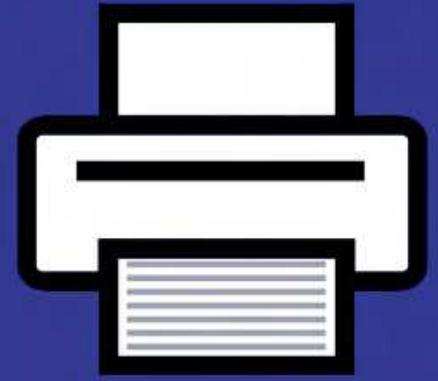


Marine Science  
For Australian Students

# Snorkelling Worksheets

## 6th Edition



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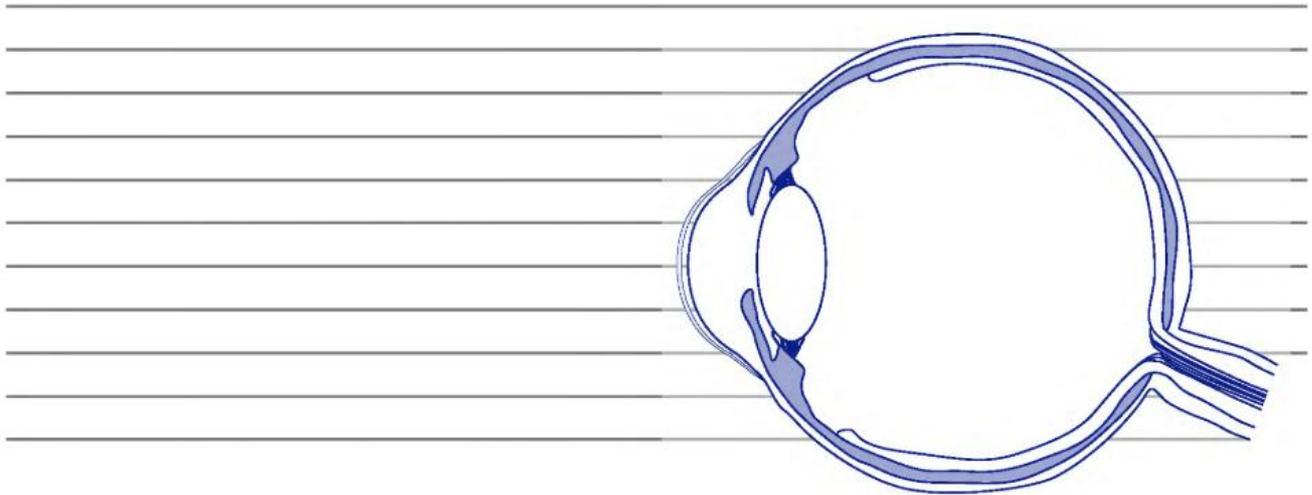
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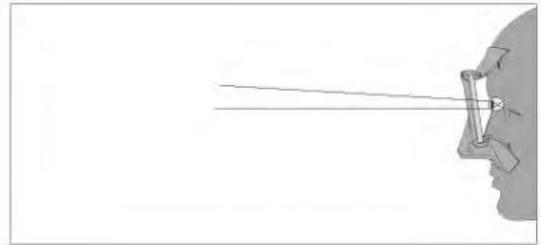
# WORKSHEET 1 SNORKELLING AND THE EYE

**Questions:**

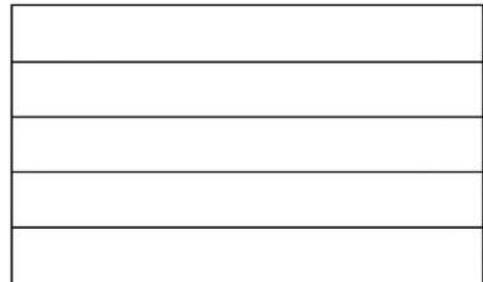
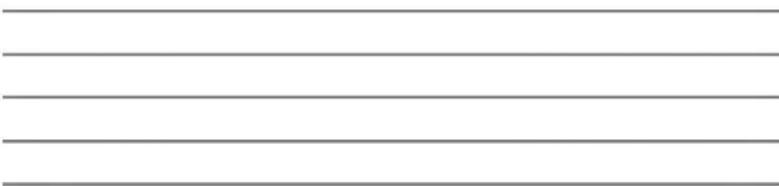
Q1. Explain how the eye functions. Complete the diagram below to illustrate your answer. (Page 3)



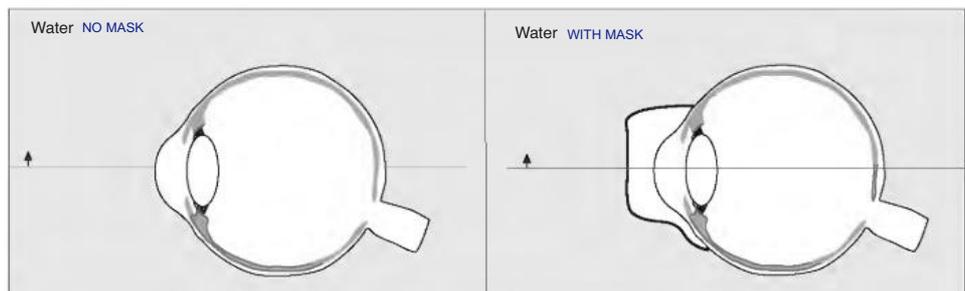
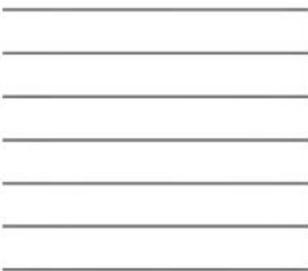
Q2. Explain why marine life appears bigger underwater when using a mask. Complete the diagram opposite to illustrate your answer. (Page 4)



Q3. Describe how the penetration of light frequencies changes with depth. Redraw Figure 6.4 to illustrate your answer. (Page 4)



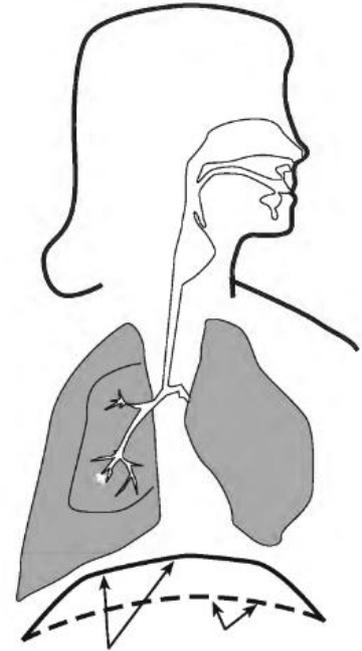
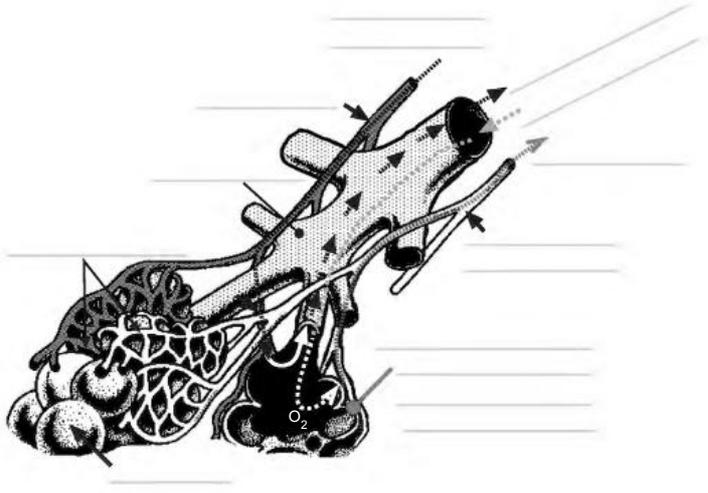
Q4. Compare how a mask focuses an image on the retina of the eye with and without a mask. Complete the diagram below to illustrate your answer. (Page 4)



# WORKSHEET 2 RESPIRATION AND SNORKELLING

## Questions

Q1. Complete the diagrams below to explain how oxygen and carbon dioxide enter and leave the body (Page 6).



Q2. Distinguish between the percentage of air we breathe as oxygen and nitrogen (Page 6).

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Q3. Explain what happens in a shallow water blackout and list two causes (Page 7).

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## Extension questions

Q1. What is hypoxic blackout and is it different to shallow water blackout? (Internet).

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Q2. Research the names for the numbers in the diagram opposite and use then use the letters to describe how the heart functions. Use red and blue colours to distinguish between oxygen rich and carbon dioxide rich blood. (Page 7).

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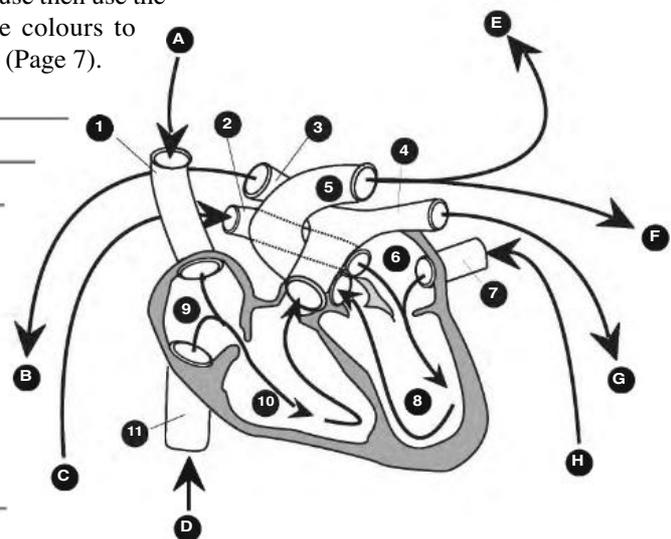
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# WORKSHEET 3 THE SINUSES

## Questions

Q1. Describe the functions of the sinuses. Complete the diagram opposite to illustrate your answer (Page 8).

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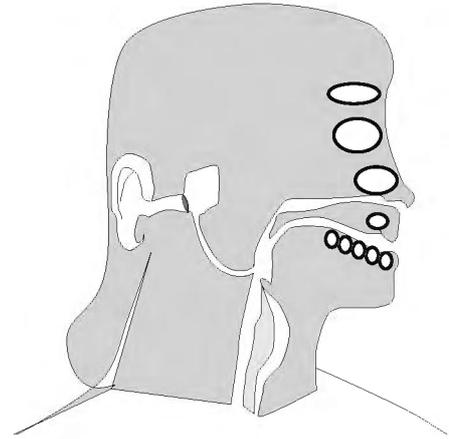
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Q2. Explain why you should never dive with a congested sinus (Page 8).

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Q3. List three health hints involving your ears and sinuses (Page 8).

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# WORKSHEET 4 CIRCULATION AND TEMPERATURE CONTROL

## Questions

Q1. Describe the function of the circulatory system as it relates to oxygen and carbon dioxide (Page 7).

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Q2. Explain how correct snorkelling techniques can maximize the function of the circulatory system (Page 8).

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Q3. Suggest one cause for cramps in the legs while snorkelling (Page 8).

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Q4. Discuss the dangers of hypothermia while snorkelling (Page 9).

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Q5. Compare the heat loss of a snorkeller in air and water (Page 8).

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Q6. Compare your life expectancy if you fell out of a boat without a wetsuit in Cairns and Tasmania. Suggest ways to improve your chances of survival (Page 9).

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# WORKSHEET 5 EFFECTS OF PRESSURE

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## Questions *(All answers on page 12)*

Q1. What is the atmospheric pressure on your lungs if you were sitting at the edge of a swimming pool?

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Q2. Calculate the pressure in your lungs if you dived to a depth of 10 metres.

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Q3. Recall the percentage concentration of oxygen and nitrogen in the air.

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Q4. Explain the term partial pressure as it relates to gases.

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Q5. At one atmosphere, recall the partial pressure of nitrogen and oxygen in your lungs.

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Q6. At 10 metres, describe how these partial pressures have changed.

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Q7. Explain how lack of carbon dioxide and oxygen can be dangerous at depth. Describe possible effects and symptoms.

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Q8. Calculate how many litres of nitrogen and oxygen there are in three litres of air.

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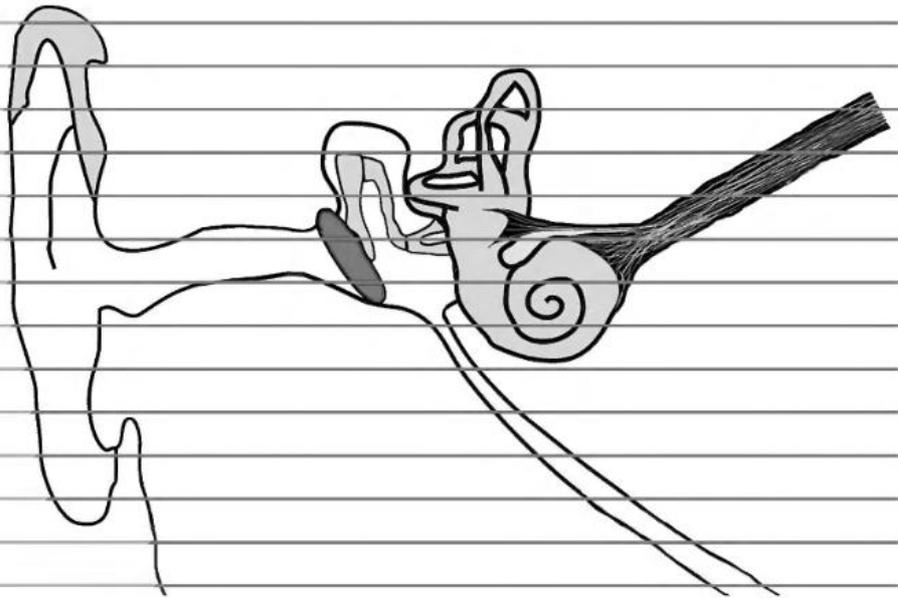
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# WORKSHEET 7 SNORKELLING AND THE EAR

## Questions

Q1. Explain how the ear functions by completing the illustration below (Page 16).



Q2. List three problems that can develop with the outer ear when swimming or snorkelling (Pages 16-18).

Q3. Argue a case for not snorkelling when you have a cold (Pages 16-18).

Q4. Evaluate the statement - *You should never use a cotton bud to dry your ears* (Page 17).

# WORKSHEET 8 PRESSURE AND SOUND

## Questions *(All answers on page 20)*

Q1. Describe the effect of pressure on the inside of the ear while snorkelling.

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Q2. Explain why clearing the ears is important as you snorkel under the water.

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Q3. Describe the Valsalva manoeuvre.

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Q4. List three other methods you can use to help equalise your ears.

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Q5. Explain how people get seasick.

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Q6. List two ways to minimise seasickness.

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Q7. Explain what an outer ear infection is and how can it be prevented.

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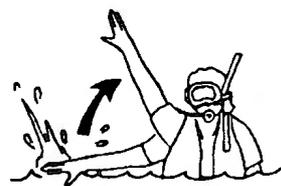
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Q8. Sound produced underwater travels greater distances and at a speed four times faster than in air. Describe what problems this causes.

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Q9. Identify the names of the following hand signals.



# WORKSHEET 9 BUOYANCY AND SNORKELLING

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## Questions *(All answers on pages 22-23)*

Q1. Recall Archimedes Principle and state the formula for calculating density.

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Q2. Explain how you would predict if a snorkeller would float or sink.

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Q3. Calculate the mass of the water displaced (upthrust) of a snorkeller if the density of water is 1 kg/L and the snorkeller displaces 65 Litres when immersed in a barrel of water.

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Q4. Calculate the density of a weight belt in Kg/L if the volume is 300 mLs and a mass of 4 Kg.

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Q5. A weight from a weight belt has a density of 10 kg/L and a volume of 500 mLs. Calculate the mass of the weight.

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Q6. An object has a volume of 75 L and a mass of 150 kg, when weighted in air.

- Estimate the apparent mass of the object when placed in water.
- Decide if it will float or sink.

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Q7. A diver has a volume of 80 litres and a mass of 75 kg, when weighed in air. Density of water = 1 kg/litre.

- Calculate the apparent mass when placed in water
- Decide if the person will float or sink giving a reason for your answer
- If the person floats, calculate how much weight will have to be added to make the snorkeller neutrally buoyant.

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Q8. Explain the difference between positive and negative buoyancy.

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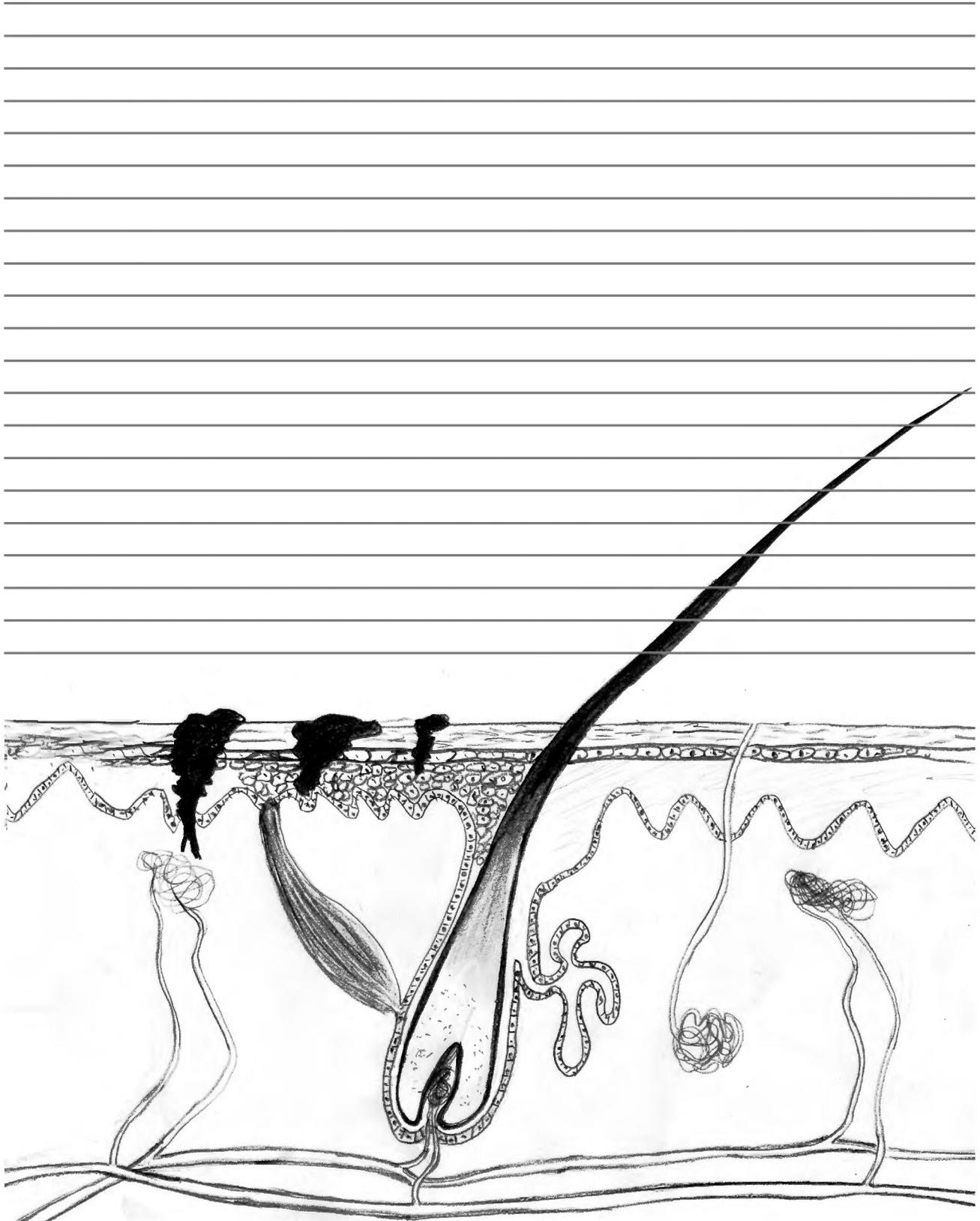
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# WORKSHEET 10 SKIN CANCER

A student researching this topic made a drawing of the skin in an attempt to show a melanoma (the most dangerous form of skin cancer), a basal cell and squamous cell carcinoma.

- Identify or correct the main parts of the skin shown (*Use web references to complete*)
- Distinguish between the three types of cancers and identify which is the most dangerous
- Outline three personal lifetime decisions you would make to prevent contracting any deadly forms of skin cancer



# WORKSHEET 11 EQUIPMENT USE

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## Questions

Q1. Compare types of equipment that would be required if you were to snorkel in a tropical climate in summer with equipment you would use around a rock outcrop in winter (Page 27).

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Q2. Evaluate the use of open heeled fins and full booted fins (Page 30).

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Q3. Analyse common problems associated with incorrect fitting fins (Page 30).

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Q4. List the advantages of wearing a wet suit (Page 31).

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Q5. Evaluate the use of stinger suits in tropical Queensland (Page 30).

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Q6. List three characteristics of a good snorkel (Pages 28-29).

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Q7. Critically evaluate one problem a person with a small lung capacity may have when using a snorkel with an oversized bore (Pages 28-29).

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Q8. Critically evaluate a snorkel with a ping pong ball in it for use in an ecotourism program (Page 29).

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Q9. You have been asked to collect data from your local area. Suggest a list of scientific equipment you would take giving reasons for your choice (Pages 34-35).

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# 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		
Transect squares		
Fins & booties		
Wet suit & rashies		
Weight belt		
Snorkelling vest		
Knife		
Gloves		
Cameras		
Transect tapes		
Compass		
Underwater slates		

# WORKSHEET 13 AQUATIC MATERIALS AND THE SEA

## Environmental effects on equipment

Based on an original activity by Mick O'Connor

### Part A: Swimsuits and heat

#### Aim

To analyse how heat affects snorkelling suits.

#### Materials

- old swimsuit or wetshirt
- hair dryer or heat gun
- retort stand and clamp
- thermometer
- scissors

#### Method

1. Note the composition of the swimsuit.
2. Cut the clothing into 10 cm by 2 cm strips.
3. Using retort stand, hold a strip between two clamps.
4. Clamp a thermometer close to the fabric.
5. Using the hair dryer or heat gun, subject the fabric to different temperatures and record your observations in a table.

#### Results

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#### Conclusions

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#### Extended response

Analyse your results so as you can prepare a warning statement that could go on the garment at a retail outlet.

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### Part B: Swimsuits and chemicals

#### Aim

To see analyse the effect of common chemicals on swimsuits.

#### Materials

- old swimsuit or wetshirt
- bleach
- petrol
- nail polish remover
- methylated spirits

#### Method

1. Note composition of swimsuit.
2. Cut the clothing into 10 cm by 2 cm strips.
3. Put one chemical on each strips.
4. Observe the results and record them in a table.

# WORKSHEET 14 ENTRY AND EXIT

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## Questions *(All answers on pages 38-39)*

Q1. List three main things to consider before snorkelling.

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Q2. Describe two simple tests to see how fit you are.

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Q3. Suggest three ways you could enter the water indicating one safety hint for each.

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Q4. Explain why floating is such a useful exercise when learning how to snorkel.

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Q5. Describe one precaution that should be taken when exiting from a rock pool.

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Q6. Discuss questions a - d below in a group on things to do when exiting from a swimming pool. Then record the group consensus answers in the space provided.

a. Should the fins be removed first and why?

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b. Should the mask and snorkel be left on and why?

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c. There are other people sitting beside the snorkeller. What precautions should be taken not to injure them?

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d. If the snorkeller is wearing a weight belt, should this be taken off before exiting? What reasons did class members give for this answer.

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# WORKSHEET 15 FINNING

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## Questions *(All answers on page 41)*

Q1. Describe the type of leg action a snorkeller tends to use when swimming without fins.

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Q2. Describe the effect on a person who cycled his/her legs while snorkelling for an hour.

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Q3. Explain how to best conserve energy while snorkelling.

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Q4. Suggest two possible reasons for wearing a weight belt.

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Q5. Predict what type of wetsuit you would recommend be worn for snorkelling in different water temperatures.

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Q6. Draw and colour in a diving flag to show its distinguishing features. State the boating rule that applies when this flag is displayed?

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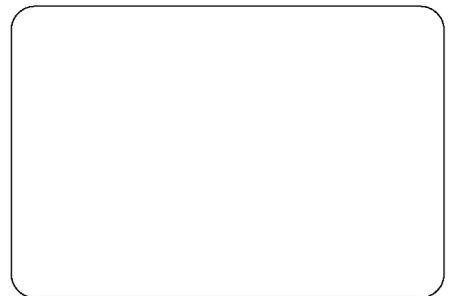
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Q7. List two things you should be able to do in a swim test. Give reasons for your answer.

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Q8. List six hints to minimise the risk of injury while entering the water.

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# WORKSHEET 17 CLEARING YOUR MASK AND SNORKEL

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## Questions *(All answers on pages 45-46)*

Q1. Explain why you tilt your head up when you clear your mask.

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Q2. As you breathe out through your nose, air displaces the water. Explain why.

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Q3. Describe what a purge valve is and what it does.

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Q4. Explain what is different about clearing a mask with a purge valve.

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Q5. Describe how to clear a mask.

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Q6. List three ways to stop your mask from fogging up.

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Q7. List two hints when using a snorkel.

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Q8. Describe two safety precautions you should adopt when surfacing.

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Q9. Explain how to clear a snorkel with a purge valve.

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# WORKSHEET 18 WATER SAFETY SKILLS (DRSABCD)

## Sending for help

- Send a runner with written or verbal instructions. If verbal, get them to repeat it back to you.
- Call triple zero
- Use a marine radio - channel 88 27mhz or 16 VHF to send a PAN PAN call.
  - you will learn more if you do a marine radio course.

Q1. Recall what is the most important thing to consider before commencing resuscitation (Page 48).

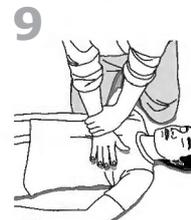
Q2. Explain why is it important to check the patient's airway properly (Page 48).

Q3. Recall the rates for compressions to inflations in a rescue situation (Page 48).

Q4. Explain how often resuscitation should be varied if more than one person is present (Page 48 and 50).

Q5. Fill in the blank spaces in the box below, to show you understand the correct steps involved in the DRSABCD plan.

(Page 49).



# WORKSHEET 19 WHAT IF?

Q1. What do the letters DRSABCD stand for? (Page 48).

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

Q3. What do the terms rescue breathing and ECC mean? (Page 50).

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.

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.

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.

Q7. One of the students becomes traumatised and faints. What you should do? (See shock treatment page over)

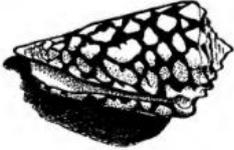
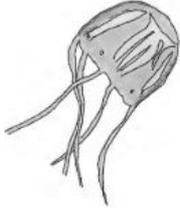
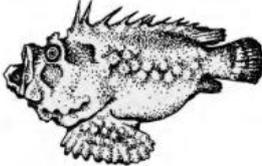
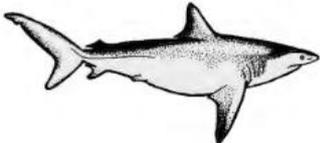
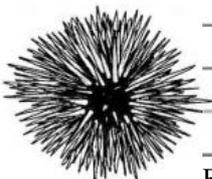
Q8. What could be some symptoms that this unconscious student would show? (Page 48).

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

- a. What is the telephone number and address of St. John's Ambulance in your State? Is the course recognised and accredited?
- b. 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?
- c. You also decide to get a surf bronze certificate. How could you go about doing this?

# WORKSHEET 20 DANGEROUS CREATURE ID

Identify the following marine creatures, suggest where they may live and assess risk while open water snorkelling. (See Page 65, Fig 65.1)

 <p>_____</p> <p>_____</p> <p>_____</p> <p>RISK: _____</p>	 <p>_____</p> <p>_____</p> <p>_____</p> <p>RISK _____</p>
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# WORKSHEET 21 SNORKELLING FIRST AID

Q1. List the steps necessary to control shock (Page 54).

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Q2. List the steps you would take to control bleeding from a 40 mm cut to the leg from a propeller (Page 55).

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Q3. Explain how to recognise if a patient was suffering from hypothermia and describe what you would do (Page 56).

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Q4. List the treatment for stonefish, blue-ringed octopus and cone shells (Page 57).

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Q5. List the steps you should take if stung by a blue bottle in Sydney. Explain how this is different from Cairns (Page 59).

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Q6. Explain how would you recognise a patient who was stung by a box jelly and describe what would you should do (Page 58).

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Q7. Describe the treatment for Irukandji syndrome (Page 58).

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Q8. Describe the treatment if you were pricked by a spine of a scorpion (lion) fish (Page 58).

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Q9. Explain the difference between the treatment of a cut and a spine (Page 60).

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# WORKSHEET 22 REDUCING SNORKELLING RISKS

## Control measure

1. Eliminate the hazard
2. Substitute the hazard with a lesser risk
3. Isolate the hazard
4. Use engineering controls
5. Use administrative controls
6. Use personal protective equipment

Describe how each of the following hazards could cause harm to a snorkeller on a school trip you are about to undertake. Then identify the type of control measure used justifying it with a short statement

<b>Hazard</b>	<b>Control measure/s and justification</b>
Weather	<i>Eg: Rough seas, high winds, cancel boat trip, snorkel in pools. Risk reduced, hazard eliminated</i>
Surface conditions	
Waves	
Sun	
Wind and rain	
Turbidity	
Temperature	
Rips and currents	
Hazardous creatures	
Entry and exit points	
Water depth	
Physical exertion	
Vessels	

# WORKSHEET 23 SAFETY CONSIDERATIONS

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Q1. Evaluate the risks of a-c occurring on a school trip and propose a simple emergency plan for consideration by your teacher.

Eg: cannot swim or have a fear of water or submerging

*Isolate - put life jacket on, tag snorkel with red tape so observer can see, advise to swim close to observer*

a. are physically challenged

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b. suffer from any fears e.g. sharks, sea snakes, etc.

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c. get seasick in small boats

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Q2. Justify your decisions to use the following pieces of rescue equipment in a snorkelling program and comment on where you would use each item and in what sort of situation.

*Eg: float. Students able to swim to, supervisor able to attach mermaid lines,*

• lifebuoy

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• pole with looped rope or inflated tube

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• dive flag

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• safety boat

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• float rope

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• mermaid line

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• marking a snorkel with coloured tape

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• VHF radio

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• whistle

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• snorkel manifest

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Q3. Why is oxygen carried onboard a vessel taking people open water snorkelling and how is it serviced?

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# WORKSHEET 24 EMERGENCY PLANNING

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Q1. Draw a map of the area you will be snorkelling and the location of emergency equipment and construct a buddy briefing for a high tide snorkel.

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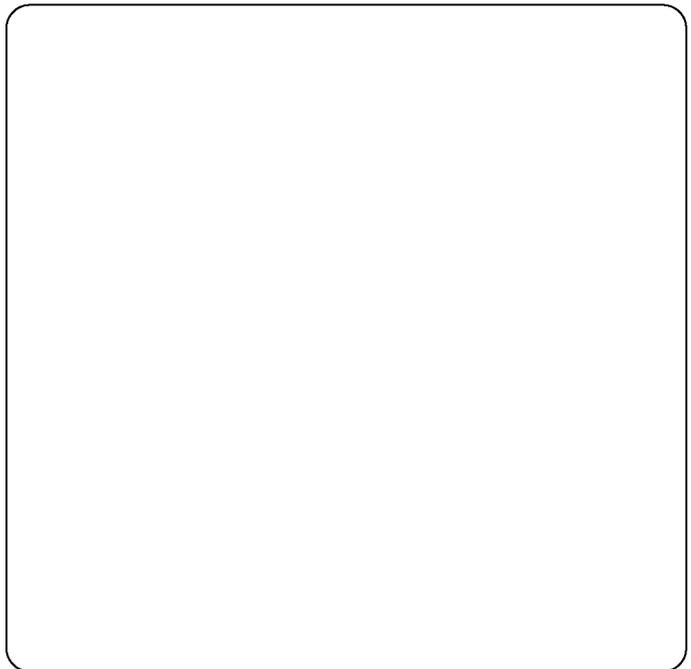
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Q2. Design emergency plans for the following situations

Eg: Rescue for your buddy who has a cramp.

*Assess danger eg it may be better just to signal for immediate help. Reassure patient. Adopt the pushing rescue position and swim patient to rescue boat or shore.*

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a. Missing persons - your buddy does not surface.

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b. Marine stings, bites, cuts and envenomations - your buddy stung by something, their is not much pain.

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c. Evacuation - you hear the emergency horn sound and your buddy has just dived down to take some photographs.

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d. You get out of the water and notice your buddy has blood streaming down her ankle.

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# WORKSHEET 26 POOL SCIENCE ACTIVITIES

Complete the following two activities and answer the questions below.

## Part A: Observe underwater creatures

(See Figure 28.1)

- Sit at the side of the pool as shown in Figure 28.1 with all your snorkelling gear on.
- Now submerge to the bottom, equalise your ears and swim towards the crate marked C
- Hold position for 5 seconds and make observations on the side of the box.
- Surface, clear snorkel and describe to your buddy your observations.

Now try this with an underwater slate.

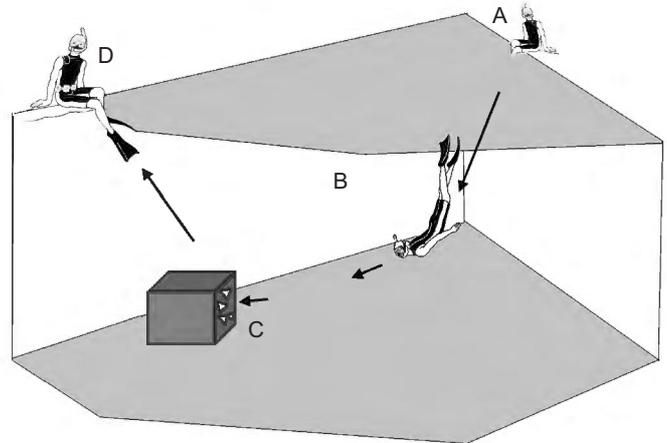


Figure 28.1 Underwater observation

## Part B: Record data along a transect line

(See Figure 28.2)

Set up a make-believe set of coral clumps at the bottom of the pool with milk crates and attach some designs to represent animals

Now set a transect line joining the crates.

- Snorkel over the crate taking making observations.
- Record data on an underwater slate.
- Take photographs of the shapes or objects on this crate
- Take a sample of rocks from under the crate and place it in a collection bag.

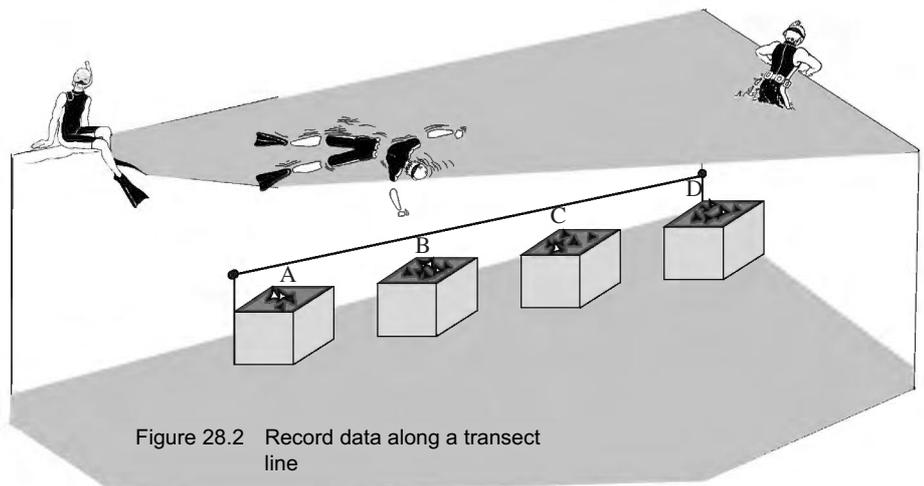


Figure 28.2 Record data along a transect line

## Part C: Underwater hockey

This is an activity which sharpens your skills and fitness.

- Google the underwater hockey association for the rules.

## Questions

Q1. Describe the things you saw and collected.

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Q2. Devise an experiment to see if size changes underwater.

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## Results

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## Medical declaration



### DOCUMENTED METHOD OF PROVIDING ADVICE ABOUT MEDICAL CONDITIONS TO PROSPECTIVE RECREATIONAL SNORKELLERS

Reference the Workplace Health and Safety Regulation 1997 Section 86I and the Compressed Air Recreational Diving and Recreational Snorkelling Code of Practice 2005 Section 2.2.2

#### Medical Declaration - recreational snorkellers

I (*print name*) \_\_\_\_\_

declare that I have been advised snorkelling can be a strenuous physical activity and may increase the health and safety risks to me if I am suffering from:

**A. Any medical conditions that may be made worse by physical exertion.**

*For example heart disease, asthma, some lung complaints*

**B. Any medical condition that can result in loss of consciousness.**

*For example some forms of epilepsy and some diabetic conditions*

**C. Asthma that can be brought on by cold water or salt water mist**

I have been advised that snorkelling can be a strenuous physical activity even in calm water and that older persons are at an increased risk of death and injury due to a higher incidence of medical conditions made worse by physical exertion, such as heart disease and stroke.

I have been advised to tell the lookout, snorkelling supervisor or snorkelling guide if I have any concerns about a medical condition.

Signature \_\_\_\_\_ Date \_\_\_\_\_

Parent's or guardian's signature for minors \_\_\_\_\_

Note: It is recommended persons with a medical condition and older persons intending to snorkel should:

**A. Snorkel in an area which allows the lookout or snorkelling supervisor to offer closer supervision.**

**B. Wear a flotation device that will support the wearer in a relaxed state.**

**C. Snorkel in a buddy pair**

#### **Example swim test - confined water**

- Swim a distance of 200 metres, nonstop, any stroke.
- Survival swim of 10 minutes, drownproofing or floating.



**Queensland Government**  
Department of Industrial Relations

# Snorkelling suggested competencies\*

This is to certify that the following student has demonstrated competencies as checked below.

Name \_\_\_\_\_ Date \_\_\_\_\_

School \_\_\_\_\_ Class \_\_\_\_\_

Teacher \_\_\_\_\_ Teacher's Initial \_\_\_\_\_

\*It is suggested you use this list to generate competencies required for you own school snorkelling trips.

## Basic skills

### Survival

Demonstrate the following swimming skills in a pool.

- Distance swim of 200 metres, non stop any stroke
- Tread water for 10 minutes, drown proofing, floating etc.
- Underwater swim of 9 metres, one breath, no push-off or dive
- Underwater swim of 18 metres, taking three breaths during swim

### Fitting a mask

Demonstrate correct methods for fitting a mask to ensure that:

- There is an adequate seal
- The strap is placed in a correct place
- The strap is adjusted correctly
- Clear vision is achieved

### Fitting a snorkel

Demonstrate correct methods for selecting and fitting a snorkel to ensure that:

- The correct snorkel is chosen for the correct lung capacity
- The snorkel is fitted correctly to the mask and on the correct side of the face

### Fitting fins

Demonstrate correct methods for selecting and fitting a pair of fins to ensure that:

- They don't fall off
- Won't cause a cramp
- Won't cause blisters

### Fitting a wet suit/stinger suit

Demonstrate correct methods for selecting and fitting a wet suit and or a stinger suit to ensure that:

- You can put it on and take it off without damaging it
- You can describe how to look after it to prevent deterioration

### Optional equipment

Demonstrate correct methods for fitting and using:

- A weight belt
- Gloves
- Knife
- Other \_\_\_\_\_

## Snorkelling skills

### Pool

#### Rescue skills

Demonstrate the following skills.

- Distance swim of 400 metres, non stop, using no hands and breathing from snorkel at least one-half the distance
- Underwater swim of 18 metres, one breath, no push-off or dive
- Underwater swim of 40 metres, taking no more than three breaths during swim and demonstrating an energy efficient finning technique
- Recover a 4.5 kg object from the bottom of the deepest part of the pool
- Transport a snorkeller of equal size 40 metres on the surface
- Rescue a snorkeller simulating unconsciousness to the surface from the deepest part of the pool
- Simulate instructions given to other rescuers and methods of transport to emergency care

#### Science skills

Demonstrate correct methods for using:

- Underwater slate
- Transect tape
- Camera
- Other \_\_\_\_\_

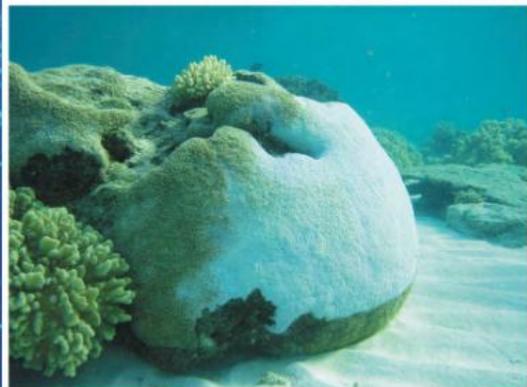
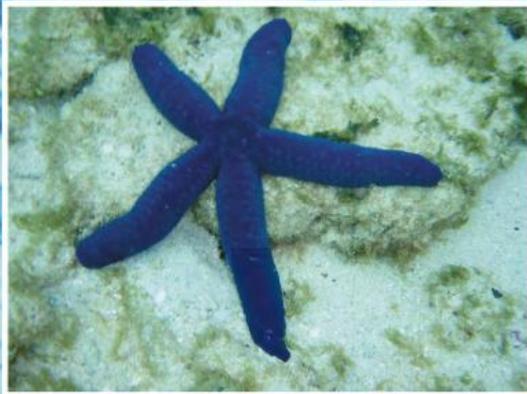
### Open water

- Assess buddy skills and group emergency plans
- Describe snorkelling plan to buddy
- Adjust weights for proper buoyancy control so as to be able to experience neutral buoyancy
- Remove and replace mask, fins weight belt (in turn) at the surface
- Surface dive, descend with deliberate control and proper ascent and surfacing techniques, including snorkel clearing
- Equalise all air spaces during descent
- Recover an object from 3 metres of water
- Demonstrate self-rescue techniques, including ditching weights and relieving simulated leg cramps
- Demonstrate safe water entry and exit, wearing snorkelling equipment from the following locations:
  - the beach
  - a water entry platform (e.g. duckboard)
  - a boat with ladder

#### Science skills

Demonstrate correct methods for using:

- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_



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