

**A5. What is climate change and how does it affect the ocean?**

**Aim**

- To interpret climate change graphs and explain how the oceans are becoming more acidic.

**What to do**

- Read page 446 of your textbook and the page opposite to answer the questions below.

**Questions**

Q1. Write a definition for the enhanced greenhouse effect.

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Q2. State which human actions increase greenhouse gases.

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Q3. Recall the major reason for sea level rise.

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Q4. Define the term climate change in terms of average weather.

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Q5. Recall the statement that says “warming of the climate system is unequivocal” and three justifications for it.

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Q6. Interpret the graph on Earth’s temperature 1000 - 2100 on the next page.

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Q7. Interpret the graph of future scenarios for sea level rise on the next page.

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Q8. Describe the effect of increased carbon dioxide on ocean acidity.

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Q9. Recall the change in pH units over the past 200 years.

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Q10. Summarise possible effects of ocean acidification and global warming on marine organisms and Earth ecosystems.

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Sample page

**A6. How do ocean currents form?**

**Aim**

- To describe how the Sun and Earth's rotation causes currents.

**What to do**

- Read pages 59 - 62 of your textbook and the page opposite to answer the questions below.

**Questions**

Q1. Explain the two effects the sun has on ocean currents.

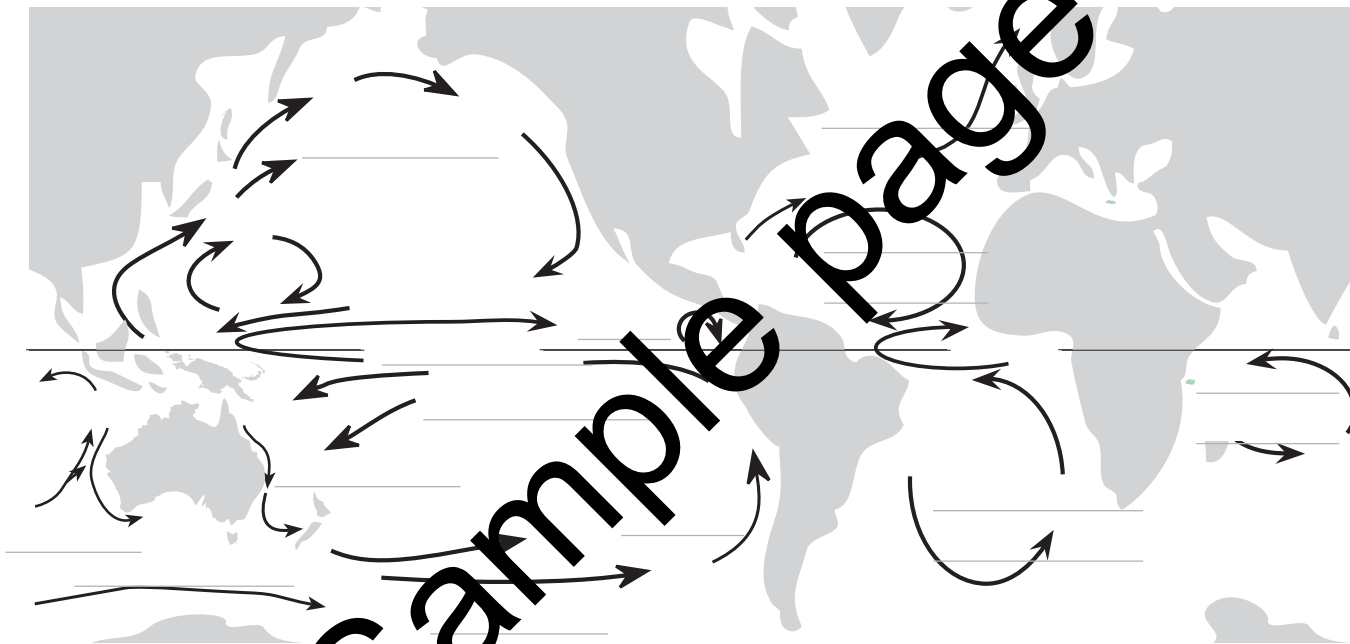
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Q2. Complete the map of the world below marking in the Pacific, Atlantic and Indian Oceans and identifying the following currents - *North Pacific, El Niño, Leeuwin, Antarctica, West wind drift, Humbolt, East Australian, Gulf Stream, Equatorial, North Equatorial, South Equatorial, South Atlantic.*



Q3. Explain how thermohaline circulation occurs, state what it controls and explain what it is responsible for.

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Q4. Define the term geostrophic current and explain their significance for Australia.

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Q5. Describe how the Earth's rotation can cause currents to move.

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Q6. Define the term Coriolis force.

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### A9. What is so special about the EAC?

#### Aim

- To describe features of the East Australian Current.

#### What to do

- Read pages 64 - 65 of your textbook, and answer the questions below.

#### Questions

- Q1. Name the person who discovered the East Australian current and explain how it was discovered.

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- Q2. Explain what instruments were used by the CSIRO Marine Division to discover that the current does not flow in one direction.

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- Q3. Name and describe the circulating bodies of water off the East Australian coast.

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- Q4. Explain why the Coral Sea is almost a metre higher than Bass Strait.

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- Q5. State where upwellings occur in the EAC and how they help the fishing industry.

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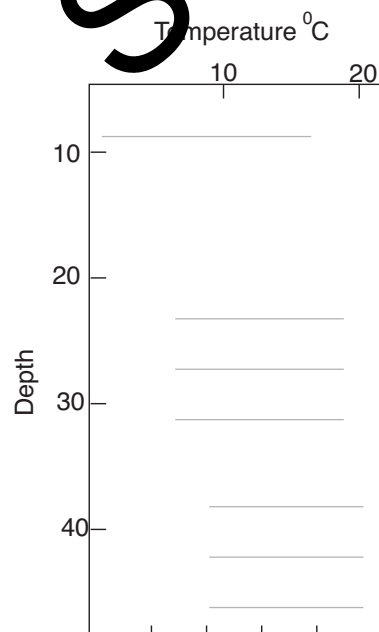
- Q6. State temperature and colour differences in these upwelling areas.

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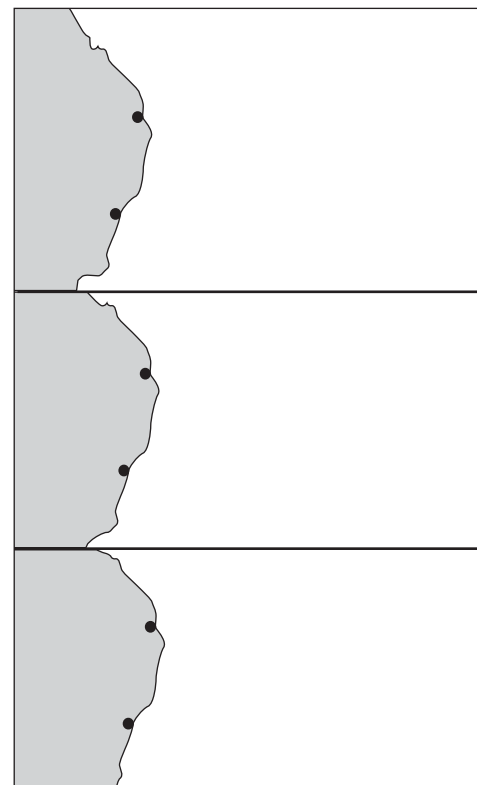
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- Q7. Use the following definition to complete the illustration below.

*A thermocline is a layer within a body of water or air where the temperature changes rapidly with depth.*



- Q8. Complete the following diagram to show how and where an eddy forms in the EAC.



#### Extension

In the film - *Finding Nemo*, Marlin took three weeks to get to Sydney in the EAC. Calculate the average speed of the current based on this information.

Sample page

**B8. How does sand get onto a beach?**

**Aim**

- To explain how sand gets onto a beach.

**What to do**

- Read page 95 - 96 of your textbook and answer the questions below.

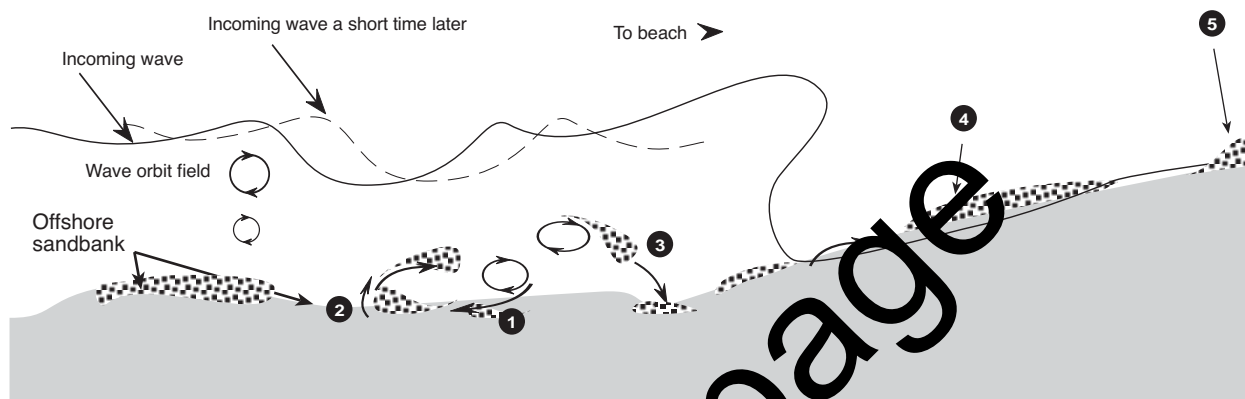
**Questions**

Q1. Define the term wave bore.

\_\_\_\_\_

Q2. Define the term microridge.

\_\_\_\_\_



Q3. Describe what is happening in the diagram above by writing a sentence after each number.

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_

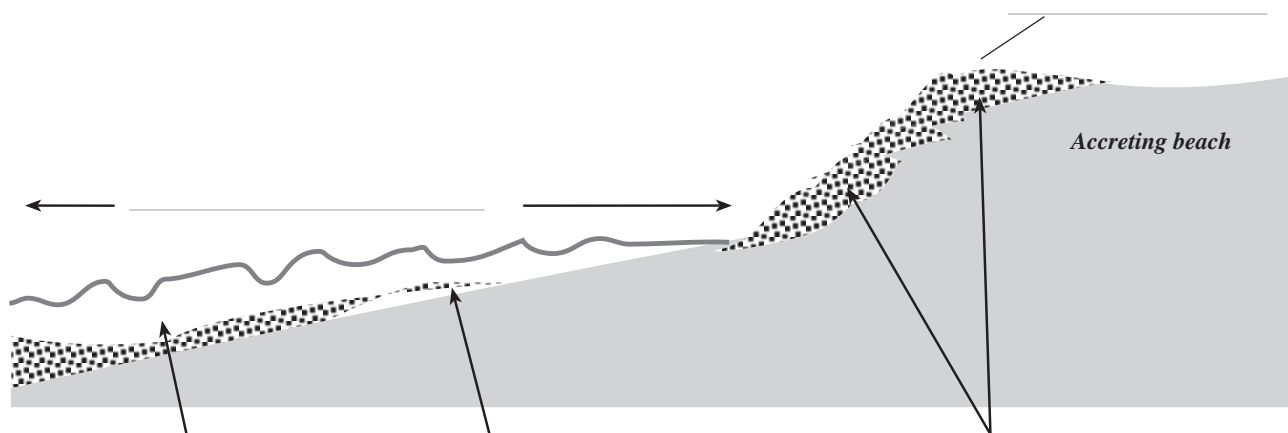
Q4. Define the term beach berm.

\_\_\_\_\_

Q5. Define the term accreting beach.

\_\_\_\_\_

Q6. Complete the diagram below to illustrate your answers to Questions 4 and 5 above.



\_\_\_\_\_

**B9. What are sand dunes and how are they made?**

**\*Note:**

If you are using the 2003 or 2005 editions of *Marine Science*, you will have to google an answer for Q5.

**Aim**

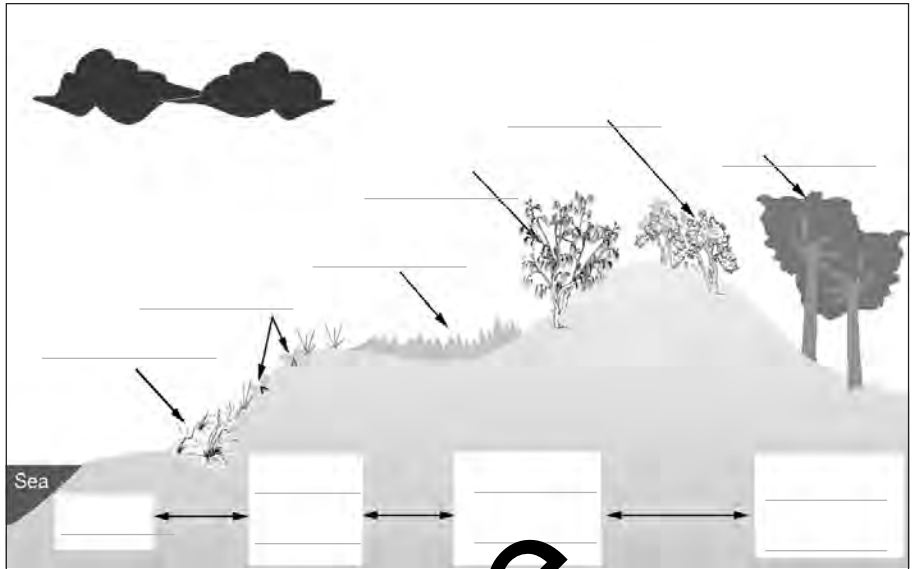
- To describe how sand dunes are formed.

**What to do**

- Read\* pages 92, 94 and 95 of your textbook and answer the questions below.

**Questions**

- Q1. Use Figure 96.4 in your textbook to label the figure opposite.
- Q2. Name the type of waves that deposit sand on the beach.
- Q3. Locate the missing words in the sentences below from your textbook.



Where beach sand is moving onshore an \_\_\_\_\_ beach is said to occur.

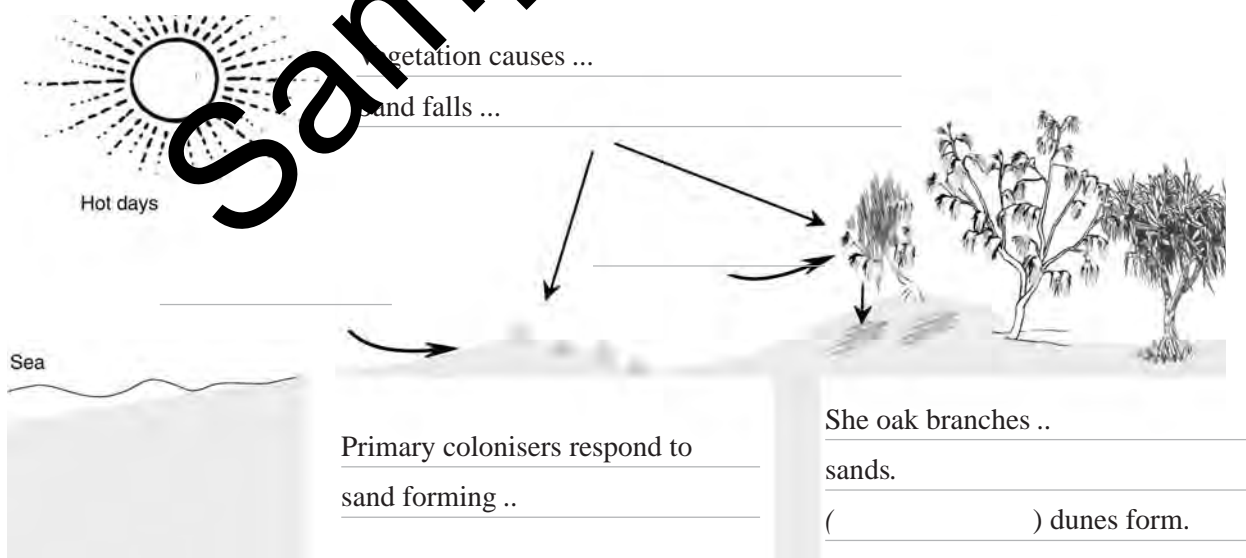
On hot, sunny, windy onshore days the sand in the berm is quickly blown up the beach.

Spindle-like plants called \_\_\_\_\_ slow the wind carrying the sand which deposits at the base of the dune plant.

This forms the structure called a \_\_\_\_\_ dune .

If the wind is strong enough, the sand continues over the primary dune where it \_\_\_\_\_ under the branches of vegetation a second set of dunes called a \_\_\_\_\_ dune.

- Q4. Summarise your understanding of sand dune formation by completing the figure below.



- Q5. Explain the terms ecological succession and climax community used to describe a dune system.

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**C3. Can we make and establish a test for seawater?**

**Aim**

To make a series of seawater samples and determine a test for salinity.

**What to do**

**Part A**

- Read pages 136 - 137 of your textbook and answer the questions below.

**Questions**

Q1. Define the terms PPM and g/L.

\_\_\_\_\_

\_\_\_\_\_

Q2. Suppose your group is required to make up 200 mLs of salt solution containing 35 g/L. Calculate how much salt you should weigh out.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Q3. Complete the table above for the entire task.

Q4. Define the term titration.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Q5. Describe what happens at the end point.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Q6. Name the solutions used in this experiment.

\_\_\_\_\_

\_\_\_\_\_

Q7. Describe how they will be used to determine end point. Copy the illustrations from page 135 of your textbook to illustrate your answer.

\_\_\_\_\_

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\_\_\_\_\_

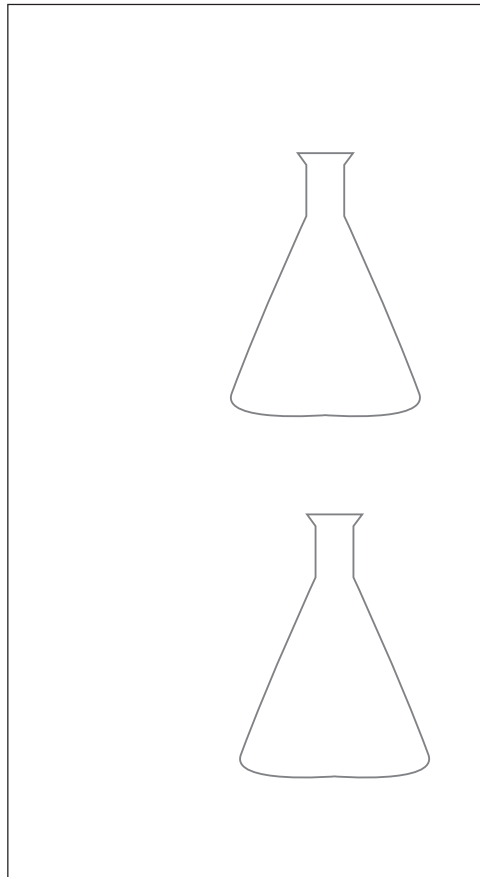
\_\_\_\_\_

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\_\_\_\_\_

\_\_\_\_\_

Sample	Weight of salt (g/L)	Weight of salt (g/200mL)	Concentration
1	5		5 000 ppm
2	10		
3	15		15 000 ppm
4	20		20 000 ppm
5			25 000 ppm
6	30		
7	35		35 000 ppm
8			40 000 ppm



Sample page

## C7. What are some of our seas contaminated with?

Based on an original exercise by Tim Ryan, Maryborough State High School. Acknowledgement is given to the Australian Fisheries Management Authority for permission to reproduce the article from Australian Fisheries.

### Aim

To describe some effects of heavy metal pollution.

### What to do

- Read the information on the page opposite and answer the questions below.

### Article update

Check out the annual report on Australia's heavy metal pollution at <http://www.environment.gov.au>

### Questions

Q1. Suggest eight sources of contamination in St Vincent Gulf.

Q2. To determine an estimate of the trace elements in St Vincent Gulf by water analysis was labour intensive and time consuming. Give a reason why and how the levels of contamination were determined.

Q3. Name the types of organisms that were examined in this study.

Q4. Recall which metal trace elements were investigated.

Q5. Recall what the letters NHMRC stand for.

Q6. In which tissue of the fish were the highest levels of zinc found? Suggest an explanation for the results.

Q7. Tabulate the NHMRC recommended levels of lead in fish, zinc in molluscs and copper in crustaceans.



Q8. Decide if any of the levels of trace elements found in the examples exceed the maximum recommended concentrations of the NHMRC and give an example.

Q9. Calculate the weight of copper found in a sample of 3 kg (dry weight) of fish muscle.

Q10. Calculate the expected range of weight of zinc found in 10 kg of living mollusc muscle.

Q11. Compare the trace metal value found in St Vincent Gulf with Cockburn Sound (WA). Determine if any of the levels at Cockburn Sound (WA) are above NHMRC recommended levels.

Q12. Would you expect trace metal levels to increase in organisms as you go up the food chain? Explain your answer. Did this occur at St. Vincent Gulf in all cases? If not, suggest a possible reason for this observation.





## 2013 Qld Marine Science syllabus match

### *Wet Paper Oceanography Exercise book*

### *Wet Paper Marine Biology Exercise book*



PART A OCEANOGRAPHY		
Activities and exercises (Could be sorted year 11 and 12)	Marine Science book page references	Proposed Syllabus Match
OA1. What does the topography of the ocean look like?	P07-11	OC1.1
OA2. What part of the world oceans does Australia own?	P12-13, 22	OC1.6
OA3. What major geological movements have occurred in Australia?	P16-22	OC1.1
OA4. What happened in ice age Australia?	P23-25	OC1.1
OA5. What is climate change and how does it affect the ocean?	P 446	OC3.4
OA6. How do ocean currents form?	P59-62	OC2.2
OA7. How does the El Niño current affect thermoclines in the sea?	P63-64	OC2.2
OA8. What effect does El Niño cause?	P63-64	OC2.2
OA9. What is so special about the EAC?	P64-65	OC2.2
OA10. What is so special about the Leeuwin current?	P66-67, MSc P66-67	MB3.2, MB 3.4
OA11. When do Australian ocean sea temperatures change?	P77	OC3.1
OA12. How is marine life in Australia governed by ocean temperature?	P210-218, 490	MB3.2, MB 3.4
OA13. What causes Tsunamis?	P52	OC1.1
OB1. What are some characteristics of waves?	P39-43, P39-42, P 95	OC1.5, OC3.2
OB2. How fast do waves travel?	P39-40, P39-40	OC1.1, OC 3.1
OB3. How does weather affect waves?	73-74, M73-74	OC3.1, OC3.2
OB4. What happens when currents approach a shore?	69-71	OC2.6
OB5. How is sand made and transported in a coastal system?	69-71	OC2.6
OB6. Why do tides change over the month?	NA (All information in exercise)	OC2.5
OB7. What happens to waves as they approach a beach?	P41 and P75, 41 and P 75	OC1.5, OC2.6
OB8. How does sand get onto a beach?	P95-96	OC1.5
OB9. What are sand dunes and how are they made?	92-95	OC1.5
OB10. Can we classify sand grain sizes found on a beach?	P89-91	OC1.5, OC2.1, MS2.6
OB11. Can we determine the percentage composition beach sand	100-103	MS2.6
OB12. How do you draw a beach profile?	99-103	MS2.6
OB13. How do the dune cycles occur?	P97-98	OC2.1
OC2. How much salt is in seawater?	131-139	OC2.3
OC3. Can we make and establish a test for seawater?	136-137	OC2.3
Questions Chapters 1-6 Marine Science		Separate table under construction

**PART B MARINE BIOLOGY**

Activities and exercises (Could be sorted year 11 and 12)

Marine Science book page references

Proposed Syllabus Match

MBA1. What do mangroves look like?	259-261	MB1.5
MBA2. Which animals use mangroves for shelter?	264	MB3.2
MBA3. How do mangroves grow?	414	MB2.4
MBA4. How do mangroves reproduce?	262-263	MB3.4
MBA5. Which animals use seagrasses for shelter?	256-259	MB3.2
MBA6. Where do mangroves and seagrasses live?	238	OC1.4, OC1.3
MBA7. What is a marine habitat?	218	MB1.2, MB3.2
MBA8. What lives in estuarine habitats?	214-215	MB3.2
MBA9. How do mangroves overcome salt and lack of air?	260-262	MB2.4
MBA10. How can we identify mangroves?	NA	MB1.6
MBA11. What other links are there between the sea and mangroves?	315	MB3.5
MBA12. What is the life cycle of a prawn?	315	MB3.4
MBA13. How can I get fish poisoning?	234-235	MB3.6
MBA14. Why are mangroves and seagrasses important	256-259	MB1.1
MBB1. What do sand dune plants look like?	NA	MB1.1
MBB2. What are sand dunes and how are they formed?		MB3.6
MBB3. Can a model be made to show where coral reef organisms live?	104-105	OC1.1, MB 3.2
MBB4. What do coral reefs look like and how are they formed?		OC1.1
MBB5. What are copepods?		MB1.1
MBB6. What do phytoplankton do in the photic zone?	233-237	MB1.1
MBB7. What lives in the intertidal zone of an exposed shore?	220-223	MB1.1, MB3.2
MBB8. What is a red tide?	231-232, 419	MB1.1
MBB9. Can we grow plankton in the lab?		MB2.1
MBB10. How do corals feed and reproduce?	275-284	MB3.4
MBB11. What is coral bleaching?	235, 283-286	OC3.3
MBB12. How do molluscs feed, breathe* and kill?	289-298	MB3.3
MBB13. What's so unusual about spiky skinned animals?	319-322	MB2.4
MBB14. Some answers to whale questions asked by tourists?	378-381	CS2.6
MBB15. How do turtles feed and reproduce?	356-358	MB3.4
MBB16. Why are sea birds significant?		MB1.1, MB3.2
MBB17. How do sharks move	330-332	MB2.3, MB2.4
MBC1. What lives in the tree of marine life?	207	MB1.3, MB1.4
MBC2. How are sharks and rays classified?	202-205	MB1.3, MB1.4
MBC3. Why do we need a system to classify marine life?	193-196	MB1.3, MB1.4
MBC4. What is the definition of a species?	197-198	MB1.4
MBC5. How are new species discovered?	200-201	MB1.4
MBC6. How are identification keys made and used?	202-203, 275	MB1.6
MBC7. What structural characteristics separate out the Marine phyla? '	CHS11-14	MB1.4
MBD1. Why do we study the biotic and abiotic environments?	385-389	MB3.1
MBD2. How do sea birds survive?	360-371	MB2.4
MBD3. How do animals use structural adaptations to survive?	394-397	MB2.3, 2.4, 2.5
MBD4. How do animals use physiological adaptations to survive?	398-400	MB2.4, 2.5
MBD5. How do animals in the intertidal zone survive and reproduce?	308-318	MB3.2, 3.4
MBD6. How do animals use behavioural adaptations?	400-403	MB2.4
MBD7. How do sharks navigate and locate their prey?	334-332	MB2.5
MBD8. How do abiotic and biotic factors affect life on a rocky shore?	390-393	MB3.1
MBD9. The difference between producers, scavengers and predators?	405	MB3.3
MBD10. What is the difference between a food chain and a food web?	414-416	MB3.3

MBD11. What are three types of symbiotic relationships?	406-407	MB3.3
MBD12. The difference between an ecosystem and a community?	413	MB3.5
MBD13. What is marine biodiversity?	208-209	MB1.1, MB3.2
MBE1. External features of a bony fish	NA All info in exercise	MB1.5
MBE2. A sea mullet dissection	NA All info in exercise	MB1.5
MBE3. External features of a crayfish	NA All info in exercise	MB1.5
MBE4. What do plankton look like?	NA All info in exercise	MB1.5
MBE5. Beach or rocky shore profile	NA All info in exercise	MB2.1, 3.1
MBE6. Complete a transect	NA All info in exercise	MB2.1, 3.1
Questions Chapters 8-16 Marine Science		Separate table under construction

### PART C CONSERVATION AND SUSTAINABILITY

Activities and exercises (Could be sorted year 11 and 12)	Marine Science book page references	Proposed Syllabus Match
SELECTED Activities FROM 4.1 – 4.1	Mangroves in Focus Pages 66-123	
OB14. What happens when the dune cycle is broken?	MSc 111-119	CS1.7, CS2.1, CS2.4, CS2.7
OB15. When is beach nourishment a solution to coastal management?	MSc 111-119	OC2.1, OC2.6, CS2.7
OB16. Can we make a model to identify coastal ecosystem?	MSc 111-119	OC1.3, CS1.7, CS2.1
OB17. Can we use a template to show wave refraction?	NA (All information in exercise)	OC1.3
OC1. How much plastic pollution is there in the sea?	EXERC OB17 NA (All information in exercise)	CS2.4, CS2.6
OC5. What effect does marine pollution have on dolphins?	NA (All information in exercise)	CS1.3
OC6. Why is DDT a problem in the marine food chain?	NA (All information in exercise)	CS1.5
OC7. What are some of our seas contaminated with?	NA (All information in exercise)	CS1.5
OC8. What effect does oil have on feathers?	NA (All information in exercise)	CS1.5
OC9. What happens in an oil spill?	NA (All information in exercise)	CS3.4
OC10. What impact do acid sulphate soils have on the sea?	MSc 168-169	CS1.3, CS1.5, CS1.6, CS2.5
OC11. What effect does water quality have on the marine environment?	MSc 442-443	CS3.2
OC12. How can impacts of coastal development be minimised?	NA (All information in exercise)	CS2.6, CS 3.5
Questions Chapters 7, 17-22 Marine Science		Separate table under construction

### PART D MARINE RESEARCH SKILLS

Activities and exercises (Could be sorted year 11 and 12)	Existing Wet Paper Resource	Proposed Syllabus Match
Activities 4.1 - 4.1	Mangroves in Focus Pages 66-123	Separate table under construction
End of Chapter questions	Marine Studies 1992 Chapter 13	Separate table under construction
Worksheets 1-14	5 <sup>th</sup> Edition Snorkelling workbook	MS 1.1, 1.2, 1.3, 1.4, 1.5, 1.6, 2.4, 2.5.
Worksheets 1-15 (PLUS RESEARCH BAY EXERCISES)	2 <sup>nd</sup> Edition Navigation workbook	MS 1.1, 3.1, 3.2, 3.3, 3.4
Review questions and exercises	7 <sup>th</sup> Edition Boating Workbooks	MS 1.1, 1.2, 1.3, 1.4, 1.5, 1.6
Worksheets 1-9	2 <sup>nd</sup> Edition Marine Radio Workbook	