

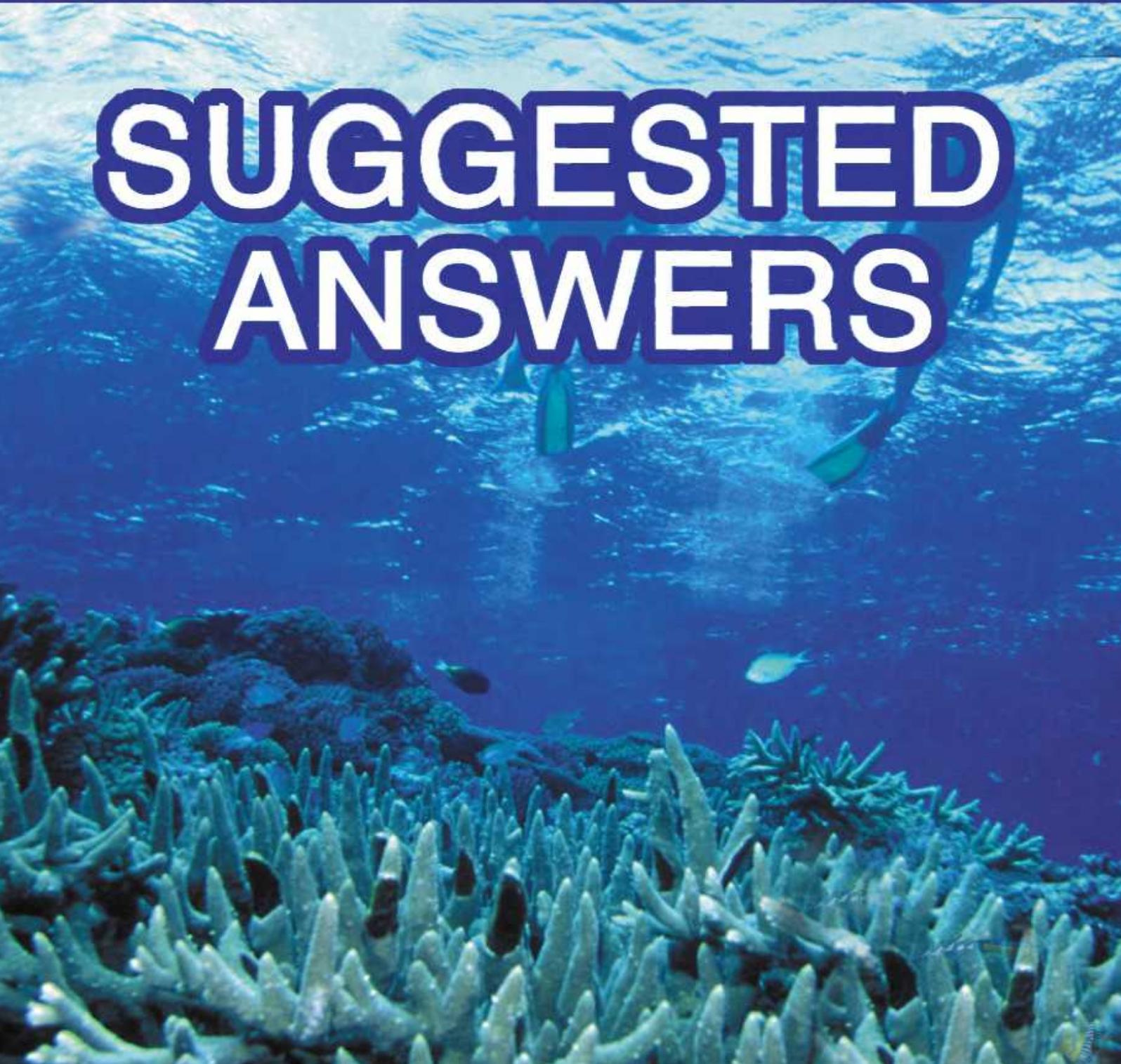
Marine Science
For Australian Students

Snorkelling Worksheets

6th Edition



**SUGGESTED
ANSWERS**



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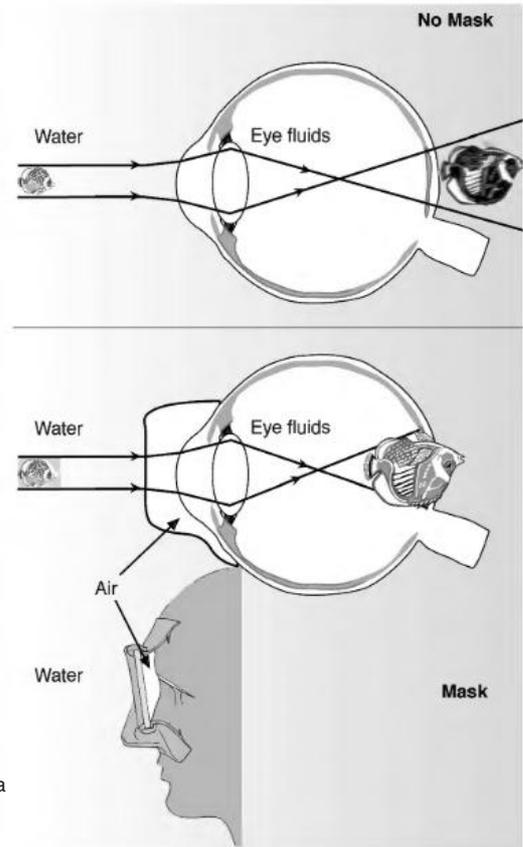
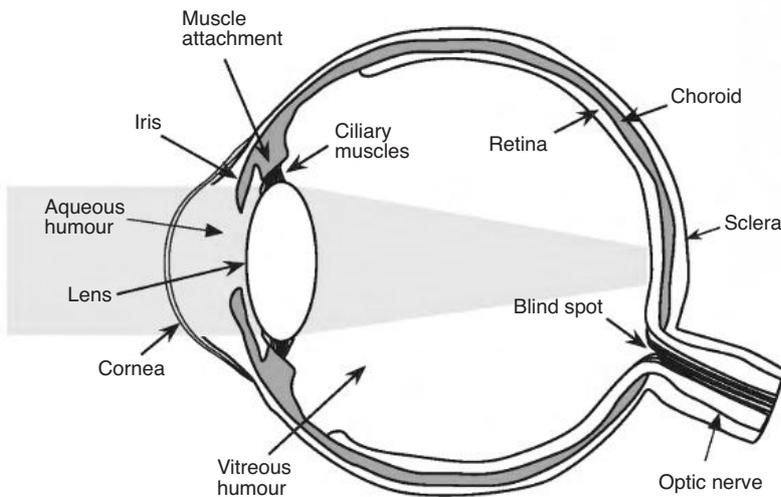
Worksheet 1: Snorkelling and the eye

Q1. Light enters the eye through the lens, cornea, aqueous humour and vitreous humour all of which bend the light towards the retina.

The eye can focus light onto the retina by means of a lens that can be contracted or relaxed by a set of the ciliary muscles.

The retina has a set of light sensitive cells which process dots of light that fall onto it. The retina then sends information to the brain through the optic nerve.

Illustration - See Figure 5.2

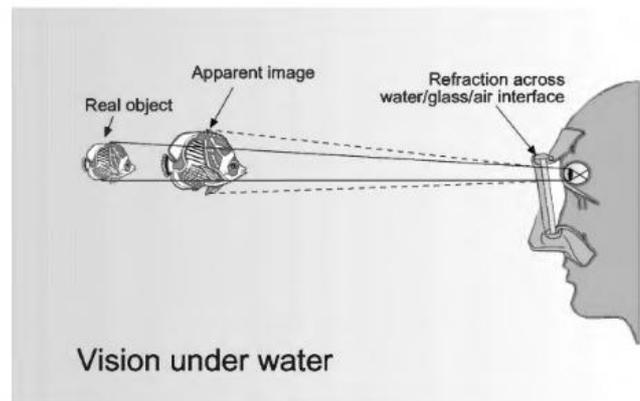


Q2. When there is a layer of air between our eyes and water, objects appear to be one third larger and closer than they actually are - due to refraction.

Illustration - See Figure 6.4

Q3. As depth increases, the range of visibility and the intensity of colour, especially at the red end of the spectrum, decreases due to the diffusion and absorption of light, hence brightly coloured marine life appears greeny-blue.

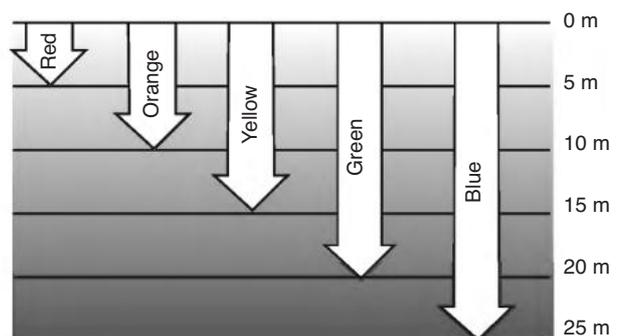
Illustration - See Figure 6.3



Q4. When a ray of light passes from water (more dense) to air (less dense) it bends away from the surface of the face mask as shown in Figure 6.2.

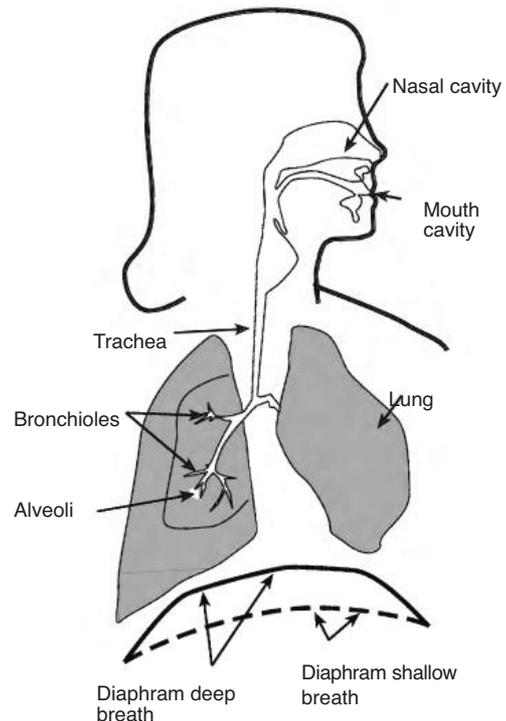
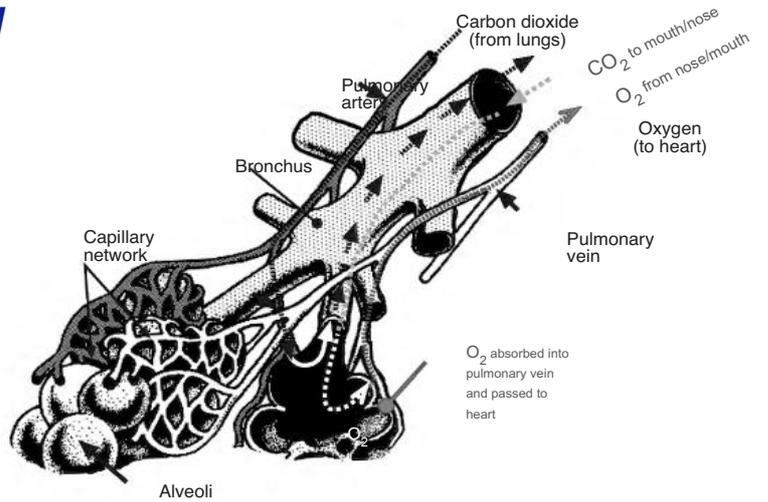
In water, rays of light are not bent as far and images focus behind the retina. This is why fish appear blurred when seen without a mask.

Illustration - See Figure 6.2



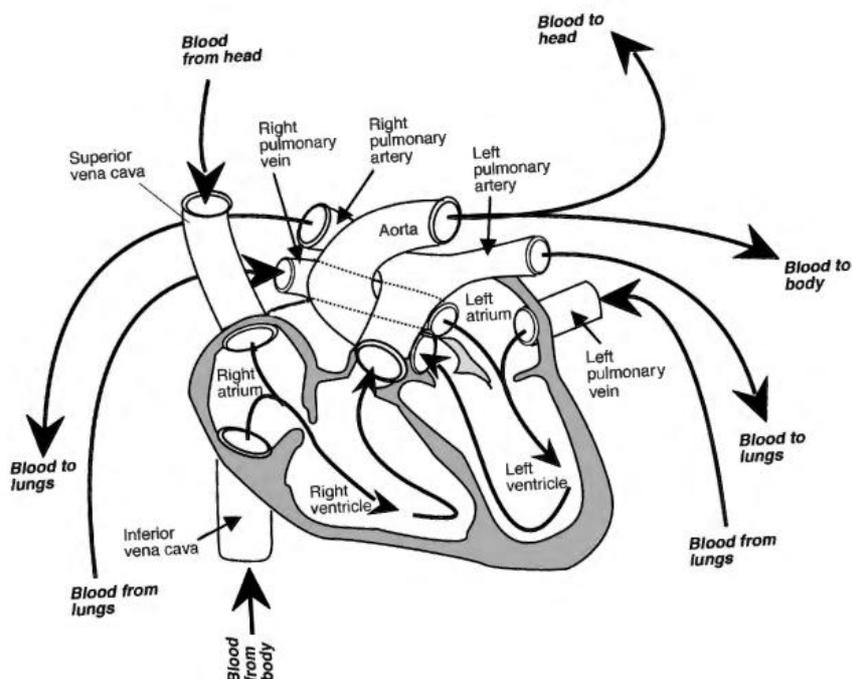
Worksheet 2: Respiration and snorkelling

- Q1. See Figures 8.1 and 8.2
- Q2. The air we breathe is 21% oxygen, 78% nitrogen and a small amount of trace gases.
- Q3. Shallow water blackout is when a snorkeller becomes faint underwater and may lead to unconsciousness. It is caused by a fall in carbon dioxide in the body combined with low oxygen levels.



Extension:

- Q1. Go to the www.worksafe.qld.gov.au site and use the search engine to search for hypoxic blackout.
- Q2. See below

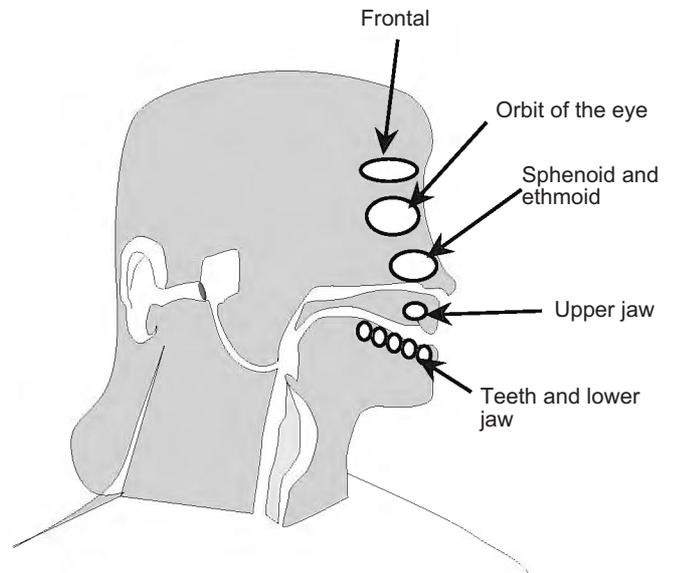


Worksheet 3: The sinuses

- Q1. Sinuses are air filled sacs on either side of the nasal cavity that clean the air we breathe and lighten the bones of the skull. They regulate heat and moisture in the skull and voice control and smell.

See Figure 10.1

- Q2. When a snorkeller gets a cold sinuses often fill with mucous and the air gets trapped. Under pressure this air expands and causes pain.
- Q3. Never snorkel dive with a cold.
Equalize your ears every time you dive underwater.
Dry the outer ear canal with a solution such as aquaeear or earwash.



Worksheet 4: Circulation and temperature control

- Q1. One function of this system is to take the oxygen from our lungs around the body to our cells where it combines with food from the digestive system to give use energy to snorkel.
- Q2. You can use a less energy with the correct use of fins and by keeping your hands by your side. If you use your legs in a cycling motion this increases the amount of energy you burn up and can lead to muscle cramping.
- Q3. If you use your legs in a cycling motion, not wearing a wet suit.
- Q4. Continued cooling of the blood will affect the organs to which it flows and their normal functioning. Hypothermia causes vital organ failure.
- Q5. An hour in the water is like a day in the air of the same temperature.
- Q6. Indefinite in Cairns, less than 12 hours in Tasmania. Increase chances of survival by adopting the HELP position.

Worksheet 5: Effects of Pressure

- Q1. 1 atmosphere
- Q2. 2 atmospheres
- Q3. 21% oxygen; 78% nitrogen
- Q4. The partial pressure of a gas is how much pressure each gas exerts (in your lungs).
- Q5. Nitrogen = 0.78 atmospheres (78% of 1 atmosphere)
Oxygen = 0.21 atmospheres (21% of 1 atmosphere)
- Q6. At 10 meters, pressure has doubled. Partial pressure doubles too.
Nitrogen: $2 \times 0.78 = 1.56$ atmospheres (78% of 2 atmospheres)
Oxygen: $2 \times 0.21 = 0.42$ atmospheres (21% of 2 atmospheres)
- Q7. Carbon dioxide can be toxic at any pressure. It can cause you to feel dizzy or fatigued.
- Q8. Nitrogen: $3 \times 0.78 = 2.34$ litres (78% of 3 litres)
Oxygen: $3 \times 0.21 = 0.63$ litres (21% of 3 litres)

Worksheet 6: Boyle's Law

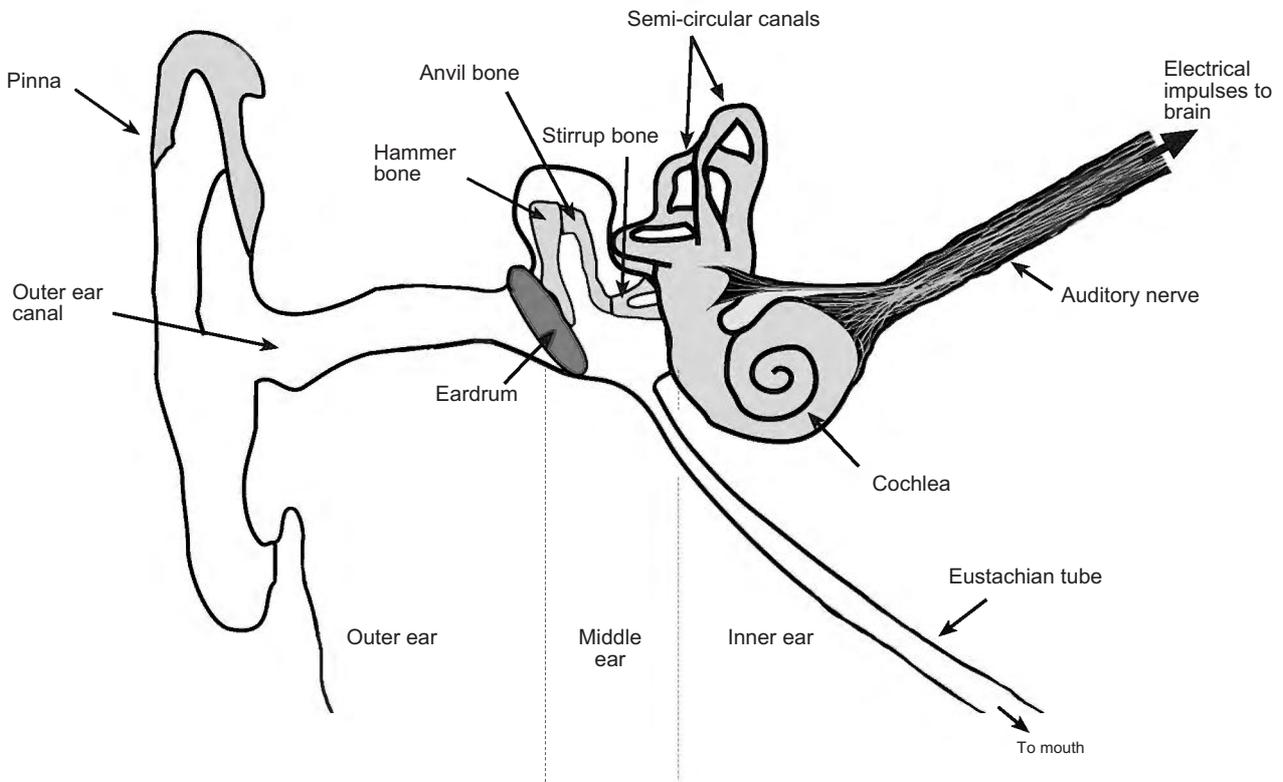
- Boyle's Law states that pressure and volume are inversely related.
- It is important to know that there is sufficient lung volume for diving. An average lung capacity is about 4 litres.
- $P_1V_1 = K$ (a constant)
 $P_2V_2 = K$ (the same constant in a new situation)
then
 $P_1V_1 = P_2V_2$

(Chemistry and Physics students might know $PV = nRT$)

- 4.
- | | | |
|-------|---|-------------|
| P_1 | = | 1 atm |
| V_1 | = | 4 L |
| P_2 | = | 2 atm (10m) |
| V_2 | = | ? |
-
- | | | |
|--------------|---|------------------------|
| P_1V_1 | = | P_2V_2 |
| 1×4 | = | $2 \times V_2$ |
| V_2 | = | $\frac{1 \times 4}{2}$ |
| | = | 2L |
- 5.
- | | | |
|-------|---|-----------------|
| P_1 | = | 1 atm (surface) |
| V_1 | = | 3.8 L |
| P_2 | = | 3.5 atm (25m) |
| V_2 | = | ? |
-
- | | | |
|----------------|---|----------------------------|
| P_1V_1 | = | P_2V_2 |
| 1×3.8 | = | $3.5 \times V_2$ |
| V_2 | = | $\frac{1 \times 3.8}{3.5}$ |
| | = | 1.09L |

Worksheet 7: Snorkelling and the ear

- Q1. Sound waves pass into the outer ear canal and cause the eardrum to vibrate. The middle ear contains small bones that pass on these vibrations from the cochlea which has fine hairs that sends nerve impulses to the brain.



- Q2. Problems that can develop with the outer ear are:
- the top of the pinna can get sunburnt
 - wax can build up and impair hearing
 - bacteria can cause an ear infection
 - the eardrum can be damaged by pressure
- Q3. Mucous can build up in the Eustachian tube and prevent you from equalising your ears. This could cause a burst eardrum.
- Q4. Cotton buds can cause wax or other foreign objects to be pushed against the eardrum causing the outer ear canal does not drain. A build up of moisture allows bacteria to grow.

Worksheet 8: Pressure and sound

- Q1. Pressure on the outside of the ear increases with depth which pushes the eardrum inwards.
- Q2. Pressure must be equalised on either side of the eardrum.
- Q3. The Valsalva manoeuvre is the attempted exhalation against the closed nose and mouth.
- Q4. Other methods to equalise include:
Pinch nose and swallow
Just swallow
Wriggle jaw
Move head and neck and yawn
- Q5. Otoliths in the semicircular canals overstimulate the brain, causing seasickness.
- Q6. Take medication before you go
Lie down and fix a position on the horizon to stabilise your balance.
- Q7. An infection of the outer ear. It can be prevented by drying ears properly and using "Aqua ear".
- Q8. Sound seems to come from all directions underwater- it is difficult to locate the source of sound.
- Q9.



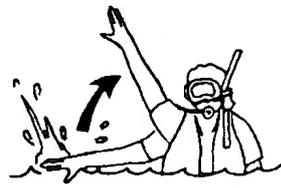
Are you OK?



Yes - I am OK



Up



HELP - "Come and pick me up - TAXI"



Down

Worksheet 9: Buoyancy and snorkelling

1. Density = $\frac{\text{Mass}}{\text{Volume}}$

Archimedes principle states that when an object is immersed, it displaces a volume of water whose mass is equal to its upthrust.

2. If the mass of an object is greater than its upthrust it will sink.
If the mass of an object is less than its upthrust it will float.

3. Errata- question should ask: what will be the upthrust of the snorkeller? or what is the mass of the water displaced?
The snorkeller has a volume of 65 litres, and would have a mass of 65 kg if s/he is neutrally buoyant; less if positively buoyant.

4. Density = $\frac{\text{Mass (kg)}}{\text{Volume (L)}}$
= $\frac{4 \text{ (kg)}}{0.3 \text{ (L)}}$ (Note: Volume converted to L: 300mL/1000)
= 13.33 kg/L

5. Density = $\frac{\text{Mass (kg)}}{\text{Volume (L)}}$ therefore:
Mass = Density x Volume
= 10 (kg/L) x 0.5 (L)
= 5.0 kg

6. a. **Calculate the upthrust**
Volume of object = 75 L
Mass H₂O displaced = 75 L x 1 kg/L
= 75 kg (Upthrust)

Calculate the Apparent mass

Apparent mass = Mass in Air - Upthrust
= 150 kg - 75 kg
= +75kg

- b. **Apply the rule**
Mass in air = 150 kg, upthrust = 75 kg
The object will sink.

7. a. **Calculate the upthrust**
Volume of diver = 80 L
Mass H₂O displaced = 80 L x 1 kg/L
= 80 kg (Upthrust)

Calculate the Apparent mass

Apparent mass = Mass in Air - Upthrust
= 75 kg - 80 kg
= -5kg

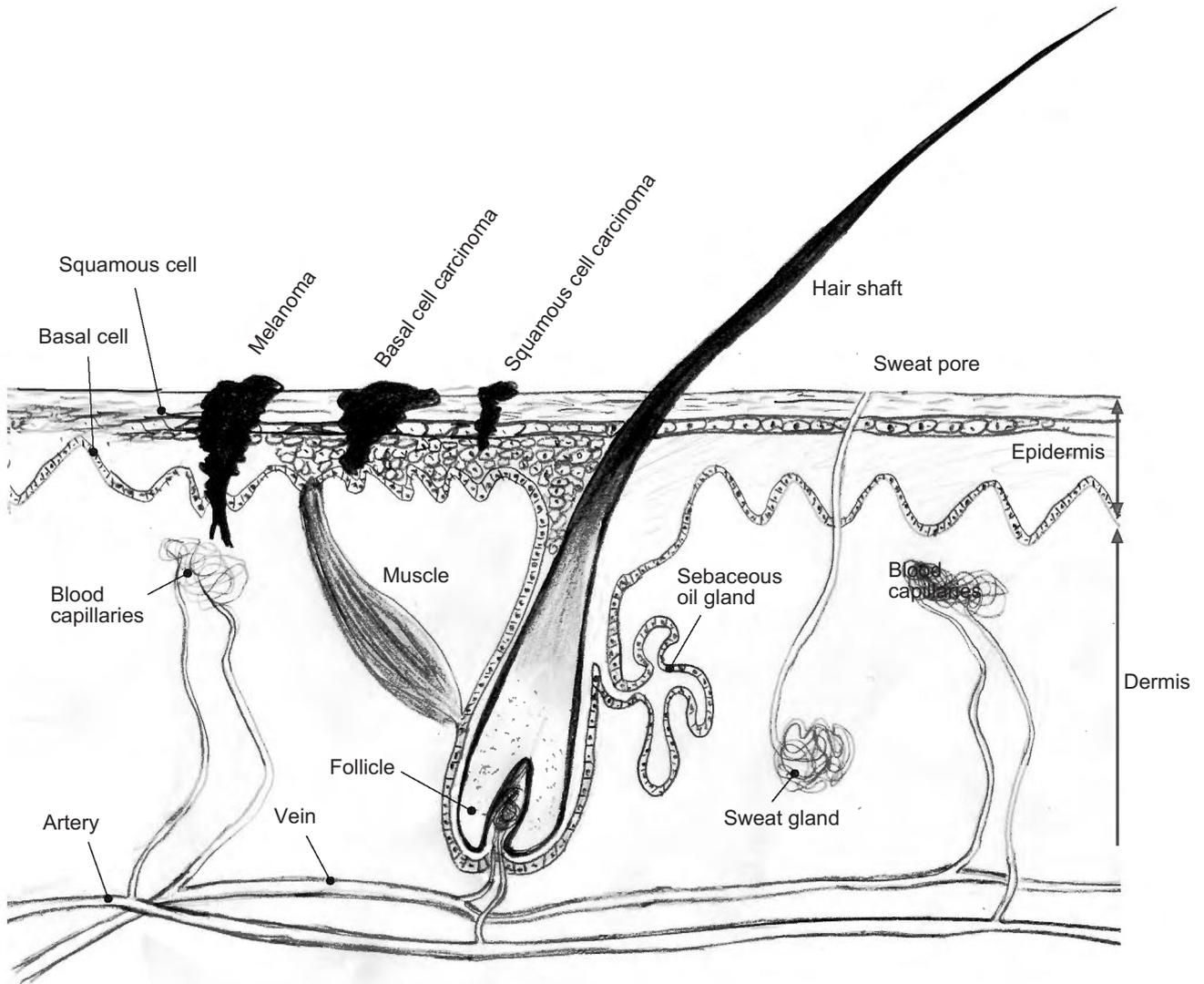
- b. **Apply the rule**
Mass in air = 75 kg, upthrust = 80 kg
The diver will float.

- c. **Add weights equal to the apparent mass.** Put 5 kg of weights on the diver, and s/he should be neutrally buoyant.

8. Positive buoyancy is when the upthrust is greater than the mass of the object: the object will float.
Negative buoyancy is when the upthrust is less than the mass of the object: the object will sink.

Worksheet 10: Skin cancer

- Students own answers. The important point is that melanomas are the most dangerous and that a skin check for Queenslanders is an absolute necessity.



Worksheet 11: Equipment use

Q1. Equipment used in the local area in summer includes:

- mask, snorkel, fins
 - booties, stinger suit or rash vest or sun shirt
 - thin wetsuit, snorkelling vest
 - weight belt, diver flag
 - other answers are possible.
- a. In a tropical climate in summer you would also need a stinger suit or sun shirt to protect against the sun and stingers.
- b. Near a rocky outcrop in winter you would need a wetsuit, gloves, open-heel fins with booties (so you can enter the water safely) and a dive knife.

Q2. Open heeled fins usually require booties and are more expensive, they are often of more durable construction and longer lasting. Full booted fins have a closed heel like normal shoes, are usually made out of a softer material so that booties are not required. Full booted fins are often lighter and less powerful than open heeled fins.

Q3. Problem Analysis

Cramps Could cause panic and drowning.

Blisters Could develop into infections. Marine plankton are highly resistant to antibiotics

Lose your fins. Could be swept away in current

Q4. Keeps you warm. Keeps you buoyant. Protects the skin.

Q5. Stinger suits are a hassle to wear and can tear easily, However they prevent you from being stung. If you want to safe wear one.

Q6. Characteristics of a good snorkel include (any 3):

- smooth, contoured, J-shaped
- comfortable mouthpiece
- flexible tube
- 30-40cm long
- diameter around 20mm
- brightly-coloured tip
- no valves on top
- purge valve
- no internal corrugations

Q7. A person with small lung capacity may have difficulty breathing because they may not be able to clear the larger-volume snorkel. This can cause stale air to be breathed.

Q8. A ping pong ball might block the end of the snorkel, cutting off the air supply. It must NOT be used in snorkelling.

Q9. Students own answers

Worksheet 12: Equipment care

Design procedures for the care and storage of snorkelling equipment based on the materials used in construction. Use the table below to summarise your answers.

Snorkelling piece	Materials use in construction	Procedures for care and storage
Mask & snorkel	Silicone, silitex, rubber	Wash clean with fresh water, air dry away from the sun
	tempered glass, plastic	Store in container away from heat and chemicals
		Check for insects before reuse. Apply surface spray if required
Transect squares	Plastic, wood, metal	Wash clean with fresh water, air dry away from the sun
Fins & booties	Silicone and rubber	Wash clean with fresh water, air dry away from the sun
		Store in drawers away from heat and chemicals
		Check for insects before reuse. Apply surface spray if required
Wet suit & rashies	Neoprene rubber	Wash clean with fresh water, air dry away from the sun
		Hang up with coat hanger to keep shape
Weight belt	Lead weights, nylon	Wash clean with fresh water, air dry away from the sun
	webbing, plastic or metal	Store in a box
	buckle	
Snorkelling vest	Brightly coloured	Wash clean with fresh water, air dry away from the sun
	waterproof fabric	Hang up with coat hanger to keep shape
Knife	Wood or rubber handle	Wash, dry and apply waterproof spray eg Inox
	Stainless steel blade	Store in cloth and not in scabbard
Gloves	Rubber, could be fabric or	Wash, dry and store in drawer
	cotton	
Cameras	Variety - stainless steel,	Keep away from SAND. Wash in fresh water. Open and close
	plastic	shutters if not in housing. Spotlessly clean case
Transect tapes	Plastic	Wash clean with fresh water, air dry away from the sun
		Do not roll up till dry. Store in drawer or box.
Compass	Plastic, stainless steel	Wash clean with fresh water, air dry away from the sun
		Store in drawer or box.
Underwater slates	Plastic and wood (pencil)	Wash clean with fresh water, air dry away from the sun
		Store in drawer or box.

Worksheet 13: Aquatic materials and the sea

Students own answers

Hopefully the data will show heat and chemicals cause severe deterioration of materials used in the sea.

Worksheet 14: Entry and exit

Q1. Three main things to consider:

- Respect for the sea
- Work cooperatively with your buddy
- Don't panic if you can't dive all the time

Q2. Simple tests to see how fit you are:

- Swim test – practise swimming with your buddy
- Treading water – find out how long you can tread water for

Q3. Three ways to enter the water with safety-hints:

- Backward Roll: hold mask with one hand, watch legs on gunwales, others balance boat, DO NOT practise from pool edge
- Safety Jump / Giant Stride: press mask on face with one hand, scissor kick when entering, look first
- Push Off / Submerged: simply push off from pool edge or climb down the ladder

Q4. Floating helps you become comfortable with your gear, particularly getting used to breathing through your snorkel.

Q5. When exiting a rock pool, look out for broken glass, barnacles and oysters on the rocks, waves, fishers, boaters and other dangerous animals.

Q6. Answers will vary. Possible answers listed below.

- Yes- fins should be removed if going up a ladder
No- you can use them to help you get out of the pool's edge.
- Yes- so you don't lose it- or pull down around your neck.
- Be careful with your feet (with fins on): don't whack them!
- Yes- makes exit much easier, but need to hand the weight belt to someone. Not good to lose (expensive and hard to retrieve without wearing it!) and it can break the tiles on the bottom of the pool.

Worksheet 15: Finning

- Q1.. Without fins, the snorkeller tends to kick from the knees down, using the calf muscles to raise and lower the legs.
- Q2. 'Cycling' makes your legs sore. It's better to use the larger thigh muscles.
- Q3. Arms at the side saves energy by streamlining the body

- Don't swim too fast.
- Keep warm.
- Wear a wet suit.

- Q4. Wearing a weight belt helps the snorkeller to become neutrally buoyant (if wearing a wetsuit/vest).

They keep the body down in the water.

- Q5. In the tropics - a short wetsuit or lycra stinger suit. In the temperate regions - Summer: 3mm wetsuit; Winter: 5-7mm wetsuit.

- Q6. Boating safety and the diver flag

The dive flag is the international code A flag. The flag means - I have a diver down, keep well clear at least 30 metres and pass at a slow speed.

- Q7. Example swim test - confined water

- Swim a distance of 200 metres, nonstop, any stroke.

Reason:

You may have to swim this far if you are caught in a rip and have to swim to shore

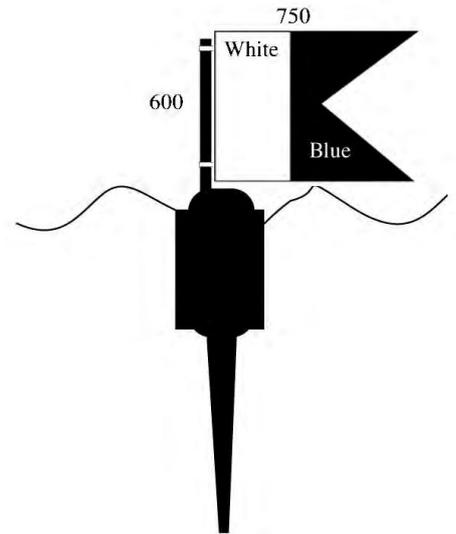
- Survival swim of 10 minutes, drownproofing or floating.

Reason:

You may have to tread water until a safety emergency is over or wait for the rescue boat to come if caught in a rip.

- Q8. Six hints

- Check out the entry point for potential dangers such as damaged or slippery surfaces.
Put your mask and snorkel on before you get in to keep your hands free.
- Make sure you can handle all your gear. If you are taking a cera make sure its securely attached to you. Losses can be expensive.
- It is best to enter via steps, with mask on the head and fins on. If you sit at the side of a platform and launch yourself in from a sitting position, make sure you don't injure your back.
- As you become experienced, its quicker to put your fins on and take them off in the water
- Watch out for others in the group as they dive. You can end up with a fin in the face if you are not careful.
- Avoid walking in fins as they may trip you. If you have to walk, walk backwards.
- Be careful of slippery edges when leaving the water.
- If you snorkel in a reef, river, creek or bay be careful of broken glass or sharp edges that will cut your hands. Gloves are a handy piece of safety equipment.



Worksheet 16: Duck diving

Q1. a. Type of dive - a duck dive

b. Student's own version of this:

Step 1 Swimming at surface

Step 2 Take a good breath and bend at the waist.

Step 3 Kick your legs into the air, allowing the weight of the legs to provide you with the momentum to force you down.

Step 4 Begin equalising immediately and continue down the dive.

Step 5 When ascending to the surface, look up, point and turn in a slow 360° movement.

c. Students' own list of problems. Common problems include:

- Pool too shallow
- Legs not lifted together
- Mask or ears squeeze
- Forget to turn on way up
- Run out of air
- Snorkel full of water

Q2. Attempt to swim around them. Find a different way to the surface if possible!

Q3. Observe the stingray carefully. Show your buddy. Be careful to keep your distance. Discuss Steve Irwin with your students.

Q4. Remove snorkel from your mouth and breathe in some air normally. Tip the water out of your mask. Replace equipment and catch up with your buddy.

Q5. You must have a buddy and in diving one stays up while the other dives because

- a. If the diver blacks out the buddy can call for help then rescue
- b. If the diver becomes stuck the buddy can cut the diver free
- c. The buddy at the surface can listen for emergency signals

Q6. Hyperventilation is taking a series of deep breaths. This reduces the amount of carbon dioxide in the lungs which delays the urge to breathe but can cause shallow water blackout. It's a dangerous thing to do.

One up / one down

Get used to the method of one up one down with the person up keeping an eye on the one down and the surrounding environment.

Worksheet 17: Clearing your mask and snorkel

- Q1. You tilt your head up so that the exhaled air will displace the water in your mask and so the water can flow out the bottom of the mask.
- Q2. Air displaces the water because the air is less dense and rises to the top.
- Q3. A purge valve is a one-way valve that lets water (and air) out, but not back in again.
- Q4. With a purge valve mask, you tilt your head forwards instead of backwards.
- Q5. Push the top of the mask towards your head, tilt head backwards and exhale steadily through your nose until all the water has come out.
- Q6. a. Spit in it
Spit in the middle of the mask and rub it around with your finger. Dunk the mask briefly in fresh water. The idea is to leave a thin film of saliva on the inside of the mask.
- b. Use baby shampoo
A few drops of watered down baby shampoo rubbed into the mask and then rinsed out just before snorkelling will again put a thin film on the mask.
- c. Use commercial defogging agents
These products are designed to coat the lens and many people find these better than spit. Make sure you keep enough agent to coat the inside of the mask.
- Q7. Make sure your snorkel has a keeper and fits comfortably.
- Extend your lips so the snorkel mouthpiece seals between your teeth and you lips.
Some call this the “Mick Jagger” look.
- Q8. When surfacing you should keep one hand up in front of you, point and look up and spin 360°. Breathe out slowly through your snorkel, keeping some air in reserve.
- Q9. To clear a snorkel with a purge valve, return to the surface then breathe out steadily and breathe in carefully.

Worksheet 18: Water safety skills (DRSABCD)

- Q1. The most important consideration before commencing resuscitation is danger to yourself.
- Q2. It is important to check the patient's airway properly to ensure it is clear of blockages such as sand, seaweed or false teeth.
- Q3. The cycle for compressions to inflations is: 30 compressions: 2 inflations.
- Q4. If more than one person is present, swap every two minutes (4 cycles).
- Q5. Delete all other answers from previous editions as they are incorrect.

1



*Check for danger
Ensure safety for yourself, bystanders and casualty. If safe, remove casualty from water as soon as possible.*

2



*Check response.
Can you hear me?
Open your eyes
What's your name?
Squeeze my hand.*

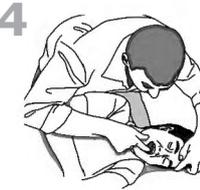
3



*Send for help NOW
call (000)
Phone for ambulance.
Remain calm while answering questions:*

Follow instructions

4



Clear airway/ If water or vomit present, roll onto side, tilt face downwards and clear mouth with fingers.

5



Check for normal breathing. Look and feel for rising and falling chest. Listen and feel for breath sounds.

6



*Start compressions.
Adults heel of hand in centre of chest. Children heel of hand. Infants two fingers. Aim for a compression rate of 100 per minute*

7



Position the airway. Adults and children tilt head back. Infants No tilt, but one hand on forehead.

8



Start breaths. Adults and children - seal nose/give 2 breaths into mouth. Infants 2 breaths to mouth and nose. Watch for chest to rise.

9



*Repeat breaths and compressions.
30 chest to 2 breaths. Continue till ambulance arrives or person regains conscious.
Aim for a compression rate of 100 per minute*

10



Attach defibrillator as soon as available. Follow the prompts. If injured person shows signs of recovery, roll onto side and check if they are breathing. Reassure the person and bystanders.

Worksheet 19: What if?

Q1. What do the letters DRSABCD stand for?

Danger, response, send for help, airways, breathing, compression, defibrillation

Q2. Someone has just been electrocuted in the Marine Studies building and is lying on the floor. What would you do?

Check for danger, cut off the power, send someone for help and call ambulance, check for vital signs, commence

ECC if necessary

Q3. What do the terms rescue breathing and ECC mean?

External cardiac compression

Q4. A student in a snorkelling class comes out of the water near you and collapses. He does not appear to be breathing but when you feel his carotid artery, you can feel a pulse. You remember where the VHF radio is located. Write down the steps you would take to attempt to revive the patient.

Still check for danger ie tentacles on the legs. Radio for help on channel 16 (use PAN PAN).

check for vital signs, commence ECC if necessary

Q5. While attempting to revive the student, his pulse stops. You can see the snorkelling supervisor. Outline how you would attempt to revive the patient and for how long you would continue this activity.

commence ECC if necessary

get oxygen and defibrillation onto patient

Q6. Two friends arrive and offer assistance. They know nothing of first aid. Outline the instructions you would give them to continue to revive the patient.

Get them to help with compressions swapping every 1-2 minutes

Aim for a compression rate of 100 per minute

Q7. One of the students becomes traumatised and faints. What you should do?

Monitor the casualty's breathing and pulse regularly. If the casualty becomes unconscious

place them in the lateral position.

Reassure the casualty

Raise the casualty's legs above the level of the heart (unless they are fractured)

Q8. What could be some symptoms that this unconscious student would show?

Pale appearance. Cold clammy skin.

Altered breathing - rapid and shallow

Rapid, weak pulse. Faintness.

Nausea/vomiting. Shaking and trembling

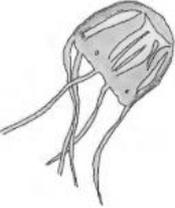
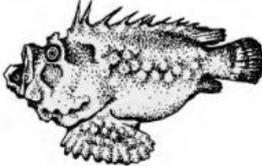
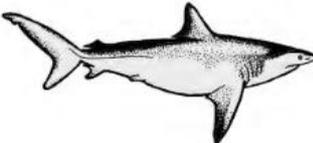
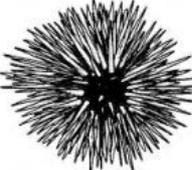
Q9. The next day you decide to do a St. John's First Aid course. Use your laptop to research the following.

- What is the telephone number and address of St. John's Ambulance in your State? Is the course recognised and accredited?
 - You want to advise the parents of the child where to do a Royal Life Saving Society rescue course when their baby grows up. What is the address and telephone number in your State?
 - You also decide to get a surf bronze certificate. How could you go about doing this?
-

Students own answers

Worksheet 20: Dangerous creature ID

Identify the following marine creatures, suggest where they may live, when they are dangerous and assess risk while open water snorkelling. (See Page 66, Fig 66.1)

 <p><u>Blue ringer octopus</u> <u>Lives in crevices but may be</u> <u>free swimming near the bottom</u> <u>Flashes blue rings on tentacles</u> <u>when dangerous</u> <u>RISK: VERY HIGH</u></p>	 <p><u>Bristle worm</u> <u>Lives in crevices and under rocks</u> <u>Bristles may come off in fingers</u> <u>Dangerous if picked up and spines end</u> <u>up in eyes</u> <u>RISK: Low</u></p>
 <p><u>Cone shell</u> <u>Lives in reefpools</u> <u>that can be exposed at low tide</u> <u>Dangerous if picked up</u> <u>RISK: VERY HIGH</u></p>	 <p><u>Box jelly</u> <u>Found only in the tropical waters</u> <u>of Australia's far northern</u> <u>beaches between December and</u> <u>March</u> <u>RISK: VERY HIGH</u></p>
 <p><u>Irukandji</u> <u>Found in coastal waters in</u> <u>Northern Australia</u> <u>Free swimming poses danger</u> <u>RISK: VERY HIGH</u></p>	 <p><u>Stone fish</u> <u>In reefs and rock pools</u> <u>Spines penetrate skin</u> <u>RISK: VERY HIGH</u></p>
 <p><u>Shark</u> <u>Found in open waters</u> <u>Fins down means</u> <u>agressive</u> <u>RISK: HIGH</u></p>	 <p><u>Fire weed</u> <u>Lives in crevices and on rocks</u> <u>Dangerous if brushed against</u> <u>RISK: MEDIUM RISK</u></p>
 <p><u>Scorpion fish</u> <u>Free swimming</u> <u>Dangerous if handled</u> <u>Spines are deadly</u> <u>RISK: VERY HIGH</u></p>	 <p><u>Sea jelly</u> <u>Free swimming</u> <u>Tentacles sting when bushed up</u> <u>against</u> <u>RISK: MEDIUM RISK</u></p>
 <p><u>Sea urchin</u> <u>Lives in rock pools crevices</u> <u>Spines can penetrate foot</u> <u>Causes much pain maybe infection</u> <u>RISK: MEDIUM RISK</u></p>	 <p><u>Stingray</u> <u>Lives nearshore in sand</u> <u>Dangerous if trod on</u> <u>Spines can be fatal if very unlucky</u> <u>RISK: HIGH</u></p>

Worksheet 21: Snorkelling first aid

Q1. Steps necessary to control shock are:

- Monitor breathing and pulse
- Place in recovery/ lateral position if unconscious
- Reassure the casualty
- Raise legs above heart
- Apply splints for fractures
- Dress wounds or burns
- Keep the casualty warm
- Give no food or drink

Q2. Steps to control bleeding are:

- Get victim out of the water
- Ring for an ambulance
- Put gloves on to avoid contact with blood
- Use pressure to stop bleeding
- Elevate the bleeding area
- Rest the patient and treat for shock
- Clear the area of skin around the laceration and apply a dressing
- Check tetanus injection records

Q3. Symptoms of hypothermia include:

- Intense shivering
- Numbness
- Apathy and decreasing levels of consciousness

Treatment includes:

- Remove patient from the elements into shelter
- Remove wet clothing
- Warm patient gradually
- Encourage patient to drink warm liquids
- Continue monitoring patient
- Seek medical help.

Q4. Call 000 (or 112) for an ambulance, use the pressure-immobilisation technique, and have the patient taken immediately to the emergency department of the nearest hospital.

*Use hot water for a stonefish envenomation.

Q5. The new technique for a bluebottle stings in non tropical waters is to use hot water and not ice. Use vinegar for all stings in tropical waters (Check latest with SLSA)

Q6. A patient stung by a box jellyfish will have a box jellyfish stuck to them and be screaming in pain. Flood the area with vinegar, remove tentacles carefully and seek urgent medical attention (for anti-venom).

Q7. Irukandji (spelling error in question, 3rd Edition) are small members of the box jellyfish family. Treatment is to flood area with vinegar and seek medical attention immediately for pain relief. The onset of pain is delayed, but the effects are potentially deadly.

Q8. Place the effected area in hot water and seek medical assistance immediately.

Q9. Cuts should be washed and cleaned of foreign materials, antiseptic applied and dressed. Spines need to be removed with a needle or razorblade, or see a doctor.

Worksheet 22: Reducing snorkelling risks

Hazard	Control measure/s and justification (suggestions)
Weather	Eliminate - don't go
Surface conditions	Issue instructions, buoyancy vests
Waves	Use mermaid lines, swim as a group
Sun	Issue instructions- Wear protective gear, sunscreen
Wind and rain	Issue instructions- Wear protective gear, sunscreen
	Eliminate - cancel if too dangerous
Turbidity	Use mermaid lines, swim as a group
	Eliminate - don't dive
Temperature	Issue instructions- Wear protective gear, sunscreen, wet suits
	Eliminate - cancel if too cold or no student has protective gear
Rips and currents	Use mermaid lines, swim as a group
	Substitute - go at a different tide
	Eliminate - cancel if too dangerous
	Use rescue boat, boards
Hazardous creatures	Eliminate - evacuate snorkellers
	Use protective gear eg issue pants hose or stinger suits
Entry and exit points	Eliminate - choose another site
	Isolate - use alternative method
	Issue instructions- Wear protective booties and gloves and wet suit
Water depth	Isolate - set depth
	Eliminate - choose shallow site
Physical exertion	Issue instructions- Wear protective gear, sunscreen, wet suits
	Warm up down
	Isolate - check for colds, ear infections set no dive rule
Vessels	Post lookouts
	Use dive flag
	Engineering - use prop guards

Worksheet 23: Safety considerations

- Q1. a. put life jacket on, tag snorkel with red tape so observer can see, advise to swim close to observer
 b. Glass bottom boat, snorkel in reef pools, channel, well supervised area
 c. administer medication 1 hr before departure
- Q2. Lifebuoy - use a rescue device, can attach line to it
 Pole with looped rope or inflated tube - reach out and pull snorkeller in
 Dive flag - COLREGS - let other boating know snorkellers in the water
 Safety boat - rescue, place for observer to sit
 Float rope and mermaid lines - security blanket for poor swimmers or panic merchants
 Marking a snorkel with coloured tape - observer able to keep an eye on poor swimmers, unsure snorkellers
 VHF radio - emergency communications
 Whistle - evacuation signal
 Snorkel manifest - determine whose missing, left behind
- Q3. For salt water aspiration, heart attack.

Worksheet 24: Emergency planning

Elements to be included

For example, your buddy surfaces with panic from a serious sting causing your excruciating pain

The buddy

- *Signals for HELP, reassures the patient, monitors vital signs.*

Snorkel supervisor

- *Sends snorkel guide for assistance.*
- *Alerts evacuation of the water by deploying an air horn, whistle and or raising a red flag.*
- *Alerts dive shop of incoming injury and possible emergency. UHF Channel 68.*
- *Prepares first aid kit and potential treatments hot water, vinegar.*

Snorkel guide (DRSABCD)

- *Assesses danger - struggling, panic.*
- *Response - swim patient to shore to meet first aid kit.*
- *Administers first aid, monitors vital signs.*
- *Commences CPR if necessary till help arrives.*

The dive shop

- *Deploys rescue craft with full medical kit.*
- *Alters airfield for possible evacuation.*

Worksheet 25: Research project risk assessment

Students own answers

This is an untried activity so feedback is welcome for future editions.

Worksheet 26: Pool science activities

Could use coloured object and object of different size to compare in and out of water.

This is an untried activity so feedback is welcome for future editions.



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