing a mask means you can see what is below you when lying or swimming on the surface but with your nose enclosed in the mask you would need to keep lifting your head up to breathe. The snorkel is a simple breathing tube to allow you to breathe continuously through your mouth whilst face down on the surface observing the underwater life and scenery.



Features

As with masks, snorkels come in a variety of sizes, colours and designs but there are two main parts common to all designs:

- **Connected to the mouthpiece is a rigid or semi-rigid open topped tube usually forming a ‘J’ shape that fits closely to your head. This allows you to breathe in and out whilst looking underwater from the surface without having to lift your head. It also means you can breathe quite comfortably with your head up if the water surface is a bit choppy.**

If water gets into your snorkel you clear it very simply by blowing out through the snorkel and the water shoots out. It is therefore important that the snorkel does not have anything that will block the top (it could stop water getting in but then you won't be able to breathe!) Nor should the snorkel be too narrow or too long. If it is too narrow it will make breathing much harder and if it is too long it will be much more difficult to blow water out. Most diving equipment companies produce snorkels with an average length of around 40-45cm and the width, or bore of the tube, will be about 2 cm.

There are very simple snorkels that perform perfectly well and are generally inexpensive, but there are also snorkels that have been designed with additional features. A self-drain valve at the bottom of the snorkel to assist in clearing water or a ‘splash guard’ on the top of the snorkel to prevent water getting in, but still allows you to breathe comfortably and clear the snorkel of water. Any additions to the basic snorkel design generally means the cost increases.

Fit

Snorkels can be held in place by using a snorkel loop strap or clip that is fitted to the mask strap to hold the snorkel. Alternatively, the snorkel can simply be held in place by putting the snorkel under the mask strap. The important thing is that the positioning of the snorkel's mouthpiece is comfortable for you.

A moulded silicone mouthpiece which has ridges inside that your teeth can gently hold onto (rather like a gum shield) with your lips outside the mouthpiece forming a seal. There are also mouthpieces available that can, with initial gentle bite pressure, mould themselves to suit the snorkeller's mouth.

Snorkelling Equipment - Fins

As a liquid, water's resistance to body movement is considerable. Swimming requires quite a lot of energy using arms and legs to move through the water. Adding a 'paddle' - what divers and snorkellers call a fin - as an extension of the swimmer's foot provides a higher surface area to move the swimmer more easily and powerfully on the surface and underwater and with much less effort.

Fins come in a variety of shapes, sizes and designs. Before buying, borrowing or hiring a set of fins, it is important to think about the type of snorkelling you will be doing:

Snorkelling in warm or tropical waters generally only requires shoe or lightweight strap fins.

Snorkelling in cooler waters and wearing a wetsuit means you may also want to wear neoprene boots to keep your feet warmer, so sturdier strap fins will be required.



Features

There are two basic styles of fins.

- **The Shoe Fin - which is also known as a pool or slipper fin. This fin has a foot 'shoe' pocket and is generally used in warm water conditions.**
- **The Strap Fin - which is also known as a sea or boot fin. This fin has a foot pocket designed to fit over thick neoprene boots with an adjustable strap.**
- **Lightweight Strap Fin - This fin has a foot pocket designed to fit over bare feet or a thin neoprene sock or bootie and has an adjustable strap**

The basic design of a fin 'blade' should include stiffening ridges to maintain the shape of the blade but it should also have some flexibility as your legs move with a finning action. If the blade is too rigid, too flexible or overlong, it will increase the strain on your legs.

Most fins include slots, grooves or shaped blades designed to assist the finning action by directing water in the most efficient way.

Fit

The most important consideration whether buying, borrowing or hiring fins, is that the fins are the right size for you. The wrong size of fin can be uncomfortable and cause cramp if it is too loose or too tight. Shoe fins generally come in standard foot sizes but as with shoes, it is important to try them on first to check whether they are too narrow, too wide or just don't feel comfortable – ill-fitting shoe fins can cause blisters. Strap fins or either type are generally sized as small, medium, large or extra large to accommodate the size of foot or boot being worn. As with shoe fins it is important to try them on to check their fit and comfort when using bare feet or a thin neoprene sock or

bootee and, if using thicker neoprene boots, fit the fins with the boots you intend to use.

Quiz 1

- 1. Why is there an air pocket between the eyes and the lens of a mask?**
- 2. Why does a mask have a nose pocket?**
- 3. If you buy a pair of fins they should be?**
- 4. What is the typical length and diameter of a snorkel?**



Answers on page 92

Additional equipment

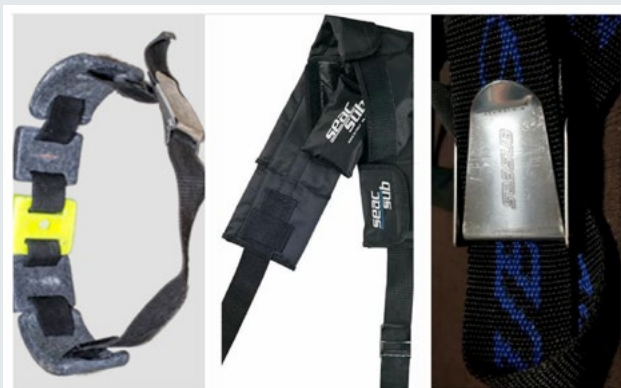
Depending on where you go snorkelling there are some additional items of equipment you may need.

A wetsuit and semi-dry suits

Depending on the water temperature these can vary from thin wetsuits (sometimes known as 'skins') to thicker neoprene wetsuits.



Wetsuits are worn to give some thermal protection. The neoprene fabric, which is made up of tiny gas bubbles, traps water between the suit and your body. Your body heat warms the water against the skin which helps to reduce



heat loss from your body and allows you to comfortably stay in colder water for a longer time. It is therefore important to wear a suit that fits you. If it is too big, the amount of water flushing through the suit will never be warmed by your body temperature and you will get cold very quickly. Even with a well-fitting suit, as your body eventually cools, the suit's thermal protection becomes less effective. If you are snorkelling in colder water you will need a thicker wetsuit.

Some snorkellers like to wear thin wetsuits, or skins, even in warm water as it helps to prevent sunburn when lying on the surface – your back, neck and legs can get burnt if you are not careful even though you might feel cool in the water. If you haven't got a wetsuit and are snorkelling in tropical waters just wearing a t-shirt helps to protect you from sunburn on your back.

A weightbelt

Wearing a neoprene wetsuit will help to keep you warmer but it will increase your buoyancy – floating on the surface. This is not a problem until you want to dive so, to counteract the buoyancy of the suit, a weight belt may be needed.

Weight belts are simple belts that allow small weights to be added or removed so that you can snorkel dive comfortably but are also still

buoyant enough to float on the surface without sinking.

There are various types of weight belt. One uses lead weights that can be threaded onto the belt and held in place by metal or plastic retainers. Another type of a belt is one that has

pockets into which weight pouches, small bags with lead shot, can be added.



One of the most important things about any weight belt is that it must have a quick release buckle – if you have a problem then the most important thing is to remain on the surface, so ‘ditching’ or dropping the weight belt using a quick release buckle easily ensures this.

A snorkelling buoyancy vest

Is basically a water proof jacket that can be filled with air to give you extra support if required at the surface. It is not a life jacket and most fit like a bib with straps to secure it around the body. Air is blown in via an inflation tube which also has a ‘dump’ valve that allows you to get rid of the air and deflate the vest which is important before attempting a snorkel dive!



Surface marker buoys (SMBs)

Snorkellers quite often carry, or get asked to carry by the Snorkel Dive Manager or lead Instructor, a surface marker buoy (SMB) on snorkel dives.

An SMB is a highly visible inflatable buoy and they can be various shapes and sizes and colours.

The buoy needs to be attached to something that you can hold onto. This can vary from a short line with a small weight that hangs just below the buoy to give you a handhold, to a reel with a handle and the reel line clipped to the buoy. There may be an additional line, a lanyard, with a quick release clip that can be attached to you leaving your hands free.

An SMB is used because:

- It marks the buddy pair's position in the water
- It is easier to see from a boat or the shore than just the snorkellers' heads
- If a snorkeller gets tired (or gets cramp) they can use the SMB as in-water support before aborting the snorkel dive.

Underwater cameras

If you enjoy the underwater world it is likely that you will want to take photographs to remind you and share with others – the underwater world offers some fantastic photo opportunities.

If you are interested in taking a camera with you when you go snorkelling there are a couple of things to consider.

Underwater cameras can vary enormously in cost – perhaps the

important thing is to use an inexpensive 'one off' disposable underwater camera and see how you go before spending more money.

If you buy a disposable underwater camera always check the depth rating – this is important, as some cameras are only 'waterproof', that is from rain, etc., they are not suitable for being submerged in water. However there are a number of inexpensive cameras (film and digital) that are depth rated to 5m, 6m or 10m and are ideal for snorkellers.



Tips for using an underwater camera:

- **Attach the camera to you.** Tie it around your wrist or clip it to your snorkelling buoyancy vest. This way, you will not risk dropping the camera and losing it!
- **Take your underwater pictures when the weather is sunny.** Most underwater disposable cameras don't come with a flash. As more light will shine through clear, shallow water you will get better photos here than in silty or murky water.
- **If you're finning, it's harder to hold the camera steady.** Slow down and stop before you take a picture and hold yourself and the camera steady.
- **If photographing fish, try to get at least one eye of your subject in the shot rather than take your photo from above or behind as this will make your photos more engaging.**

- Practice with still or slow moving subjects before trying to capture fast moving targets.
- Most of all – just experiment and have fun. The beauty of digital underwater photography is that you can snap away and learn quickly through trial and error!

Care of equipment

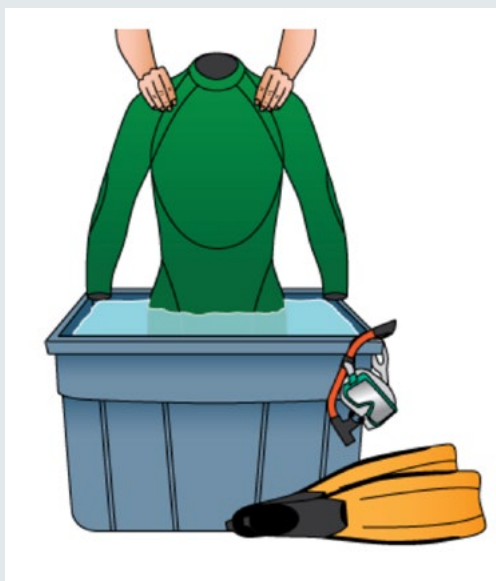
General Care

As with basic equipment, additional equipment care is quite easy:

- **Wash all equipment in fresh water after every dive.**

It is advisable after a number of dives to wash suits and the inside of snorkelling buoyancy vests with a mild detergent solution to prevent build up of bacteria. When washing out a snorkelling buoyancy vest, never breathe from or try to suck air out using the inflation/deflation tube - you may well breathe in bacteria which can cause nasty throat or chest infections. Remove any sand, grit or weed from the buckles and snorkelling buoyancy vest inflation mouthpiece. Air dry out of the sun.

Looking after and cleaning your mask, snorkel and fins is quite easy – look after your equipment and your equipment will look after you! Wash all equipment in fresh water after each snorkelling



session and check and remove any sand, grit or weed. Allow equipment to air dry out of the sun. This is important as sunlight can affect the flexibility of the silicone rubber in masks and make it stiffer and this could affect the 'fit' of the mask.

Repair

It is worth checking your equipment from time to time to check for any signs of wear and tear as mask and fin straps can start to split and buckles on some fins can crack or break. Replacements can generally be purchased from most dive shops or from various dive shop websites.

Check zips, repair of additional equipment is generally quite rare but it is worth checking the following every so often: lubricate zips (if any) with silicon or beeswax, any straps for fraying and buckles for cracks.

Storage

Store your equipment after it has dried in a cool dry place and if storing fins leaning upright make sure they are supported on the 'foot' end not the fin end – if they are left standing on the tips of the fins they can bend and distort.

Snorkelling signals

Why we need signals?

Although snorkellers can talk to each other on the surface, if it is calm there are times when the surface may be

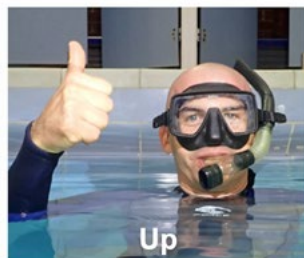
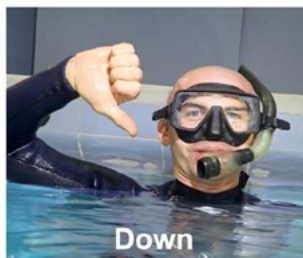
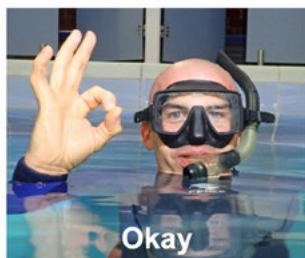


choppy and it is much more comfortable to keep the snorkel in your mouth and prevent swallowing any sea water. At times like this and particularly when you snorkel dive underwater, it is impossible to talk so snorkellers and divers around the world use a very simple sign language between each other and also to their surface cover - those watching them from the surface.

International language - there may be some slight differences depending on where in the world you are snorkelling but if snorkelling from a dive or snorkelling centre on one of their boats, they will run through the signals they use.

Types of signals

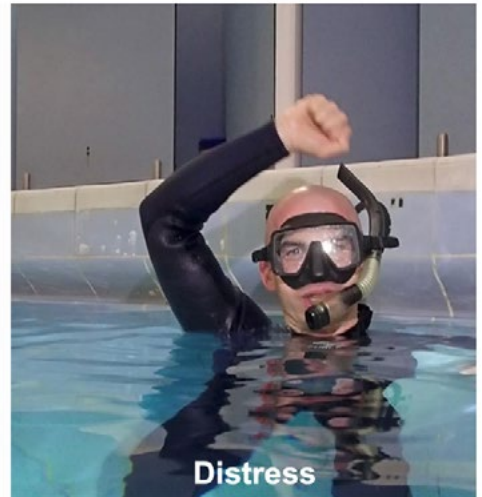
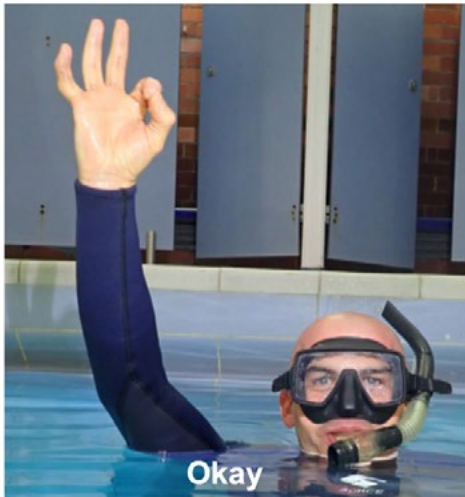
There are 3 main types of signals you will be using as a Snorkel Diver, basic signals, safety signals and special signals. Your instructor will be using teaching signals when communicating with you to mimic a skill they have asked you to do in the water.



Teaching signals



Surface Signals



Dive flags

Another type of 'signal' that snorkellers may see, particularly if snorkelling from boats, are dive flags. These are used to signal other water users that the dive boat has 'divers down, stay clear'



The International 'A' Flag - The letter A - Alpha in the flag alphabet. This means I have a divers/snorkellers down; stay clear and reduce speed. It is used in the UK, Europe and British Commonwealth.



There is also the red and white **American Sports Diver Flag** more commonly used across Europe, Canada and the USA and other parts of the world.

Quiz 2



- 1. What colour is the Alpha flag?**
- 2. A snorkeller frantically waving their arm at the surface is signalling?**

Answers on page 92

Test yourself

- 1. The glass in a diving mask should**
 - a) Break easily if stepped on by mistake
 - b) Be made of tempered glass
 - c) Be made of strong plastic
- 2. So you can see underwater, your mask should be full of**
 - a) Water
 - b) Air
 - c) Spit solution
- 3. You should wash your mask, fins and snorkel after use**
 - a) In the sea
 - b) In a washing machine
 - c) In fresh water

4. A snorkel lets you

- a) Breathe whilst you are underwater
- b) Breathe whilst looking down from the surface
- c) Breathe whilst you are travelling in a boat

5. A snorkeller frantically waving their arm at the surface is signalling

- a) The water's lovely so come on in
- b) Hi, I am having a great time
- c) I need help urgently

6. If you wear a wetsuit you may need a weight belt to

- a) Help you leave the surface
- b) Immediately plunge you to the bottom of the sea
- c) Because it looks seriously cool

7. If you wear a weightbelt its most important feature is

- a) That the colour matches your fins
- b) That it has a quick release buckle
- c) That it needs at least two people to release it

8. If your mask mists up so you cannot see properly, you should

- a) Throw it away and buy a new one
- b) Swap it with someone else's when they are not looking
- c) Clear it using spit or a little water

9. If you buy a pair of fins they should be

- a) Big enough for you grow into them in a couple of years
- b) Tight and already beginning to hurt your feet
- c) Comfortable and fit your feet

10. Your mask has a nose pocket to

- a) Keep your nose warm whilst snorkelling in cold water
- b) Prevent your nose getting bruised when you fin into a rock
- c) Allows you to avoid mask squeeze or clear water from the mask

Answers on page 92

Snorkelling science

A close-up photograph of a seal's head floating in the water. The seal has large, dark, round eyes and a dark, wet nose. Its fur is a mix of brown and grey, with some white whiskers visible around its mouth. The water is dark and slightly rippled, reflecting the light. The background is a soft, out-of-focus view of the sea and a distant shoreline under a cloudy sky.

[Go back](#)

Check out your eLearning video

Snorkelling science

Sophie Heptonstall will take you through this module.

This video will cover:

- Understand the effects of pressure on the body
- Understand buoyancy
- Understand heat loss
- Understand heat gain

Remember if you need to discuss any of the theory e-mail or call your instructor at your club or centre.

Video time length | 22:28 mins.

Click the image below to start watching the video.



Snorkelling science

Module contact

- Understand the effects of pressure on the body
- Understand buoyancy
- Understand heat loss
- Understand heat gain

The earlier chapters looked at how snorkelling equipment is designed to help you adapt to a water environment. This chapter looks in more detail at pressure and other factors that will affect your body when you go snorkelling.

Air pressure

Air

To understand the effects of the underwater environment on snorkellers, we need to start in the environment we are accustomed to – the Earth's surface

The air you breathe every day is made up of a mixture of gases, approximately 80% Nitrogen and 20% Oxygen. There are other gases mixed in the air in much smaller amounts but it is the Oxygen that is important as we cannot live without it!



Air, because it is a gas, is compressible – a volume of air can be squashed into a much smaller volume; for example you can compress air using a bicycle pump into a bike's tyres.

The other fact about the air around you is that it has weight. About 100,000 metres (approximately 60 miles high) of air surrounds the Earth and it has a downward force on the surface of the Earth – this force is weight and it exerts pressure.

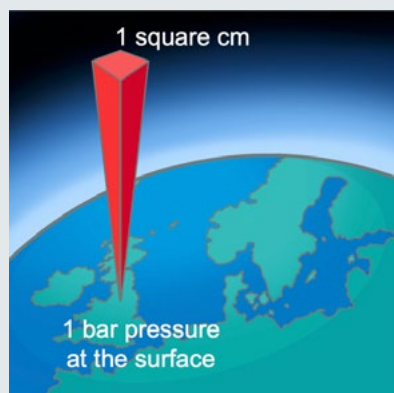
Imagine balancing a column of air on your thumb or fingernail (that measures about 1 square centimetre) and it stretches up 100,000 metres high. The weight of air at the bottom of the column on your thumb or finger nail is about 1 kilogram.

But we cannot feel this weight - why? The reason is that your body, consisting of lots of water and some air, is in balance (or in 'equilibrium') with the surrounding air pressure all around you.

Atmospheric pressure

The measurement of 1 kilogram per square centimetre ($1\text{kg}/\text{cm}^2$) at sea level is known as 1 atmosphere or, more commonly referred to as 1 bar (barometric pressure). Although it can vary a little due to weather conditions, we use this as a measurement for snorkel diving purposes.

If you find it hard to believe that air has weight, try the following: drill holes (or make notches) 15cm from each end of a narrow 1m length of wood/stiff plastic. Then, make a hole in the exact centre of the stick which is 50cm from each end. Place a cord or wire through the centre hole and suspend the stick from a chair back or a rod. Blow up a large



balloon, tie its mouth tight using a wire tie wrap (from freezer bags) and hang it from one of the end holes of the stick. Then suspend a small can/box from the hole at the other end of the stick and place flour, sugar, or rice in the can until the stick balances. Then, slowly let air out of the balloon and the can/box sinks down. When air leaves the balloon, the balloon becomes lighter and this shows that air has weight.

Can you feel change in air pressure?

Normally you are unaware of any changes in pressure but there are a couple of occasions when you can feel it, such as when you fly in aircraft or drive over hills and mountains – you sometimes experience ear ‘popping’. This is because the air high above the surface of the Earth is less of a column than the air at the sea level, the air pressure around you decreases.

As you ascend in an aircraft or drive up a big hill, the air pressure in the aircraft decreases as it does at the top of the hill. Any air from sea level that is trapped in your middle ear (behind your ear drum) will be at a higher pressure than that on top of the hill or in the aircraft. This trapped air will try to equalize with the surrounding air pressure by expanding and this causes your eardrums to push outward. You may feel some discomfort before your ears naturally equalise this trapped air with the air pressure around you, usually accompanied by a soft ‘popping’ sound – the air in your ear is now at the same pressure as the air around you.

If your ears don’t ‘pop’, you can equalize the pressure by allowing some air from your middle ear to escape through small tubes that connect them to the throat. To do this you can pinch your nose and gently breathe into it, push your tongue up to the roof of your mouth, yawn or swallow (which is why eating a sweet helps on aircraft take off). Any of these methods (called a Valsalva manoeuvre) opens

the air tubes and allows the trapped air to escape to the back of the throat. When you try this pressure release, you hear the change, the 'pop' of equalization.

On the way down from a flight or big hill, the air pressure increases and your inner ear is still at the lower pressure it has adjusted to. Now the extra pressure being felt on the way down, or at sea level, pushes the eardrums inward. Eventually, the pressure will equalize again, but many people don't like to wait, they 'equalize' the pressure by using a Valsalva manoeuvre.

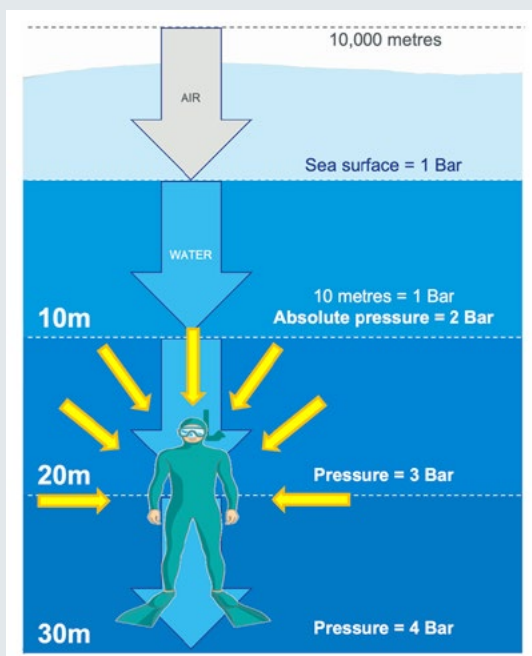
Water pressure

So what has air got to do with snorkelling and snorkel diving?

We know that at sea level, the air in the atmosphere exerts a downward pressure of 1kg/cm^2 – 1 bar (remember the column of 100,000 metres of air balanced on a finger or thumbnail).

Water

Water cannot be compressed – it is a very dense and heavy fluid. If you dived down below the surface but this time balancing a 1kg/cm^2 column of sea water on your finger or thumb nail, you would only need to go down 10 metres for the pressure to reach 1 bar. If we combine the 1 bar water pressure at 10 metres with the 1



bar air pressure on the surface, you would now be experiencing 2 bar pressure on your body.

Absolute pressure

So if we snorkel down to 10 metres, we are not just experiencing the water pressure from the water surface down to 10m – 1 bar - but the air pressure at the surface as well – another 1 bar – we are experiencing a total (or absolute pressure) of 2 bar.

If you want to see how water pressure increases, use an empty milk carton or plastic bottle and punch three or four holes one above the other down the side of the carton/bottle. Cover the holes with a long strip of adhesive tape and fill the carton/bottle with water. Then place the carton/bottle in a sink, basin or bowl and pull off the tape. You will see that the stream of water from the lowest hole travels farthest - the water at the bottom of the carton has the force exerted by the pressure of the water above.

Depth and pressure

Effects of pressure on an air space

If pressure is exerted on air, remembering that air is compressible, it will squeeze and reduce the air volume. If water pressure is exerted on a volume of air, say in an upturned open rigid container like a bucket, then the deeper the air volume is taken, the higher will be the squeeze on it.

The compression of the air volume for every 10 metres of water depth is fairly easy to remember:

- **At 10m, 2 bar pressure; the volume reduces to one half of its original volume.**

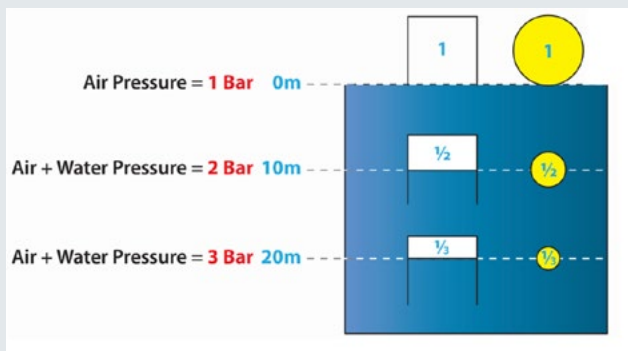
- **At 20m, 3 bar pressure; the volume reduces to one third of its volume.**

You can see how water pressure compresses air by using a tank or deep glass bowl, hold a glass with its mouth down and push it into the water. You will see that the water enters the glass a little way. No bubbles of air escape. Explanation: the water forces the air into a smaller space – the air is being compressed!

Fortunately, as humans, we have high water content in the body (70-85%) and most of it can adapt to the increase in water pressure for the depth that snorkellers go to.

Impact on Snorkellers

So why is it important to understand pressure when snorkelling? The answer is that it explains what is happening to your body when you dive underwater and also how you can overcome some of the effects of pressure.



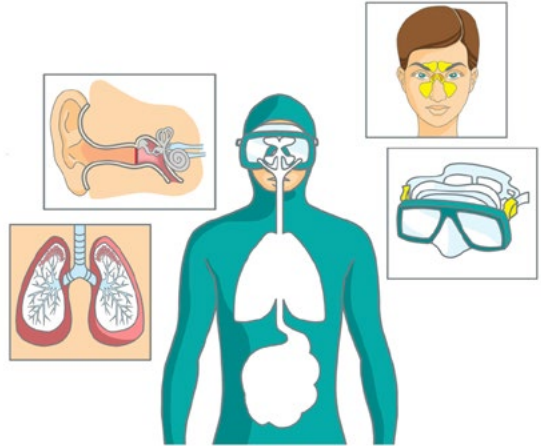
You have to know that the air in your mask is squeezed by the water pressure as you descend - 'mask squeeze' - which can easily be resolved by gently blowing out through the nose to equalize the pressure.

Air spaces

Increased pressure at depth affects air spaces in the body.

What air spaces?

- **Ear** (We can feel this)
- **Sinuses**
- **Airways**
- **Lungs**



These are not a rigid

air container like a bucket but, more like two balloons, they are flexible air spaces. As you breathe in and out, the elasticity of the lungs allows their expansion and contraction. We are so used to this that we rarely notice this movement unless we take a big breath or have worked hard and are panting.

If you take a breath and dive down, immediately the water pressure begins to squeeze the air volume in the lungs and they get smaller. 10m is a deep snorkel dive for many people but even at this depth you cannot feel your lungs even though they are half the size they were at the surface. Nor will you feel them on ascent when they expand back to their normal size when you reach the surface.

- **Mask**

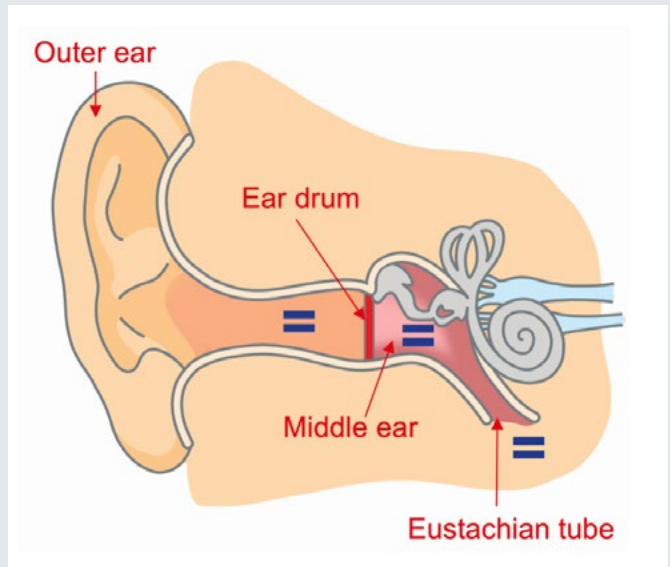
You normally breathe using your nose or mouth and air moves in and out of the lungs via the throat. When you are snorkelling and wear a mask, you are extending the nasal airpassage to create an air space, the air trapped in the mask. However, as we have already discovered, this air space inside the mask gets squeezed by the water pressure and breathing out a little through the nose equalizes the pressure and resolves the problem.

- **(Stomach and gut)**

The ears

There are two other important air spaces in the head - one in each ear and to understand how pressure can affect them when you go snorkelling we need to understand the ear in a little more detail.

Sound travels in waves. It's like when you throw a stone into a pond - waves travel from it. Imagine that the stone is a sound, such as someone talking or music playing. The sound creates waves in the air, just like the stone makes waves in water. Our ears pick up these sound waves, convert them into signals that travel to the brain which translates them into what we understand as words and music.



The ear is made up of five components divided into three sections:

The Outer Ear - this is the part of the ear we can see. It starts with the bit that sticks out either side of our head (the pinna) which acts as a funnel to collect the sound air waves and direct them into the ear canal – this canal is either full of air or, when you snorkel dive, with water.

The Eardrum - is at the end of the ear canal and prevents air or water travelling any further into the ear. The eardrum is a membrane that, as it suggests, vibrates in response to the sound waves that have travelled through the ear canal. The eardrum separates the outer ear from:

The Middle Ear - This is an air filled space that contains tiny interconnected bones that are attached to the ear drum and, as the ear drum vibrates in response to sound waves, these bones transmit the vibrations across the middle ear to where they are connected to another membrane that separates the middle ear from the inner ear. The air filled middle ear is connected to the back of the throat by a small air tube called:

The Eustachian tube - this small tube is normally closed but when you swallow or yawn you briefly open it. Any popping you hear as you yawn indicates that the tube is opening and air is entering it. If you pinch your nose and blow gently against closed nostrils you can force air up the Eustachian tube into the middle ear.

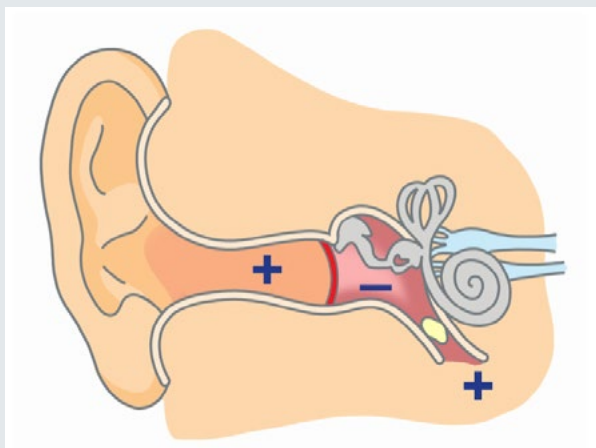
The Inner Ear - is fluid-filled to protect all the delicate nerve endings in it. The vibrations that pass through the membrane separating the middle ear from the inner ear are converted to fluid waves and these are sensed by the nerve endings, which send the information to the brain.

In everyday life you don't really notice how pressure affects the ear.

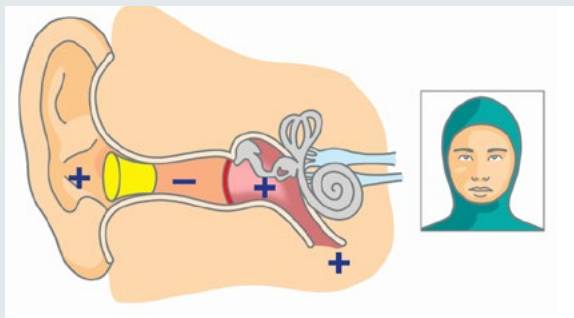
The ear remains in balance with the pressure around us because you unconsciously swallow saliva and, as you swallow, it opens the small (Eustachian) tube that connects the middle ear to the back of the throat. If you fly and feel discomfort in your ears, you can pinch the nose and gently blow against it or swallow to ease the discomfort –this is called a ‘Valsalva manoeuvre’ – but it can just as easily be referred to as ear clearing.

Clearing your ears

When you go snorkelling and dive below the surface the water pressure, even in quite shallow depths, increases and this presses on the eardrum, pushing it inwards. A Valsalva manoeuvre opens the air tubes to the back of the throat and introduces more air into the middle ear. The increased pressure in the middle ear equalizes with the water pressure and pushes the eardrum back and eases any discomfort.



However problems can arise, even in shallow water, if there is a blockage in the air tube that prevents ear clearing. This is most common following a cold when there is mucus congestion. The only thing to do is to ascend a little and ear clear again which might clear the mucus from the tube. This may not resolve the problem so



the only thing to do is surface and not attempt any more dives for the time being.

Much less common is a blockage in the outer ear. A tight fitting hood may block off the ear canal with trapped air between the blockage and the eardrum. Trying to resolve by ear clearing will push the eardrum outwards and result in discomfort. Ensure that water is free to enter the outer ear by easing out the hood. Do not snorkel dive if you wear earplugs or grommets.

You can build a very simple model of the eardrum by using a plastic bottle with the bottom cut off or a small funnel. Make the eardrum by stretching a balloon or cling film over the bottom of the bottle or wide part of the funnel so that it is as flat as possible and fix with a rubber band. Blow into the top of the bottle/funnel tube and the balloon/cling film should move outwards a little way. You have added extra pressure to the inside of the bottle/funnel and are moving the 'eardrum'.

Don't

So there are three important things to remember about snorkelling and the ears:

- **Dive if you have, or are recovering from, a cold**
- **Force your ears to clear on the way down**
- **Dive with ear plugs or tight hood**

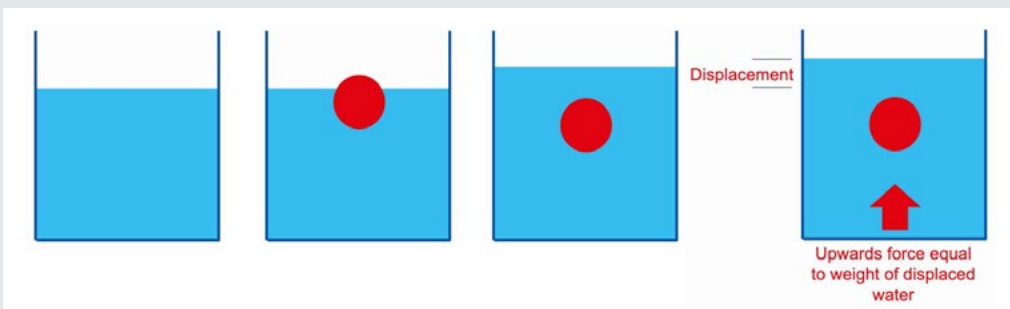
Do

- **Ascend to shallower depth to relieve pressure**

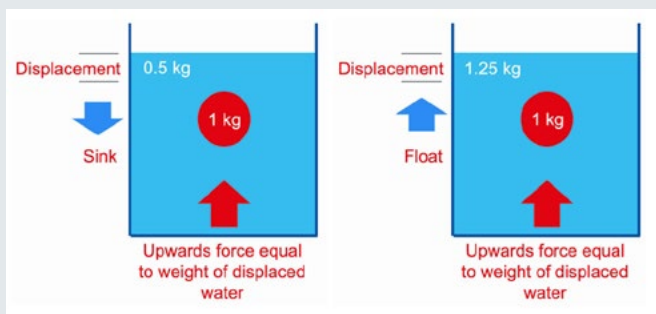
Buoyancy

Water displacement

Why do some things sink and others float? It was a Greek philosopher, Archimedes who worked it out when he got into his bath and noticed that the water level rose. He suddenly understood that the volume of water moved out of the way (or displaced) must be equal to the volume of the part of his body he had submerged.



A lot of pictures of Archimedes in his bath show the bath overflowing as he shouts 'Eureka' – the ancient Greek for 'I have found (discovered) it'.



When an object is submerged, its weight pushes down and moves water out of the way. The water pushes back in an upward force (up thrust) equal to the weight of water that was moved out of the way by the object.

You can feel how water tries to push things up by using a lilo or swim float. Try to push it underwater and it always bobs back – you can actually feel the water that is being pushed away pushing back.

Density is relevant

- **Objects sink when they are heavier than water displaced**
- **Objects float when they are lighter than water displaced**

An example of how buoyancy works:

- **Make a ball out of plasticine or modelling clay and drop it in a tank or bucket of water. It will sink – its weight is more than the up thrust – it is heavier than the water it displaces.**
- **Because the ball has displaced water, the water has to go somewhere and it does. It rises so its level is higher than it was before the ball was dropped in.**
- **Remove the ball of plasticine or modelling clay and reshape it into a boat or bowl shape with high sides - this increases the volume of the plasticine/modelling clay.**
- **Put the bowl or boat shape carefully into the water so it floats (if it sinks, take it out and make it bigger with higher sides).**

- **Although the plasticine or modelling clay weighs the same, shaping it into a boat or bowl shape together with the air it contains, pushes or ‘displaces’ more water out of the way – and so the water pushes back harder. The up thrust has been increased and the boat or bowl floats.**
- **With the greater displacement of water, the level of water in the bowl is higher because of the greater amount of water displaced than the submerged ball.**

This is the same principle that lets steel ships weighing thousands of tons float because of their large ‘displacement’ and they also contain a large volume of air.

Buoyancy and snorkellers

Unless you are doing surface dives, you will want to float or fin on the surface. It is the air in the body, particularly the lungs, that keeps you there – it is called positive buoyancy. If you wear a wetsuit this will increase your positive buoyancy because of all the tiny gas bubbles that form the fabric of the suit.

Just breathing out a little will reduce your lung size and you will begin to sink below the surface and be able to hover or fin underwater between the surface and the bottom. This is neutral buoyancy - you are in equilibrium with the water pressure. If you wear a wetsuit, a weightbelt might be needed to counteract the extra buoyancy effect of the bubbles of gas in the suit fabric.

Breathing out more will reduce the lung size further– even the gas bubbles in the suit will begin to become squeezed with the pressure – you will sink and be negatively buoyant. You may need to fin up a

little to start an ascent and, as you ascend, your lungs will expand back to normal size, as will the gas bubbles in the wetsuit and give you positive buoyancy back to the surface.

Quiz 3

- 1. Where is pressure felt the least?**
- 2. What is the absolute pressure at 15 metres?**

Answers on page 92



Breathing

Deliberate breath-holding interferes with the normal process your body is attuned to. If you hold your breath for some time you may begin to feel a little light-headed and the urge to breathe gets stronger and stronger. Holding your breath for too long whilst fighting the urge to breathe can even make you faint. For snorkellers doing surface dives, over-riding the desire to breathe and fainting underwater is obviously very dangerous.

Metabolism - the process of life

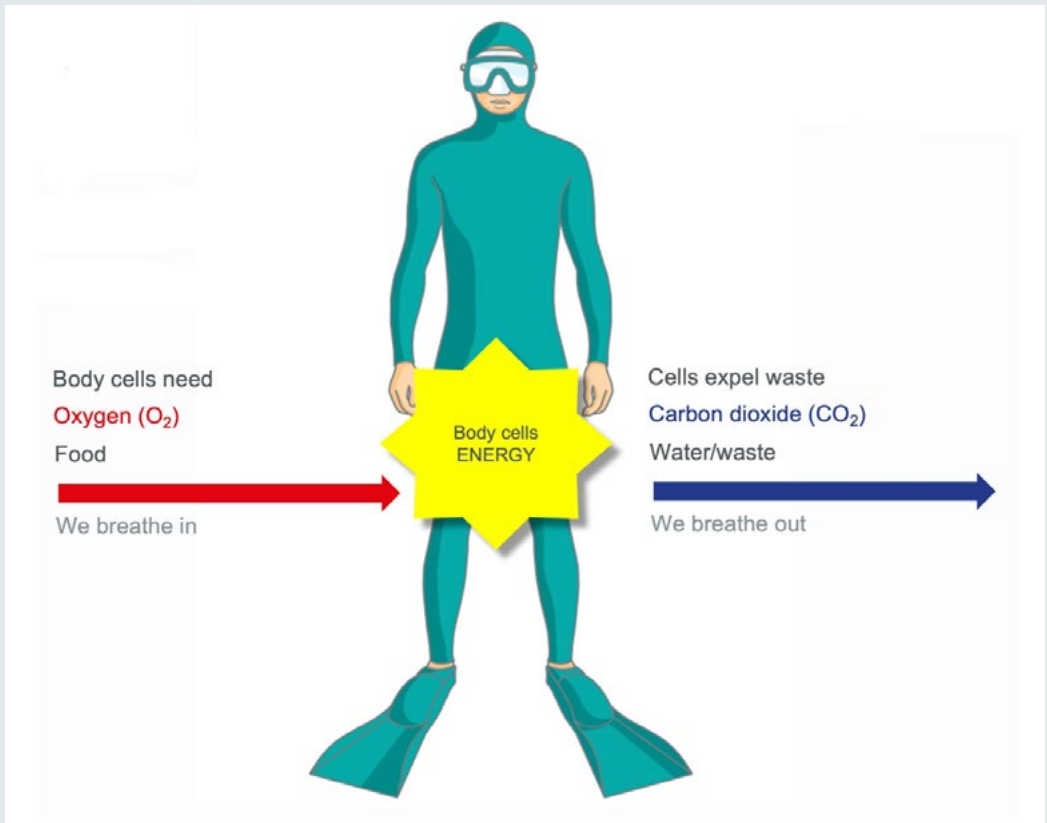
What causes the desire to breathe, what triggers your body to demand an intake of breath?

Your body is composed of millions of cells, each with a particular function.

Body cells need

- **Food + oxygen = energy**
- **Waste product removal**

They are the body's building and storage blocks. The cells need food and oxygen for energy. You eat food but to release its energy in a form that the cells can easily use, it must be broken down by a series of chemical reactions within the cells and oxygen is a vital ingredient in this process. By breathing in, you deliver oxygen via the lungs to the cells.



The cells use the energy but, as a result, waste products are produced and need to be removed. The waste product of some of the oxygen used in creating energy in the cells is another gas, carbon dioxide and by breathing out, you expel it via the lungs from your body.

The body cells can store many of the substances it needs, e.g., body fat, as an energy reservoir, but it cannot store more than a couple of minutes worth of oxygen. So it needs a constant supply of oxygen to the cells and the removal of the waste produced, carbon dioxide – we need to breathe in and out constantly and most of the time we are totallyunaware we are doing so.

You might think that it is the need for oxygen that makes us breathe but it is getting rid of the waste product from the body, the carbon dioxide, that triggers or stimulates the desire to breathe.

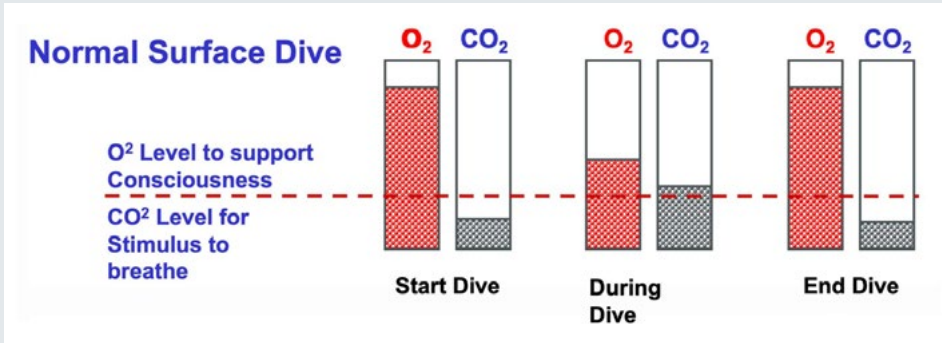
The stimulus to breathe is the need to expel the carbon dioxide.

Breath-holding means no intake of oxygen and no release of carbon dioxide even though oxygen is being used and carbon dioxide generated. Your body can tolerate this to a small extent but breath-holding should stop when the carbon dioxide level increases to its critical level and triggers the desire to breathe.

Never over-ride the desire to breathe when you are underwater.

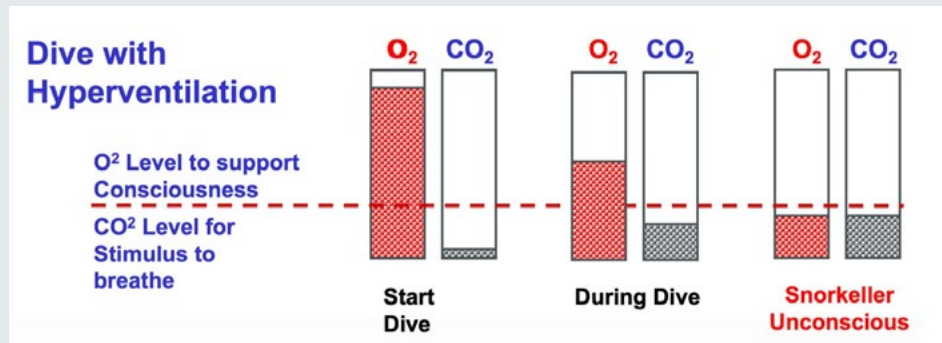
Hyperventilation

At the start of a normal snorkel dive, following breathing in and breathing out, the carbon dioxide and oxygen are at their normal levels. During the dive, you are using energy and the level of oxygen



in the cells is reducing and the waste product, the carbon dioxide, is rising to the level that triggers the desire to breathe - so you have to surface to breathe. This happens before the level of the oxygen drops to its minimum level to support consciousness. At the end of the dive, breathing in and out returns the oxygen and carbon dioxide to their start levels.

Hyperventilation is an attempt to override the normal breathing control mechanisms by rapid, unusually deep breathing. The mistaken belief is that it increases the intake of oxygen to allow the snorkel diver to remain underwater longer. However, the increase of oxygen is minimal and this is where the danger lies.



Hyperventilating increases the oxygen level by only a very small amount but it does reduce the level of carbon dioxide to a level much lower than normal.

During the dive, the oxygen is used as normal and the carbon dioxide produced but, as the carbon dioxide level had been reduced at the start of the dive, its rise to the level that triggers the stimulus to breathe is delayed. The oxygen level continues to fall and even with the small increase at the beginning of the dive, it reaches the point where it cannot support consciousness before the carbon dioxide reaches its level to trigger the need to breathe.

On land a person will faint, which allows the still breathing body a period of recovery back to consciousness. However, and this is obviously very dangerous, if a snorkeller 'faints' and becomes unconscious underwater (known as 'shallow water black out') there is no air to aid recovery and with lungs reduced in size the snorkeller will sink and drown.

Hyperventilation is a practice that should be avoided at all costs. You should start the dive in a relaxed state and should take no more than two or three medium breaths.

You may see articles or films about free divers, breath-hold divers who go to extreme depths and are seen hyperventilating. Free divers go through a very long training regime to achieve incredible levels of fitness in an attempt to reduce cell oxygen demand while attempting this type of diving. They also always have in-water support because many do go unconscious underwater or on their return to the surface and some have not survived.

Breath hold dives

Do not hyperventilate

Before the dive:

- **Start in a relaxed state.**

- **Take no more than 2-3 medium breaths.**

On descent equalize:

- **Ears**
- **Mask**

Do not push depth - dive within your comfort limits

Body temperature

Core body temperature

Human bodies have temperature sensors to maintain the 'core' body temperature at 37 degrees Celsius. The core consists of the important body areas: brain, spinal cord, chest organs, abdomen and pelvis and these are surrounded by a peripheral 'shell' consisting of the limbs, muscles and skin. The core temperature is controlled to very narrow limits, plus or minus 2 degrees'.

Heat loss

Losing heat from the body depends on many factors but the main one is a cooler temperature around the body drawing the heat away.



Water conducts the heat away from the body 25 times faster than air.

The main areas of heat loss are from the head, at the front of the chest, the armpits and the groin.

As we do on the surface when it is cold, we wear extra clothing, depending on the temperature of the water, snorkellers may require protective clothing, such as wetsuits, to reduce heat loss. Even snorkelling in what may feel like warm water, if its temperature is lower than the body's, there will be heat loss and a gradual feeling of getting cold.

Hypothermia

If the body is not insulated against the cold, the body begins to protect the core temperature by narrowing the blood vessels and this reduces the blood supply to the body's peripheral shell. As the blood flows less, the heat loss is reduced and the initial areas affected are the hands, feet, nose and ears. They look bluish in colour because their blood supply has been reduced and



also they begin to feel numb. If the peripheral cooling continues, the muscles begin contracting and relaxing quickly to generate body heat – 'shivering'. This is a clear indication that the body needs to increase insulation against the cold by moving to a warmer environment or adding additional clothing.

If nothing is done to remedy the situation and shivering stops, the body is sinking into a state called hypothermia, which can become a very serious condition with the body slowly shutting down.

Signs and symptoms

- **Blue/numb extremities**
- **Shivering**
- **Lethargic – slow moving**
- **Loss of concentration**
- **Confusion**

If snorkellers start to feel cold there are easy ways to resolve the situation

Resolve

- **Get out of the water!**
- **Protect from wind**
- **Change into dry clothes**
- **Warm drink**

Hyperthermia

When you are in a climate where the weather is hot, getting into the water and going snorkelling is one way you can cool down. However, lying on the surface and snorkelling does not prevent you getting sunburnt if you are not careful. Your neck, back and the back of your legs are, quite often, breaking or just below the surface and therefore exposed to the sun's rays.



Protection from the sun

- To prevent sunburn, wear a wetsuit, a skin suit or a t-shirt and protect your head and neck with a hat (which you will need to pass to your buddy when doing surface dives!).

Prevention

- Wear a wetsuit or skin suit
- Wear a t-shirt, hat, neck protection
- Use a rash vest (SPF50)
- Waterproof sunscreens (Reef Safe) – remember that some may need to be re-applied as they can wash off in the water.

Quiz 4

1. What is hypothermia?
2. What is the stimulus to breath?

Answers on page 92



Summary

- ✓ Understand the effects of pressure on the body
- ✓ Understand buoyancy
- ✓ Understand heat loss
- ✓ Understand heat gain

Test yourself

1. You should not dive with a cold because
 - a) Blowing your nose makes your mask fog up
 - b) Having a blocked nose makes it difficult to clear your snorkel
 - c) You could risk damaging your ear drums
2. You can equalise your ears by
 - a) Holding and carefully pinching your cheeks
 - b) Pinching your nose and blowing gently blowing against it or by swallowing

- c) Gently squeezing your ear lobes and pulling them downwards

3. If you cannot equalise your ears on a snorkel dive you should

- a) Ignore the pain and continue to dive down
- b) Hit yourself on either side of your head
- c) Return to the surface

4. The amount of pressure we feel on the Earth's surface is generally stated as

- a) One bar
- b) One ruler
- c) One measure

5. Did the Greek philosopher Archimedes discover the principle of buoyancy when he

- a) Dived into his swimming pool
- b) Was using tea bags to make a pot of tea
- c) Got into his bath

6. If you are floating on the water's surface you are

- a) Positively buoyant
- b) Negatively buoyant
- c) Neutrally buoyant

7. Is the pressure on your body when you are underwater caused by

- a) The pressure of air on surface of the water

- b) The pressure of air on the surface plus water pressure around you
- c) Just the water pressure around you

8. If you get cold whilst snorkelling you should

- a) Ignore it because you will go numb and not feel anything
- b) Think about a hot water bottle and a warm drink
- c) Get out of the water and warm up

9. Before a surface dive you should

- a) Not breathe at all
- b) Hyperventilate by taking lots of deep breaths
- c) Take a couple of breaths

10. Hyperventilation before a surface dive is dangerous because

- a) You could lose your snorkel underwater
- b) You could pass out under water
- c) You could get mask squeeze

Answers on page 92

Safe snorkelling

Check out your eLearning video

Safe snorkelling

Sophie Heptonstall will take you through this last module.

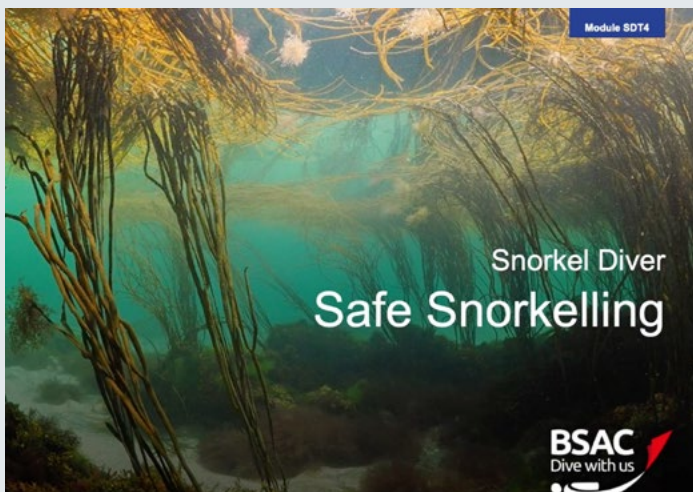
This video will cover planning a snorkel dive and assessing the site:

- Water movement – is it safe?
- Dive with a buddy and having a dive plan
- Having someone watch you at all times – surface cover
- Respecting the underwater environment

Remember if you need to discuss any of the theory e-mail or call your instructor at your club or centre.

Video time length | 20:22mins.

Click the image below to start watching the video.



Safe snorkelling

Module content

Planning a snorkel dive and assessing the site

- Water movement – is it safe?
- Dive with a buddy and having a dive plan
- Having someone watch you at all times – surface cover
- Respecting the underwater environment

Diving in the sea

Also a good environment for training and building experience

Water is not our natural environment: we are land based creatures so venturing forth on or in water requires a degree of planning. Understanding as much as we can about this alien environment will help you prepare for your snorkelling



adventures so that you can enjoy the experience as safely as possible.

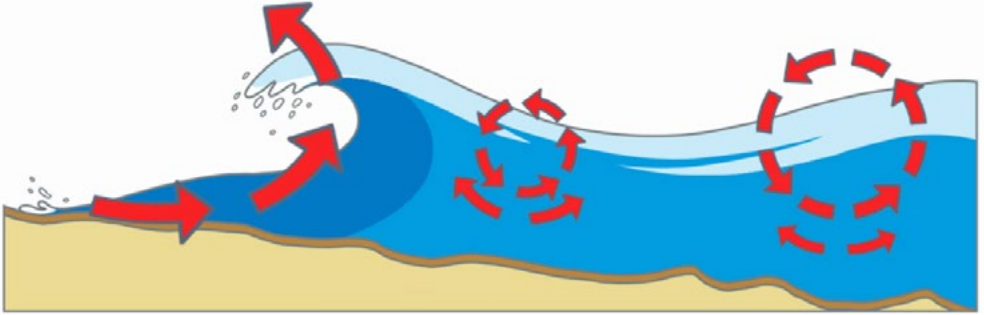
All snorkel divers need to have a plan so they can enjoy their snorkelling and looking at, or assessing, the site is important for your safety. Understanding the water conditions that might affect the site, such as wind, waves, currents and tides, will help with your planning.

Diving with a buddy is another important safety factor with both of you agreeing and following a plan as well as ensuring that someone watches you at all times – surface cover.

Site facilities

If you're snorkeling in the UK, the environment and needs are a bit different from tropical destinations—cooler waters, variable weather, and tidal ranges. So the land-based facilities that are most useful at UK snorkelling sites include both comfort, safety, and environmental considerations.

- **Boat or shore access**
- **Changing and wetsuit facilities**
- **Toilets and showers**
- **Secure storage or car parking**
- **Lifeguard presence or RNLI support**
- **Marine info boards and trail maps**
- **Visitor centres**
- **Food, water, and shelter**
- **Accessibility**
- **Designated snorkelling areas / marine trails**



Surface conditions

Waves formed by wind - It is the wind that creates waves whether it is on a pond, a lake or the sea. Imagine a completely flat sea and then a gentle breeze starts to blow and begins to lift the water up to form ripples. The ripples slope upwards and they create a larger area for the wind to blow against, this larger area creates more resistance to the wind and, if the wind increases, bigger waves are formed.

You can make your own waves - with a bowl of water and straws, blow through a straw just over the surface of the water. A gentle blow creates a gentle breeze and a harder blow creates a stronger breeze. You can also use a paper fan to generate the same effect

Waves have energy - looking at waves you would think that all the water in the wave is moving but it is only the shape of the wave that moves not the water itself. The water in a wave primarily moves up and down in a circular pattern and this creates energy that is transferred forward by one wave to the next.

If you are in the sea away from the shore, or in a pool that has a wave machine, the waves don't push you forwards or backwards. You will bob up and down with the wave staying in more or less the same place.

You can use a length of rope to see the wave energy principle. Lay the rope out on the ground and, holding it at one end, move it up and down vigorously and a wave will move down the rope but the rope stays in the same place. The further the rope 'wave' travels away from the source of energy (your arm), the slower and lower it becomes.

Wave heights increase in shallow water - if a wave reaches shallower water such as the shoreline, or a beach, it will behave quite differently. As the wave approaches shallower water, the movement over the bottom causes friction, which slows the wave's energy down. This makes the wave higher and steeper and, eventually, it tumbles over – releasing its energy as surf on the shore.

So why is surf important to consider when planning a snorkel dive?

When the surf runs back into the sea it can cause an undertow, water that can pull you into the sea and, if the waves and surf are big enough, it can knock you off your feet and tumble you around in the water.

The bigger the waves and the surf, the likelihood is that underwater visibility beyond where the waves are breaking will not be good for snorkelling. When the surf runs ashore and then back into the sea it can disturb the seabed, churning sand or tumbling pebbles. You can often hear this tumbling sound on a pebbly beach as a gentle growl. Even beyond the line of breaking waves, the underwater visibility will be reduced.

If you think about snorkelling at a site where there is surf, check local knowledge before you go in. With the possibility of an undertow and being knocked over, entries and exits could be difficult and sometimes quite frightening.

Safe entry and exits - When snorkelling, safe entry and exit are crucial to avoid injury, conserve energy, and protect the marine environment.

Seasickness - While snorkelling in the sea is more common than people think, especially when floating on the surface with swell underneath.

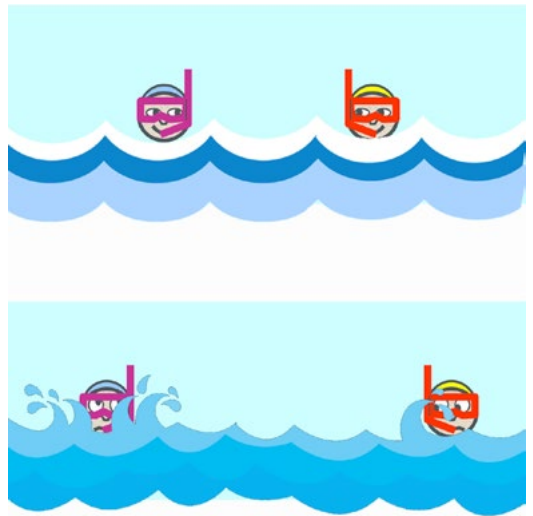
Waves and snorkelling

Waves too big

Looking at the size of waves is important. If the waves are large it will affect your enjoyment of snorkelling in a number of ways:

If the waves are big you may lose sight of your buddy or even lose sight of your surface cover as you bob up and down in the water.

Snorkelling in big waves can make some snorkellers quite uncomfortable and it can be rather scary.



The other effect of big waves is that you may begin to feel seasick with the up and down motion of the waves. It might be that you are snorkelling on the surface or travelling out to a snorkel site when you begin to feel sick. What is happening is that the wave movement is having an effect on the sensitive balance organs in the ears. It is easy

to resolve the problem if you are snorkelling from the shore - get out of the water.

If you are on a boat and feel seasick it is often less easy to get ashore quickly. Sit or stand in the fresh air as near to the centre of the boat as you can because it is here where the boat's movement is less affected by the waves. Look up at a fixed point on the horizon as this can help the balance organs adapt to the movement after a short time – it's called getting your 'sea legs'. If you have been sick make sure you drink water before going snorkelling. Sometimes getting in the water helps but if you have been very seasick you may feel the best thing is not to snorkel this time but stay on the boat. If you are on a boat, position yourself as near as you can to its centre but in the fresh air and look at a fixed point on the horizon.

Important

Don't go in - if the sea looks too rough

Get out - if it gets rough when in the water

Water movement - tides

If you have been to the seaside you will have noticed how the sea comes in and goes out and people referring to this as 'high and low tides'. But what causes the tides? This is quite a complicated subject but a simple explanation might help to understand this.



The Moon's gravity

The Moon circles around the Earth and its gravity, its attractive force,

pulls a 'bulge' of water towards it – it lifts the sea up. At the same time, there is a bulge on the opposite side of the Earth because the Earth is also being pulled towards the Moon (and away from the water on the far side). The bulge is the biggest wave to move around the Earth approximately every 12 hours but, remember what we have discovered about waves, they don't move water forwards, it is simply lifted up and down.

Tides – the moving bulge

As the bulge moves around the world it moves away from coastlines and the sea water level lowers – this is called low water – and as the bulge nears coastlines, the sea water rises – this is called high water.



Tides and snorkelling

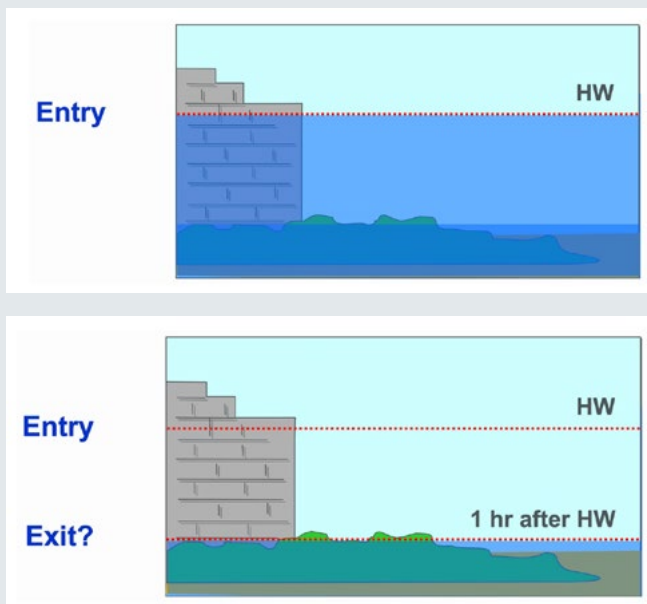
Why are tides important for snorkellers?

Will tides affect snorkelling? It depends on where you are. A sandy bay may mean it is easy to enter and exit the water at high or low water if there is no surf. However, if the bay has rocks that dry out sometime between high and low water, then the entry might be easy on a high tide but as the tide goes out, an exit could be slippery and difficult.

A snorkelling entry from a set of steps at high water might look nice and easy but if you come back just an hour after high water can you exit the water easily?

So tides are important for snorkellers:

- **Always check that you can enter and exit the water easily, especially at low water.**
- **Ask someone – seek out local knowledge. (They may also tell you the best places to go snorkelling). Ask, find out through local snorkelling dive centre.**



Water movement – currents

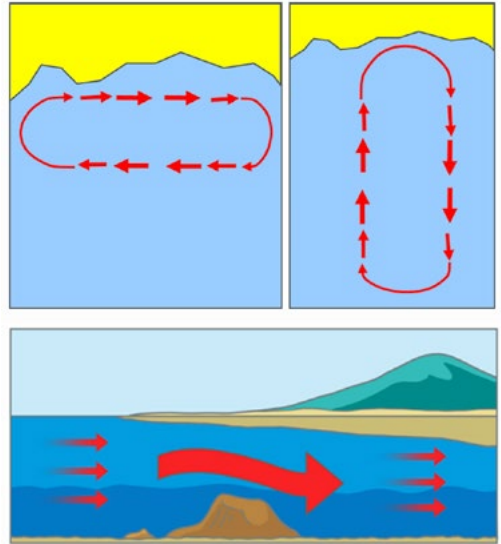
As tidal bulge moves

As the tidal bulge moves around the Earth it creates a 'wash', like a boat. This wash moves the water – and moving water means currents.

Currents follow the tide

Currents, like the wash from a boat, follow the tide and as the tide rises and falls, the currents can flow in one direction and then back

in the other. Currents can move along the shoreline and back again or they can move into the shore and out again. Local land features, such as rocks, headlands and islands and the shape of the seabed underwater, can affect the direction of currents.



Important for snorkellers?

Drift away from surface

cover - One particular type of current to avoid is a 'rip tide' which can carry swimmers, surfers or snorkellers very quickly away from the shore. On popular beaches there is generally a flag system to indicate when it is safe to go in the water, green for OK and red for danger.

It is important to know if there are any currents that might affect your snorkelling site - snorkelling against currents is hard work and very tiring. Ask – find out from local snorkelling/dive centre.

Safe snorkelling – the site

Always ask the question. . .

. . . “It is safe to go snorkelling?”

Always ask yourself when looking at a snorkelling site the most important question - “Is it safe to go snorkelling?”

It is always safest and easiest to snorkel:

- **In calm waters**
- **Where there is little or no current**
- **Where it is easy to get in and get out**
- **Where you can avoid areas used by other water users or water sports such as boats, jet skiers and wind surfers.**

Good practice/if in doubt:

If in doubt – ask!!!! Local knowledge or a snorkelling/dive centre will help with any information you need.



Buddy system

The benefits of buddy diving

Snorkelling with a buddy is far safer than snorkelling alone .

- **Monitor each other and assist if necessary**
- **Help with kitting-up, entry, exit and de-kitting**
- **Develop skills with more experienced buddies**



- **Share, compare and learn from snorkelling experiences**
- **Discover the type of snorkelling you enjoy**

Increased safety and enjoyment

Follow the golden snorkelling rule when surface diving with a buddy – One Up, One Down.

Buddy briefing

After you have assessed that the site is as safe as possible to go snorkelling, having a plan and talking it through with your buddy adds to the safety of the dive ahead.

This talk, or brief, outlines what you are going to do, where you are going, what you are going to look at and how long you will be.

Sometimes, you might be buddied-up with a snorkeller you don't really know, so briefing each other about the snorkel dive beforehand really helps.

You may discover that they don't like snorkelling where the water

gets deeper so, as a buddy, you will remember this when you are snorkelling and, if the water starts getting deeper, turn around so



you can both snorkel in shallower water. It may be that you need to mention something to your buddy, for example you got cramp on the last snorkel dive so don't want to fin too fast on this snorkel dive.

You can use the word **SEEDS** to help you remember what to cover when talking the dive plan through with your buddy:

Safety

Having assessed the site, are there any particular things about it that need to be mentioned? For example, the entry and exit point has some slippery rocks so it would be best to put fins on and take them off in the water. Know where and who the surface cover is - this is important should any problems arise. Last, but not least, are you and your buddy fit to snorkel?

Exercise

Why are you snorkelling? Is it just to have fun, investigate a particular area or look for a particular creature? Decide your timings, how far you will go before turning around and how long you plan to be in the water.

Equipment

Do you have all the equipment you need for the planned snorkel dive? Mask, fins or snorkel can easily be left in the car, at home or in your hotel room!

Discipline

Always stay together and remember the golden rule when surface diving – One Up, One Down.

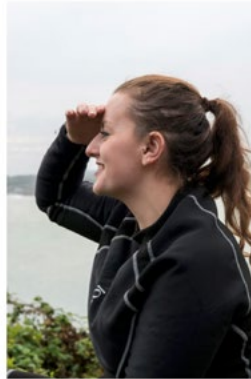
Signals

Check signals between you and also what signals the surface cover should expect as normal ones or emergency ones (remember your surface cover may not be snorkellers!).

Plan the dive and dive the plan

Surface cover

It is obviously important to have someone watching you in the water at all times – but it is equally important for you to make sure that they can see you at all times – if you can't see them, they can't see you! Surface cover can be someone watching from the shore or a boat. The important thing is that they know what you are doing and for how long.



From the shore

Make sure everyone on the shore and the snorkellers are aware of your plan and return time. Make sure everyone is counted in pairs in and out.

From a boat

If snorkelling from a dive centre



boat such as the ones used in holiday locations, the surface cover (or group leader) will probably give a group brief to all the snorkellers on board as they have local knowledge of the site. They will tell you about the site, what to look for and how long you have in the water. Don't go over the time allowed – it may be that the site has currents after a particular time and the surface cover and boat captain are thinking of your safety.

If you use a large snorkelling boat from a snorkelling/dive centre that has quite a number of snorkellers on the trip, the surface cover should count the buddy pairs in and out of the water.

If you are on holiday and using a dive or snorkelling centre, snorkelling is sometimes arranged as a group session with a group leader or instructor in the water with you. If you are on your own it is still a good idea to buddy up with someone but the group leader or instructor will act as your surface cover.

The importance of surface cover is quite simple – if you have problem help is quickly at hand

Surface Marker Buoys (SMBs)



Comprises of:

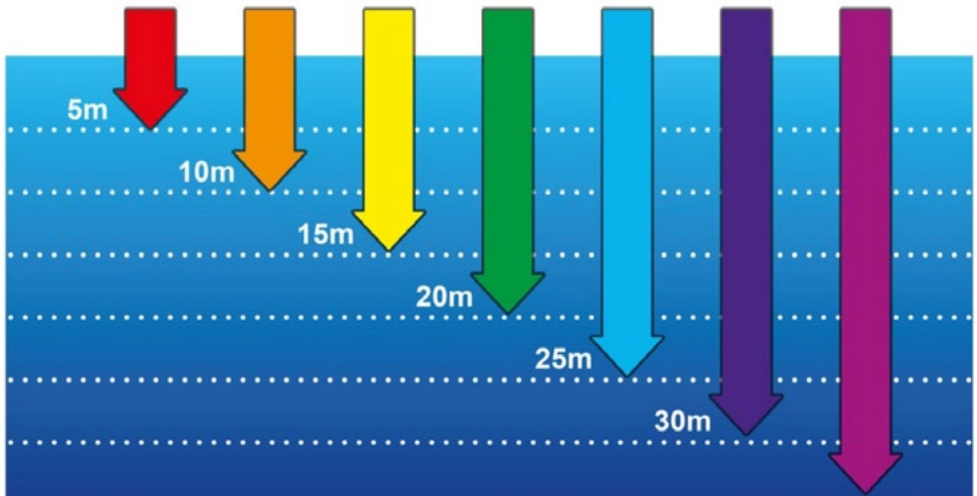
- Inflatable buoy
- A reel and cord
- Quick release clip

Why use an SMB?

- Marks buddy pair or group in water
- Easier to see from boat or shore
- Can be used as in-water support

The environment underwater

We know that underwater visibility can be affected by wave action – there is really no point in going snorkelling unless you can see what is underwater! Even with good visibility, you cannot see as far underwater as you can on land as available light and particles in the water will restrict your vision.



Light

Colour - White light, such as sunlight, is made up of the colour spectrum: red, orange, yellow, green, indigo, blue and violet.

Water absorbs the individual colours and if you are snorkelling and look down from the surface to a reef wall below, you may see coloured marine life at the top but below this everything looks blue. In natural light, marine life that is red will appear blue after about 5 metres and the other colours at the top end of the colour spectrum will lose their colour the deeper you go.

Snorkel diving is generally carried out in the shallower depths so loss of colour is minimal but, if snorkel diving or looking down from the surface beyond 5m, red colours will fade. Only by using artificial light, such as a diver's torch, will the true colours be revealed.

Visibility - In the sea refers to how far you can clearly see underwater. It depends on how much light penetrates the water and how much that light is scattered or absorbed.

Factors Affecting Underwater Visibility:

- **Light Penetration**

Sunlight provides illumination; its intensity decreases with depth. In clear tropical waters, sunlight can reach over 100 meters deep. In murky coastal waters, visibility may be less than 5 meters.

- **Water Clarity**

Clear water improves visibility; murky or cloudy water reduces it. Particles like plankton, silt, sand, or pollution scatter light and block your view.

- **Waves and Surface Conditions**

Calm seas allow more light to penetrate. Rough, choppy waters reduce light entry and stir up sediments from the seafloor.

- **Time of Day and Sun Angle**

Best visibility is usually midday, when the sun is directly overhead. Early morning or late afternoon light enters at an angle and gets scattered more.

- **Depth**

Visibility drops rapidly with depth due to light absorption. Colors disappear with depth: reds first (around 5–10 meters), blues last (deepest).

- **Tides and Currents**

Strong currents or tides can stir up sediments, reducing clarity. Slack tides (periods between high and low tide) usually offer better visibility.

Magnification - Water can act as a natural magnifying lens due to its ability to bend (refract) light. This phenomenon is based on how light changes direction when it moves between different mediums - like from air into water. When light passes from air (lower refractive index) into water (higher refractive index), it slows down and bends. This bending of light rays causes the image of an object to appear larger or closer than it really is.



Sound

Sound travels differently underwater than in air. It travels much faster (approximately 4 times faster) and further due to the denser medium of water. This means that what you hear underwater will be perceived differently than when heard through the air.

Speed - Sound waves travel significantly faster in water due to the tighter packing of water molecules, allowing for quicker transmission of sound energy

Direction - Sound travels very well underwater, but directional hearing is difficult. This is because the human brain uses the time difference between sound reaching each ear to determine direction, and underwater, the speed of sound is much faster, making this difference very small and difficult to perceive

Temperature

Thermoclines - A thermocline is a distinct layer in a body of water, such as an ocean or lake, where the temperature changes rapidly with depth. It separates the warmer surface water from the colder, deeper water. The term comes from “thermo” (heat) and “cline” (slope or gradient).

Marine conservation

Local information

Often to get the best information about what you can see at a site is to ask the local Snorkelling dive centres or club. They will have done all the local sites and even created some snorkel tours. Ask about the local life you might see and what to avoid. Check what marinelifes you should avoid – some marine creatures and corals can sting or bite if you get too close. Check what to do if stung or bitten – it can happen but is quite rare.

Marine life identification slates for specific areas

Marine life identification slates are waterproof guides (often laminated plastic or PVC) are perfect to identify local sea creatures underwater.

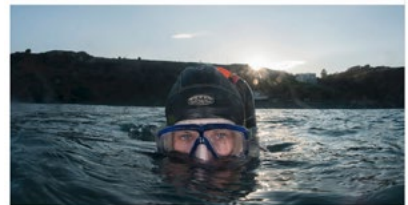
This gives you a purpose to go snorkelling to see what you can identify. They're incredibly useful for recognising species specific to a region, like fish, corals, invertebrates, and sometimes even plants.

Dive centres (especially near dive destinations) will stock them but a lot can be found online: Websites like Amazon, Reef Smart Guides, New World Publications, and local diving organisations. Aquariums and marine sanctuaries often sell location-specific guides in gift shops.

Marine life books

There are many books that have been written about specific areas with photographs to help you identify marine life. These are packed with lots of information, they tend to be organised in biological classification and habitat. They tend to cost more and you can't take them underwater with you. So a camera, video or drawing can be used underwater, then once on the surface you can then identify what you have just seen.

Protecting the underwater environment



Many people have a limited and sometimes distorted picture of what lies below the surface of the sea, particularly in temperate waters. They assume that all the colourful and fantastic life is in tropical waters but, wherever you go snorkelling around the world, the marine life is as varied as the scenery and animals that live on the land.

When you go snorkelling one of the main joys has to be seeing marine animals and plants in their natural environment. With over two thirds of our planet covered by water there is a huge diversity of marine life to seek, discover and marvel at.

As snorkellers you are quite privileged in being able to visit the underwater world but, as with many areas on land, there is much more awareness of the fragility of our environment and the need to protect and preserve it not just for now but for future generations.

Always respect the marine environment. Always remember it is not your environment, it belongs to the marine life. You are a visitor to their world and should treat it with respect. As part of good snorkelling practice, snorkellers should demonstrate care and protection of the underwater environment and there are some key rules to follow:

- **Excellent buoyancy control**
- **Good finning technique**
- **Look but don't touch**
- **Take only memories and photographs**
- **Don't aggravate wildlife**

Participate

Get involved in projects such as the Great Seagrass Survey and Operation Oyster. You can get all the information from this link on the BSAC website. <https://www.bsac.com/advice-and-support/protect-our-seas/conservation-projects-and-events/>

Other areas you can get involved in are:

- **Beach cleans**
- **Underwater litter picks**
- **Helping sharks in UK seas**

Quiz 5

- 1. What is SEEDS?**
- 2. What is the 'Golden Rule'?**

Answers on page 92



Summary

Planning a snorkel dive and assessing the site

- ✓ **Water movement – is it safe?**
- ✓ **Dive with a buddy and having a dive plan**
- ✓ **Having someone watch you at all times – surface cover**
- ✓ **Respecting the underwater environment**

Test yourself

1. Snorkelling with a buddy is an important safety factor because

- a) They can carry all your snorkelling kit
- b) They can be bossed around
- c) They can help if you have a problem

2. The 'golden rule' when you surface dive in a buddy pair is

- a) One stays up on the surface whilst the other dives down
- b) You both hold hands and dive down together
- c) Ignore your buddy completely and do your own thing

3. Safe snorkel diving involves

- a) Planning the dive and diving the plan
- b) Planning the dive and then totally ignoring it
- c) Not planning the dive at all

4. The word you can use to help remind you cover all the elements of your dive plan when giving a snorkel dive brief is

- a) PIPS
- b) SEEDS
- c) SKINS

5. If you are planning a snorkel dive from the shore you should make sure

- a) There is somewhere to sit to put your fins on
- b) That you can always enter and exit the water easily
- c) That there is an ice cream van or parlour nearby

6. Snorkellers should be aware that if waves are breaking as surf on the seashore

- a) They are fun to dive through with your snorkelling kit
- b) They can be used to 'surf' ashore at the end of your dive
- c) They can cause undertows, knock you over and tumble you around

7. Surface cover is

- a) Someone who just helps you put your kit on and then can have a sleep
- b) Someone watching you from the shore or boat at all times
- c) A large towel you can use after a snorkel dive

8. A stride entry can be used when

- a) The water is known to be deep and clear of obstructions
- b) The water is very shallow and you can see the bottom
- c) You can see large rocks just below the surface

9. When finding marine animals underwater you should

- a) Look and then poke them with your snorkel
- b) Look but do not touch

c) Look and then suddenly move so you scare them

10. If snorkelling on holiday from a diving centre boat you should make sure that someone on the boat

a) Tidies up and polishes your snorkelling kit

b) Counts all the snorkellers in and out of the water

c) Has a dry towel ready when you get out of the water

Answers on page 92



End of module quiz answers



BSAC
Dive with us



[Go back](#)

SGT2

Quiz 1 answers

1. Allow the eyes to focus
 2. Allows you to equalise the air pocket between the mask and your face
 3. Comfortable and fit your feet
 4. 40-45cm long & 2.0cm wide
-

Quiz 2 answers

1. White & Blue
 2. They need help urgently
-

Test yourself answers

1. Be made of tempered glass
2. Air
3. In fresh water
4. Breathe whilst you are travelling in a boat
5. The water's lovely so come on in
6. Help you leave the surface
7. That it has a quick release buckle
8. Clear it using spit or a little water

9. Comfortable and fit your feet
10. Allows you to avoid mask squeeze or clear water from the mask

SGT3

Quiz 3

1. The Lungs
 2. 2.5 bar
-

Quiz 4

1. Too cold
 2. Carbon Dioxide
-

Test yourself answers

1. You could risk damaging your ear drums
2. Pinching your nose and blowing gently blowing against it or by swallowing
3. Return to the surface
4. One bar
5. Got into his bath
6. Positively buoyant
7. The pressure of air on the surface plus water pressure around you
8. Get out of the water and warm up
9. Take a couple of breaths
10. You could pass out under water

SGT4

Quiz 5

1. Safety, Exercise, Equipment, Discipline and Signals
 2. One Up/One Down
-

Test yourself answers

1. They can help if you have a problem
2. One stays up on the surface
3. Planning the dive and diving the
4. SEEDS
5. That you can always enter and exit the water easily
6. They can cause undertows, knock you over and tumble you around
7. Someone watching you from the shore or boat at all times
8. The water is known to be deep and clear of obstructions
9. Look but do not touch
10. Counts all the snorkellers in and out of the water

After your course...

Go and use your newly acquired skills

Go diving... with the support of your club, you will be able to encounter a fascinating variety of wildlife and shipwrecks in seas, rivers, quarries, lochs and lakes. Plus, you will be able to dive anywhere in the world with your internationally-recognised qualification.

Progress your diver training... you can quickly move onto your next grade in BSAC's Diver Training Programme.

We recommend for your next course

Snorkel Lifesaver

To start the course, discuss your options with your Training Officer/Diving Officer of your branch, your Regional Coach or local BSAC Partnership Centre...

Learn new specific skills... you could also develop specific skills such as safety and rescue, wreck diving or driving a dive boat.

Other courses you may like

Advanced Snorkeller Oxygen Administration Boat Handling

To book and pay for your Skill Development Course simply click on the link to get going...

bsac.com/events



Shop online at **bsac.com/shop**



Login to MyBSAC ([BSAC.com/mybsac](https://bsac.com/mybsac)) to obtain:

- Secure online ordering
- Up to 35% discount for all BSAC members
- Training packs, merchandise, decompression tables, BSAC manuals and lots more
- Buying online from the BSAC shop supports our work in underwater heritage, marine conservation and protecting our seas

Let's grow the love of British diving together



Diver benefits. . .



. . . Don't forget as a BSAC member, you get access to exclusive scuba and snorkelling-related benefits and prices.

www.bsac.com/member-benefits



Notes

Document change record

Date published	Document Version Number	Page(s) affected	Description of changes	Author
2018	v3.0	AI	Updated	Lizzie Bird
1/9/2025	v3.1	All	Reformat materials to be consistent with eLearning course	Sophie Heptonstall

Enjoy your
diving...





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