Part A: Oceans

A1. What does the topography of the ocean look like?

Aim

- To explain ocean topography and relate it to Australia.

What to do

- Read pages 7 - 11 of your textbook and answer the questions below.

Questions

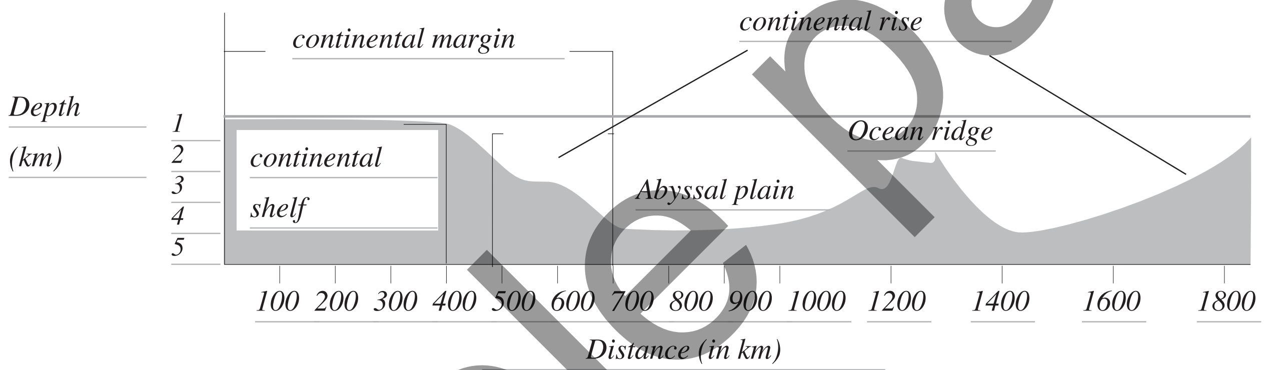
Q1. Describe how the world's oceans formed from the Earth's atmosphere.

As the new atmosphere slowly cooled, it eventually reached a temperature at which water vapour and liquid could exist at the same time. The oceans were then formed.

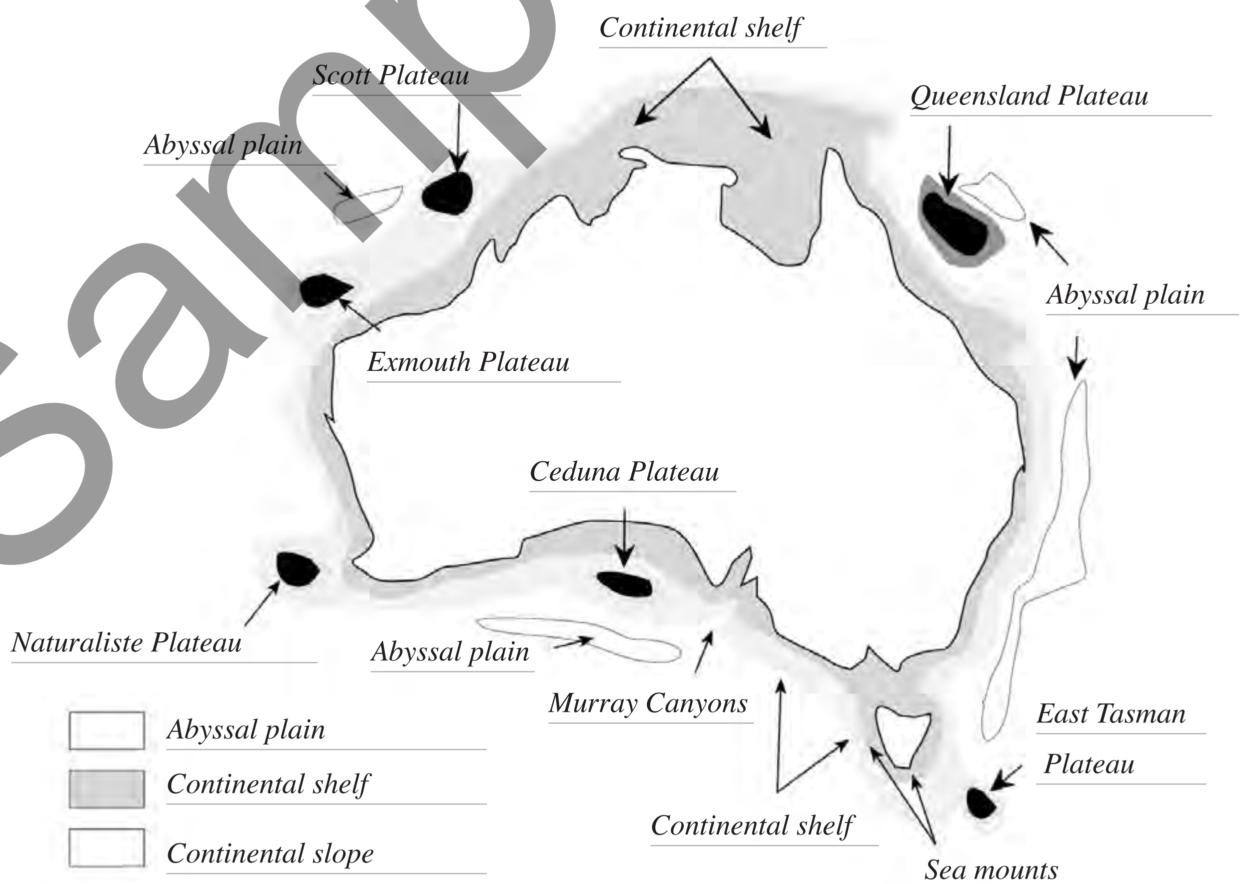
Q2. Recall the mean depth of the ocean. Compare the depth of the Mariana's Trench with the height of Mt. Everest.

The mean depth is 3118 m but the deepest part, the Mariana's Trench in the Pacific Ocean, is 11 038 m deep. This trench dips further below sea level than Mt. Everest reaches above.

Q3. Identify the main features of Figure 11.1 of your textbook by completing the illustration below.



Q4. Complete and colour in the figure below to identify the main features of Australia's continental shelf.



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2.1 Can we measure currents in the field?

Aim

- To measure currents on a beach or in a river.

What to do

- Read page 72 of your textbook and answer the questions below.

Questions

Q1. List items used to make simple field measuring equipment.

Q2. Describe how you could measure current in a river or estuary.

Q3. Complete Table 1 opposite for river/estuary data and map of your study area.

Q4. Describe how you could measure current on an open beach.

Q5. Complete Table 2 opposite for beach data and map of your study area.

Q6. Describe any other method you could use on the beach or in an estuary.

Table 1: River or estuary results

Description of what happened

Data and calculations

Questions

Q1. Estimate the speed of the current.

Q2. Identify the current direction.

Q3. Explain what caused this current.

Q4. Decide if these currents will change during the day and if so propose an explanation.

Map of study area

Show direction of current flow and main features

Table 2: Beach results

Questions

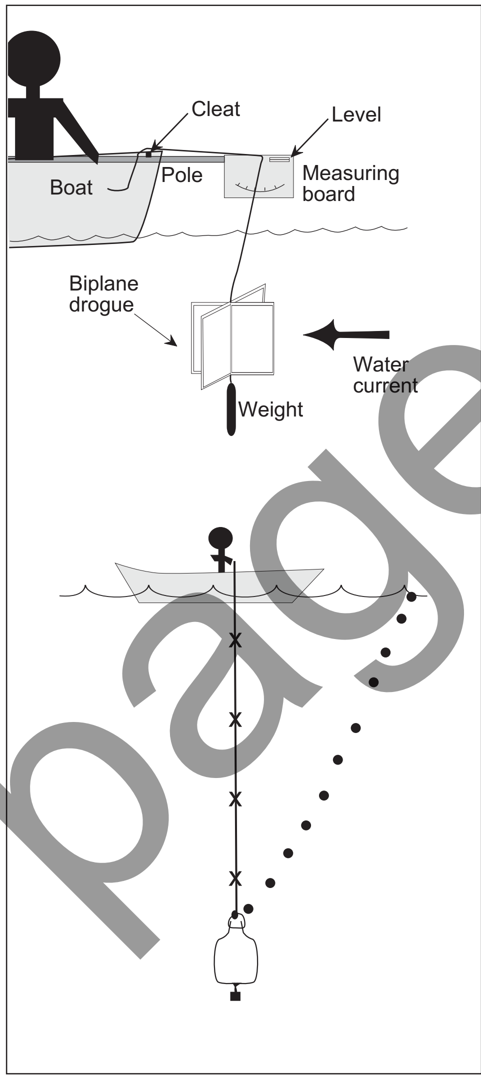
Q1. Identify the current direction.

Q2. Which orange travelled faster - inshore or far out? Propose a reason for this.

Map of study area

Show north and main features of beach

Activity 2.1 - suggested answers



Questions

Q1. List equipment used to make simple field measuring equipment.

Electrical tape, empty plastic bottle , old broom stick, drill, divers weight 11 metres venetian blind cord, coloured materials (for flag), watch with second hand handbearing compass, two oranges

Q2. Describe how you could measure current in a river or estuary.

Make a map of the area.

Now tie 10 metres of cord to a drink bottle.

Select a place such as a jetty where the current is running and you can launch your drogue.

Lower the drogue into the water and tell your partner to time how long it takes for the drogue to run out to the full length of the 10 metres of rope on a prearranged signal.

When a partner is ready, release the drogue and observe what happens.

Use the hand bearing compass to determine the direction of the current.

Using the formula

Speed = distance / time

calculate the speed of the current and record it. Repeat the experiment twice and average your results.

Q3. Complete Table 1 opposite for river/estuary data and map of your study area.

See table and map opposite

Q4. Describe how you could measure current on an open beach.

Pace out 5 stations, 15 metres apart on the beach.

At a prearranged signal you cast two oranges into the sea

- one close in the other as far out as you can throw and the timekeeper starts the watch.

Then follow the two oranges and any variations. If the orange comes in, you should throw it out again.

After one minute the timekeeper signals and marks the position of your orange in the sand opposite where the orange is.

After two, three, four and five minutes, record data accurately

Q5. Complete Table 2 opposite for beach data and map of your study area.

See table and map opposite

Q6. Describe any other method you could use on the beach or in an estuary.

Students own answers

Activity 2.1 - suggested answers

Table 1: River or estuary results

Description of what happened

Data and calculations

Length of rope

Time to run length out

Speed of current

(Distance/time)

Direction of current

Questions

1. How fast was your current?

   Students own answers

2. In what direction did it go?

   Students own answers

3. What causes currents?

   Students own answers

4. Do you think currents will change during the day and if so what could cause these changes?

   Tides, low pressure systems

Map of study area

Show direction of current flow and main features

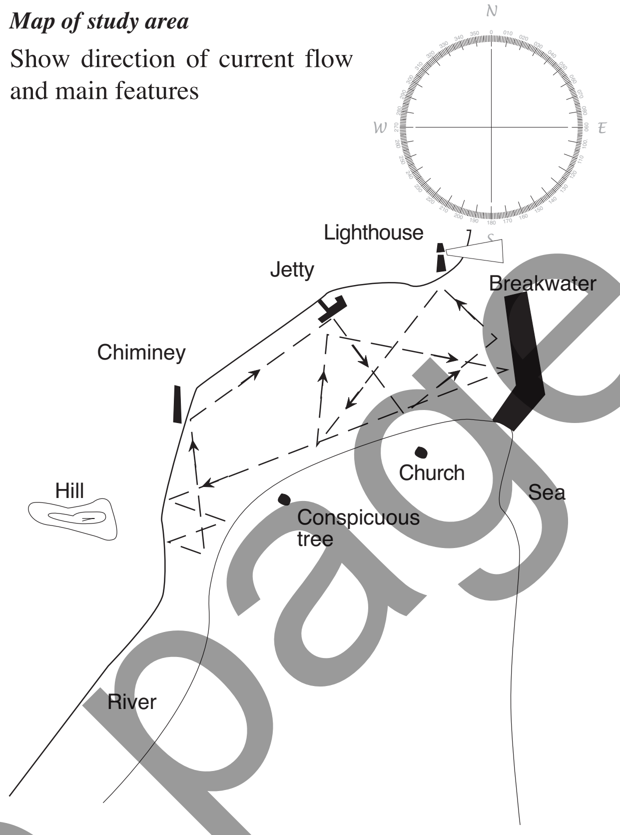


Table 2: Beach results

Questions

1. Which direction did the current flow?

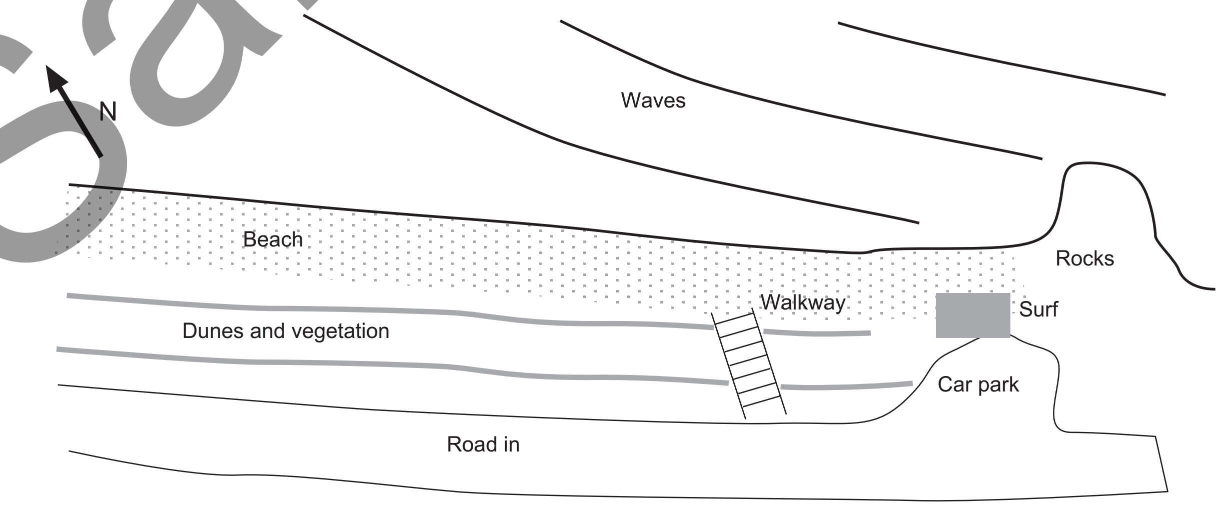
   Students own answers

2. Which orange travelled faster - inshore or far out?

   Students own answers the ones in closest should travel faster

Map of study area

Show north and main features of beach



Appendix 3 Laboratory work

3.1 Weather front demonstration

Aim

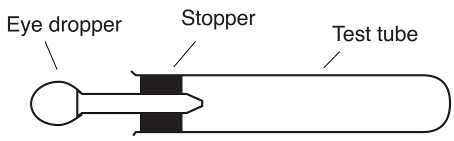
To observe what happens when two different temperature fronts collide.

Materials

- Food colour dye
- 2 eye droppers fitted with rubber corks
- bunsen, tripod, gauze mat, bench protector
- beaker
- 2 test tubes

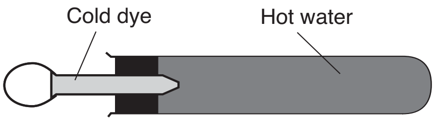
Method

Set up the test tubes as shown by the diagram below.



Part A. Cold front

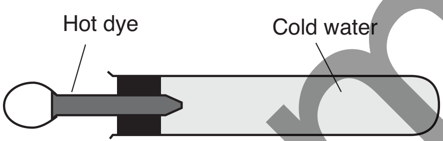
1. Fill test tube with hot water and set up as shown in the diagram below.



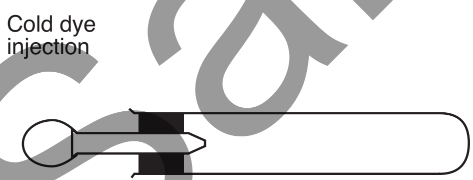
2. Add cold dye slowly and record what happens.

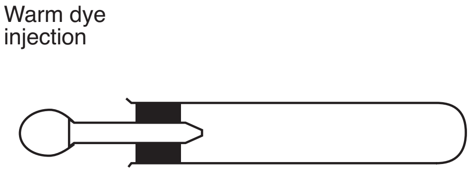
Part B. Warm front

1. Heat some dye in a beaker using the bunsen.
2. Fill test tube with cold water as shown in the diagram below.



3. Add hot dye slowly and record what happens.





Teacher feedback

I've done something similar years ago with red dye (hot water) and blue dye (warm) in a 4 foot fish tank with a divider in the middle. Fill both sides, remove divider, and away you go! Get a bit of mixing and swirling when the barrier is removed.

Similarly I have demo'd convection currents in the ocean by heating water (not boiling) in a large beaker over a bunsen, and adding a couple of KMn04 crystals. The colour rises. I then put an ice cube with loads of food colouring in it into another beaker. The colour falls. When both the diagrams are combined, it nicely complements the onshore/offshore wind diagrams.

Conclusion

The dye and water in the experiment represented two air masses.

Appendix 4 Classroom activities

4.1 The active beach system

Based on an original exercise by Gwen Connolly, St. Augustine's College

Method

1. Read the instructions to the three level guide in Figure 130.1.
2. Now read the article on the page opposite, then complete the following:

Level 1 Literal — reading for accuracy

a. For each of the following statements write T (true) or F (false) in the space just after the number.

b. Be able to show where these statements appear in the article.

c. Use P for paragraph and L for line.

1. ____ Beaches are made of sand from the erosion of rocks.
2. ____ A sand budget is only governed by the prevailing winds, tides and currents.
3. ____ Small broken waves predominately control the sand build up on the beach.
4. ____ Bores drop their sand in a small ridge known as a berm.
5. ____ During storms, wave bores, drag the sand offshore to form a sand bar.
6. ____ A groyne is a preventative measure against weathering.

Level 2 Interpretive — drawing conclusions

1. ____ Estuaries and bays act as sinks where sand is stored for later movement along the beach.
2. ____ Bays are areas of sand collection due to the bending of waves around headlands.
3. ____ A beach will not erode during a storm if the waves are absorbed by the storm bar.

Level 3 Applied — defending your opinion

Be able to give reasons (argue) why your answer is correct.

You may draw on additional information from other sources.

1. ____ Beach conservation groups should be more active in your local area.
2. ____ Developers should be allowed to build on the waterfront.

The three level guide

A three level guide is used to impart important information. Teachers believe that in doing work and having to justify your answer, students are more likely to remember it.

The following rules are important to make this work.

1. Absolute silence for 10 – 15 minutes during which time you are to read the article and answer True (T) or False (F) to the statements in the method section.

   You also need to justify your answer by referring to the article, e.g. P3L2 — paragraph 3 line 2 or F10.2 — Figure 137.1
2. The class is then divided up into groups of four students and you have 15 minutes to discuss your answers and arrive at a group set of answers. Make sure that democratic discussion occurs and that the group is not dominated by one or two people.
3. Finally re-group and as a class discuss the article.

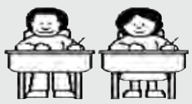


Figure 130.1 The three level guide