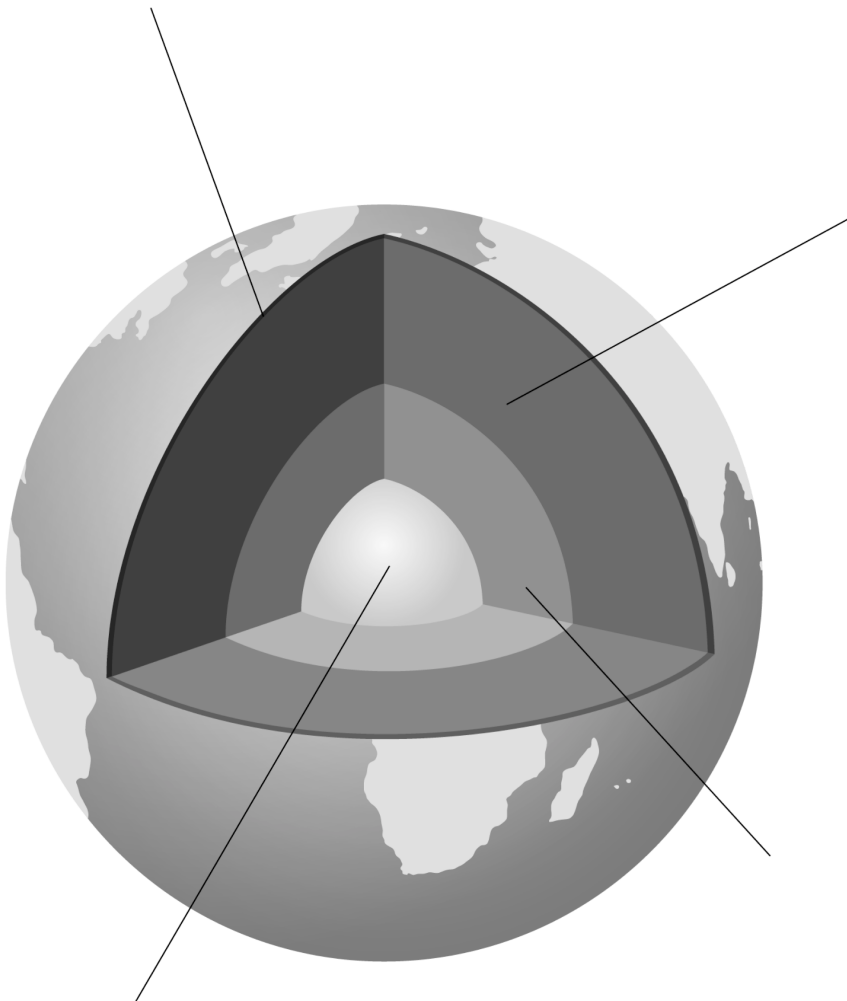


The following table lists all The Natural Environment worksheets for the Teacher Guide. The third column indicates for which lesson plan the worksheets will be useful.

Worksheet No.	Worksheet title	Lesson Plan
2.1	The structure of the Earth	2.1(1)
2.2	Creating a supercontinent	2.1(1)
2.3	The world's greatest earthquakes	2.1(2)
2.4	Activity at plate margins	2.1(2)
2.5	Earthquake-proof building	2.1(3)
2.6	Earthquake survival kit	2.1(3)
2.7	Volcano vacation!	2.1(4)
2.8	Effects of the Soufriere Hills eruption on the Caribbean island of Montserrat	2.1(4)
2.9	The long profile of river _____	2.2(1)
2.10	Processes of river erosion	2.2(1)
2.11	Identifying river features from grid references on maps	2.2(2)
2.12	River features Keyword Bingo	2.2(3)
2.13	River deltas around the world	2.2(3)
2.14	The Mighty Mississippi	2.2(4)
2.15	Mississippi flood plain	2.2(4)
2.16	Weathering and erosion of a headland	2.3(1)
2.17	How do groynes control longshore drift?	2.3(3)
2.18	Salt marsh development behind bars and spits	2.3(3)
2.19	Types of coral reef	2.3(5)
2.20	Why are coral reefs so important?	2.3(5)
2.21	Case study of an atoll	2.3(6)
2.22	What decisions are influenced by the weather?	2.4(1)
2.23	Recognising cloud types	2.4(4)
2.24	What aspects of the environment affect natural vegetation?	2.5(1)
2.25	The diurnal rainfall pattern in the rainforest	2.5(1)
2.26	Rainforest plant adaptations	2.5(2)
2.27	Animal adaptations in the hot desert	2.5(4)
2.28	Oases and artesian wells	2.5(5)
2.29	Primary and secondary hazard impacts	2.5(7)
2.30	The monsoon climate in Bangladesh	2.5(8)

Complete the diagram below by adding the names of the different layers of the Earth and details of the characteristics (depth, temperature, etc.) of each layer.



Creating a supercontinent

Cut out the continents and separate India from the rest of Asia (along the dotted line shown).

Now try to match the coastlines and put the continents together to form the supercontinent Pangaea – it should look like the landmass in the small box on the right.

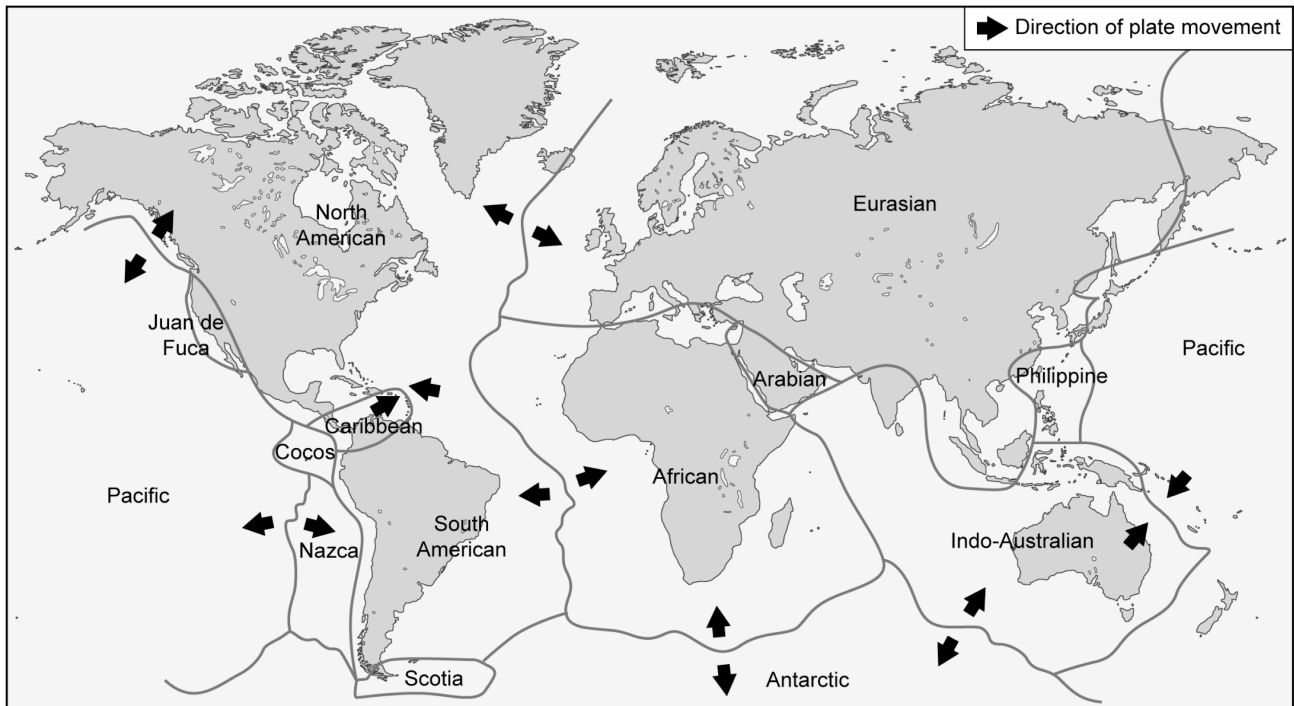


Worksheet 2.3

The world's greatest earthquakes

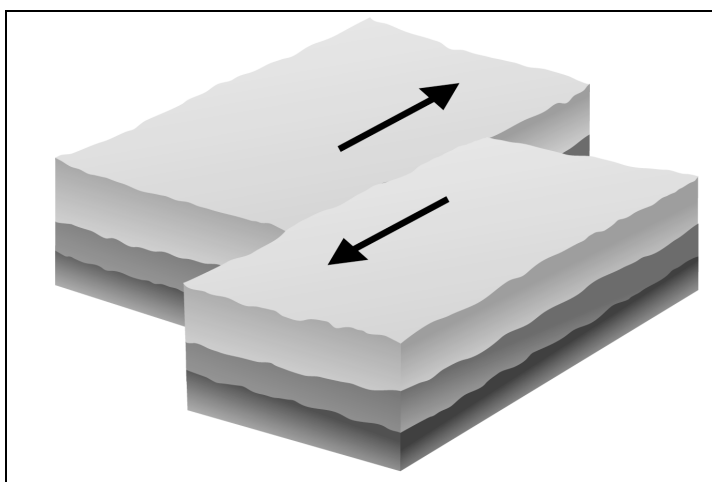
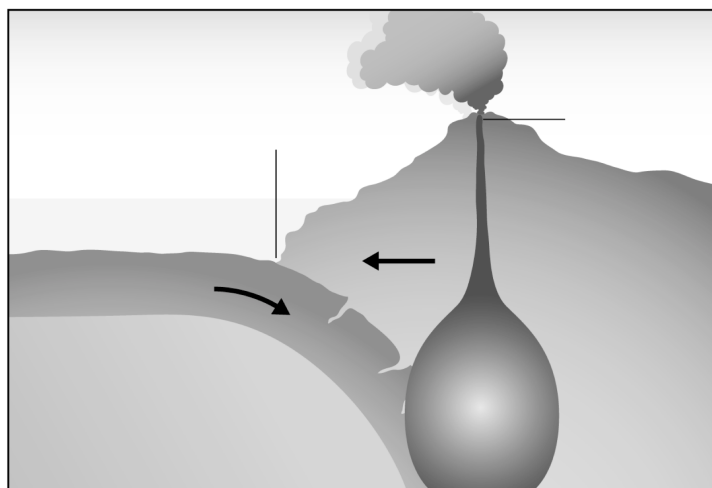
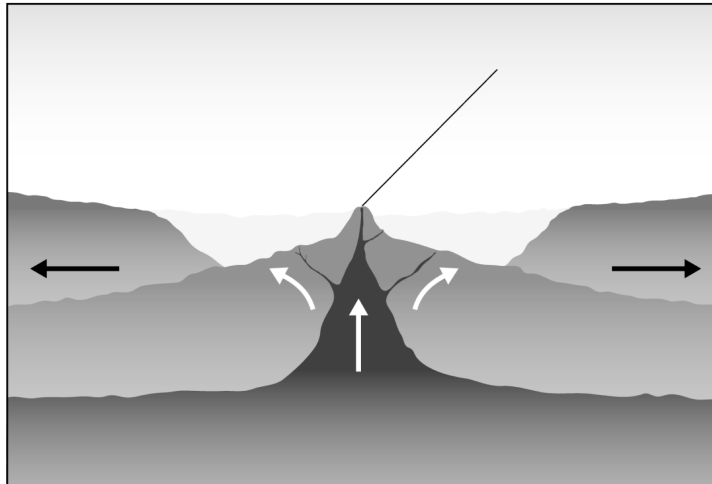
Use an atlas (or the internet) to locate 10 major global earthquakes. Mark them on the plate boundary map below.

Add details such as date, number of deaths/casualties and amount of damage caused.



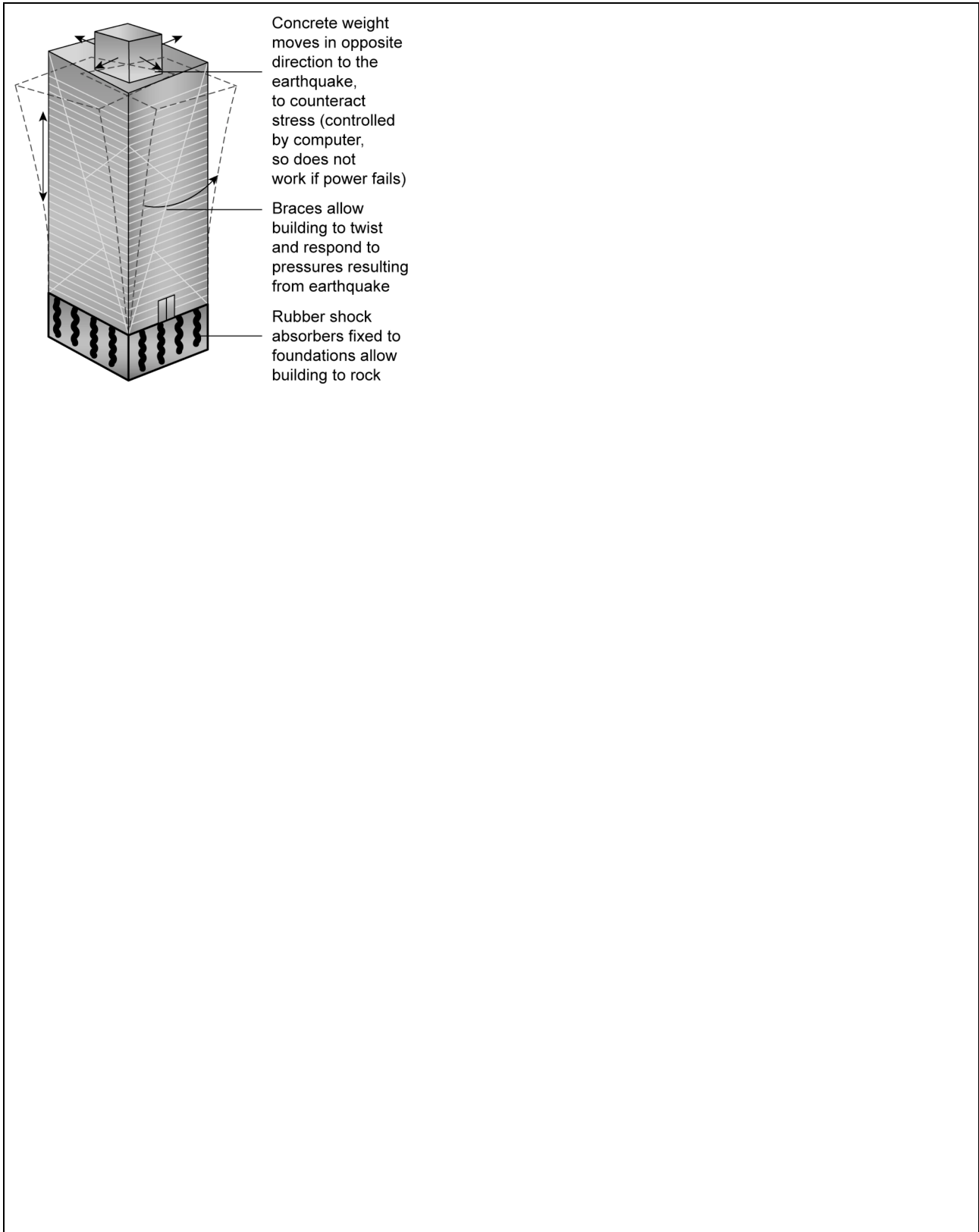
Activity at plate margins

Identify the three types of plate margin below and label the diagrams with details of the different kinds of activity and the processes that are taking place.



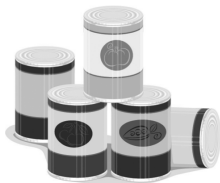
Look at the design for an earthquake-proof building below – the labels show examples of things we can do make buildings safer.

Now try designing your own. Remember to keep it practical (i.e. no 'flying houses')!



Below are some items that are likely to be included in an earthquake survival kit. Identify each item and write a brief explanation of why it would be useful.

Add some more items you would like to see included in the kit, and explain why.



In the box below, design a poster to sell your 'volcanic holiday' to the world. Make it bright and bold to attract as many paying customers as possible. Feel free to change the picture, or draw one of your own if you prefer.



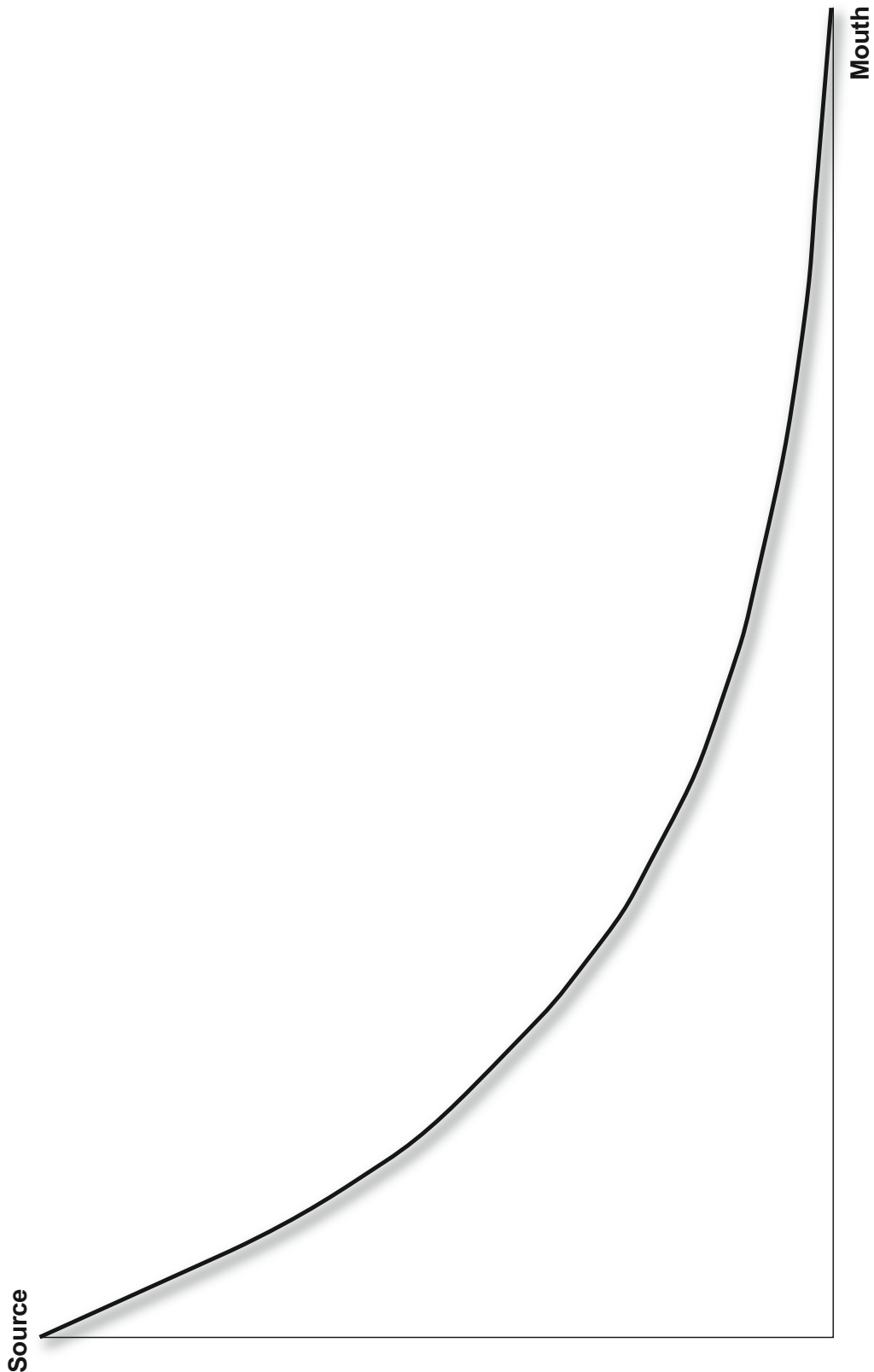
Image: David Stanley/CC by 2.0

Compile two lists in the table below, using the information given to you by your teacher.

Positive effects	Negative effects

Annotate the long profile of your chosen river with details of the source, mouth, towns, cities and other landmarks on its route.

Complete the title of this worksheet (above) with the name of your selected river.



Processes of river erosion

The processes of river erosion can be illustrated using familiar scenes. For example, hydraulic action is like a man with a hose blasting dirt off a forecourt.

Think of similar ways to illustrate the other processes of river erosion (corrasion, attrition and corrosion) and draw them in the other three boxes.



Hydraulic action

Corrasion

Attrition

Corrosion

Image top left: Jack/CC by-SA 2.0

**Worksheet
2.11**

Identifying river features from grid references on maps

- 1 In the boxes in the left column, write down the grid references for 10 river features you have found on the map your teacher gave you.
- 2 Now hand the worksheet to somebody else in the class to try to identify what the features are.

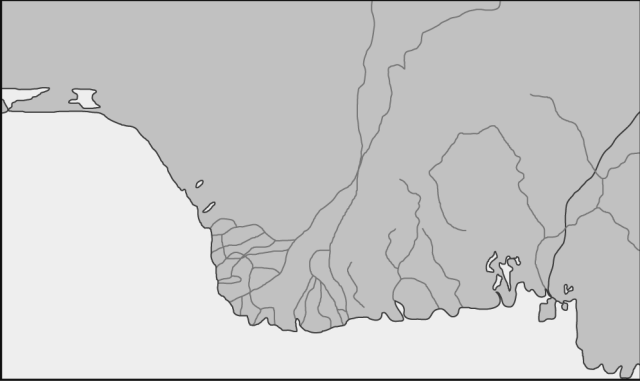
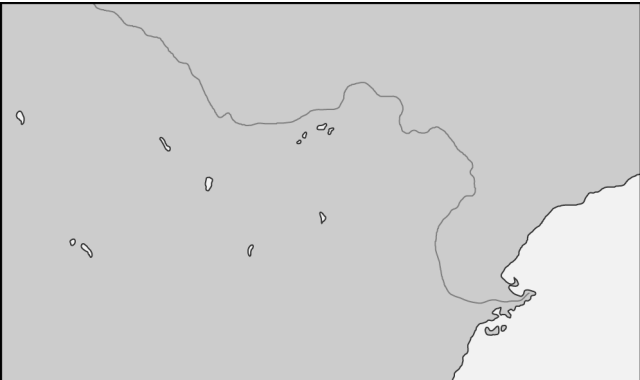
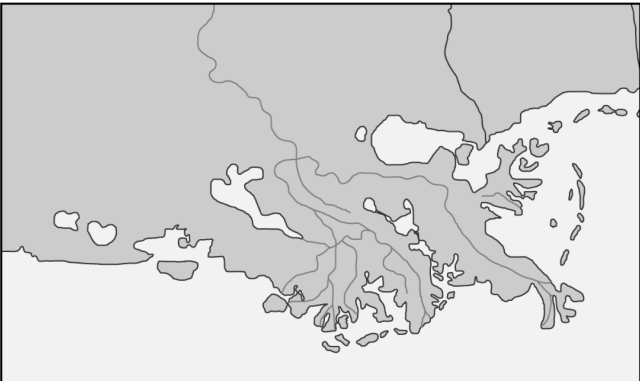
Grid reference	River feature

Cross out the correct word when you hear its description from your teacher.

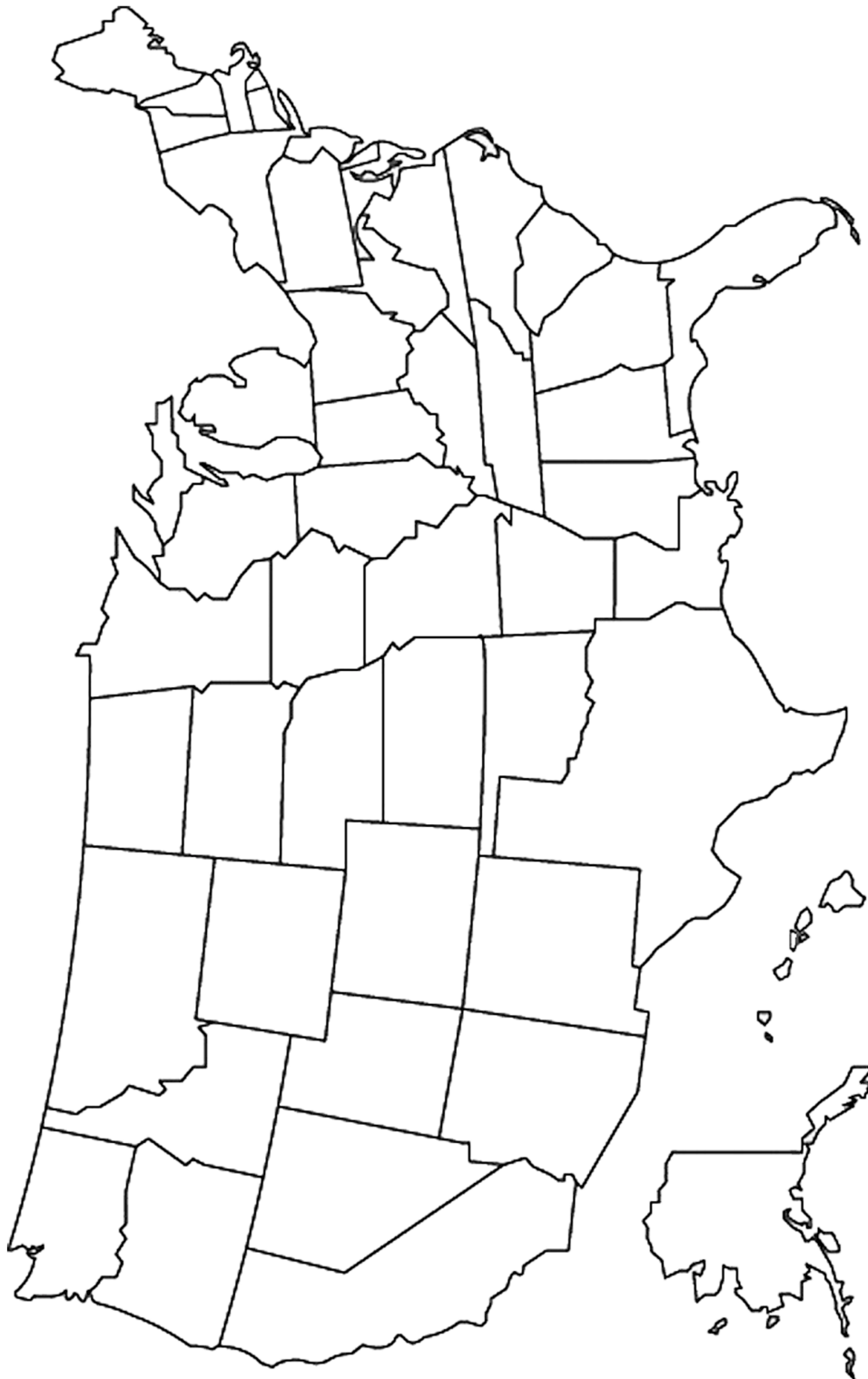
Shout 'BINGO' very loudly when you have crossed out all the words.

Transportation	Hydraulic action	Oxbow lake
Tributary	Delta	Meander
Saltation	Waterfall	Corrosion
Load	Deposition	Bed

Using an atlas, try to find examples of the three types of river delta from around the world.

Type of delta	Where in the world?
 <p data-bbox="408 837 561 869">Fan-shaped</p>	
 <p data-bbox="432 1339 537 1370">Cuspate</p>	
 <p data-bbox="416 1841 553 1872">Bird's foot</p>	

Using the map of the USA below, draw the course of the Mississippi river from source to mouth. Annotate your map with details of features along the river's course, marking in the major towns and cities – especially those further down the river that are particularly liable to flooding



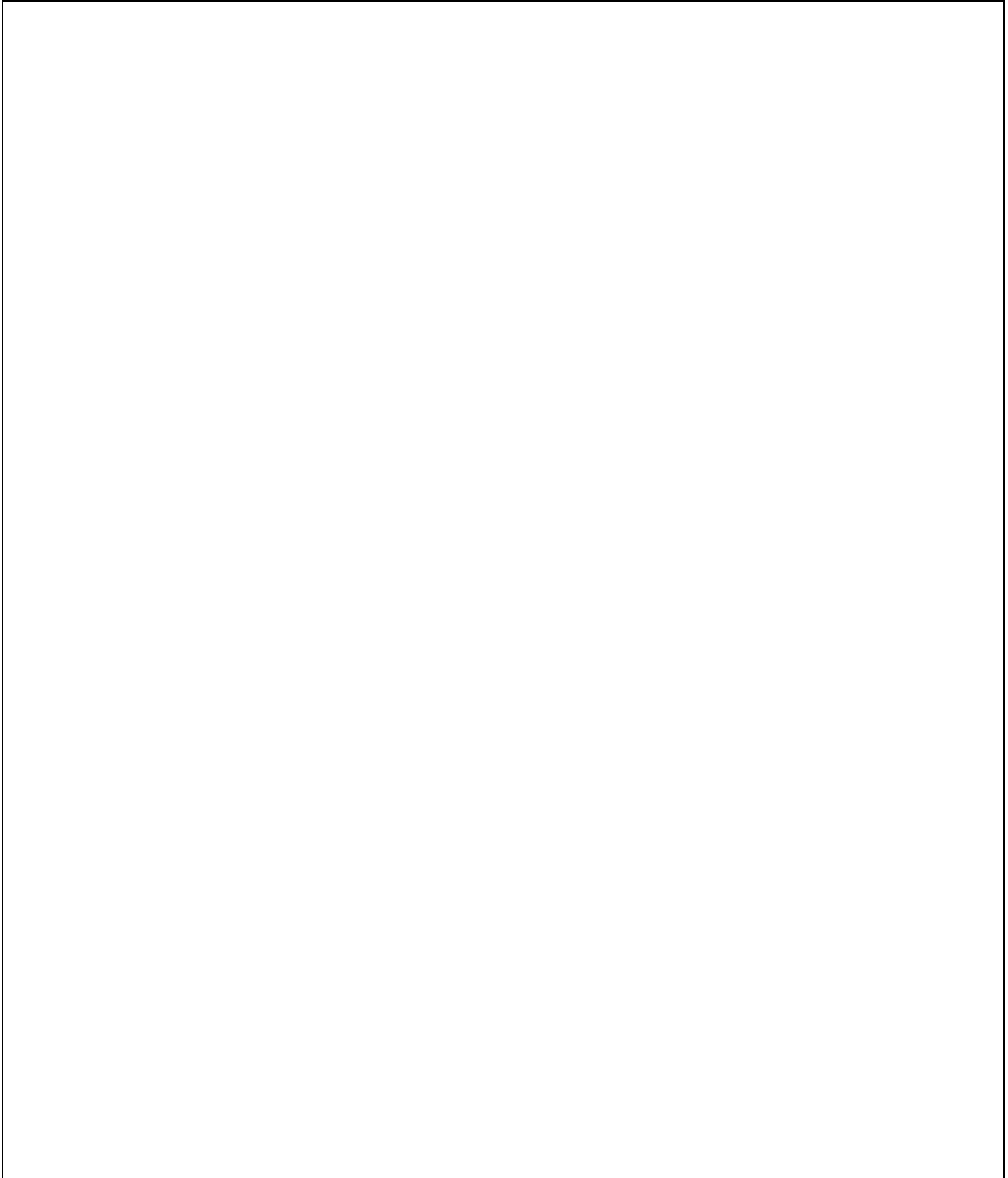
In groups, discuss the following questions and write notes in the boxes below.

<p>Which areas of the Mississippi are most likely to flood and why?</p>	<p>What kinds of human activity will be taking place on the flood plain?</p>
<p>Is it worth paying the money needed to keep putting prevention measures in place in order to stop the flooding?</p>	<p>What were the effects of Hurricane Katrina on flooding by the Mississippi?</p>

Weathering and erosion of a headland

Use photo 2.8 showing a famous headland called The Foreland in Dorset on the south coast of England. In the box below, draw a field sketch from the photo, leaving plenty of space around your sketch.

Then annotate it with details of erosion and weathering processes, and of the features formed. Draw an arrow clearly pointing from each annotation to the relevant point on your sketch.



How do groynes control longshore drift?

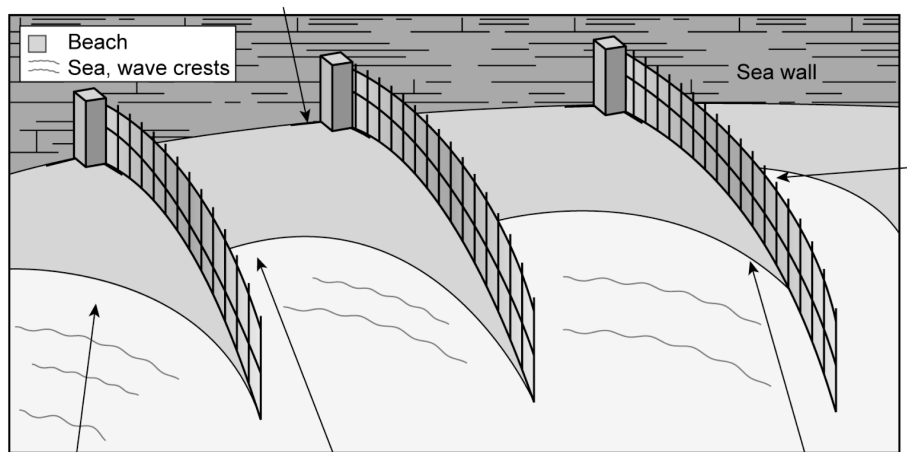
Groynes are lines of wooden or concrete posts, wooden fencing, or stone or concrete walls or jetties. They go from the top of the beach to the sea, usually at right-angles (or 90 degrees) to the coast. Their job is to prevent the waves moving the beach material along the beach.

Your task is to work out exactly how they do this. Write at least one thing about how groynes affect each of the following:

- swash
- backwash
- wave energy.

The field sketch **A** below shows arrows in the correct places, but no labels. You should write a suitable label (or annotation, if you can) for each arrow.

Sketch A



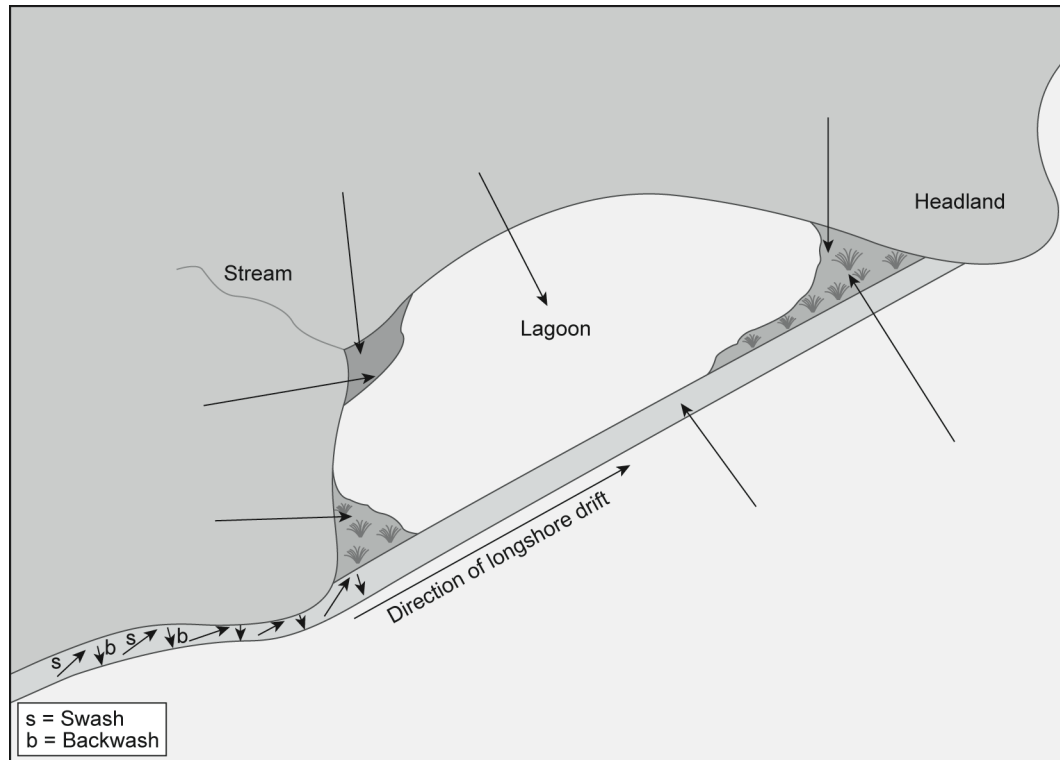
Comment on how well you think these groynes are doing their work.

Salt marsh development behind bars and spits

On pages (a) and (b) of this Worksheet are two diagrams. Each one has a set of annotations to go with it. Match each annotation to a suitable arrow.

Devise a number coding system for the diagram below to show the order in which each stage of salt marsh formation occurs. Add the numbers to your annotations on each diagram.

Bar and lagoon



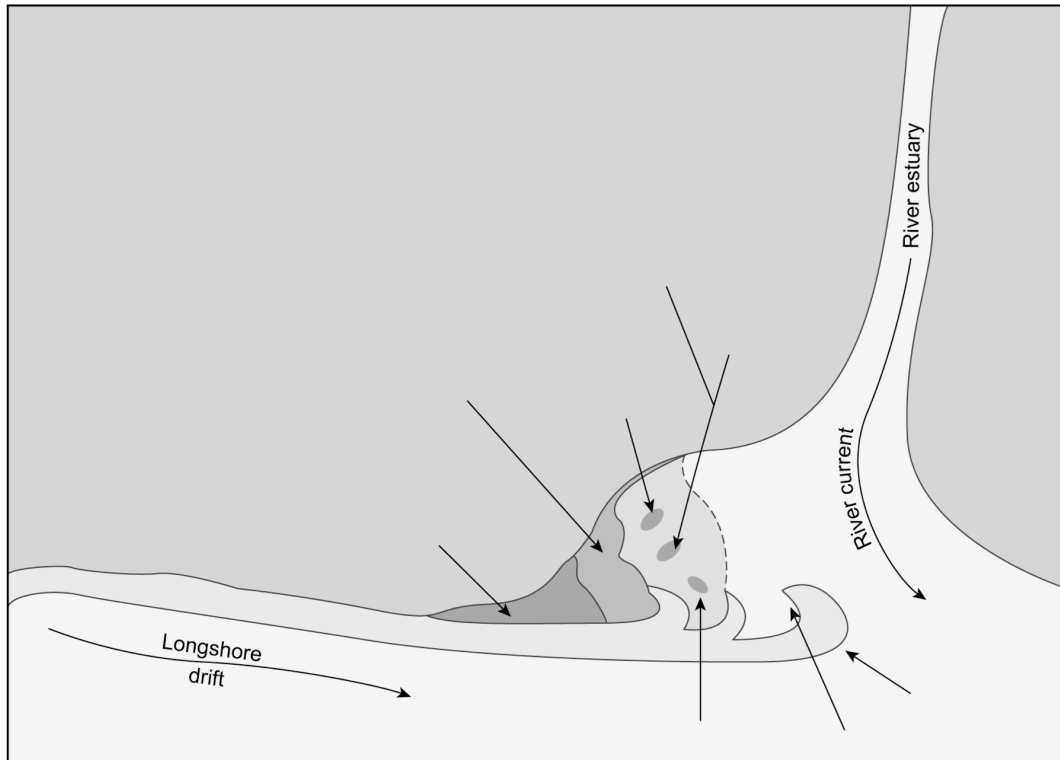
- A Lagoon may eventually disappear as it is filled in with deposits and vegetation.
- B Bar closes off lagoon from open sea.
- C Larger load is deposited first.
- D Algae and simple salt-tolerant plants (halophytes) take hold on the fine sand and mud deposits which are exposed to the air.
- E Vegetation takes hold and helps keep deposits in place.
- F Calm water creates a low-energy environment.
- G Fine load is deposited.

Worksheet 2.18 (b)

Salt marsh development behind bars and spits

Devise a number coding system for the diagram below to show the order in which each stage of salt marsh formation occurs. Add the numbers to your annotations on each diagram.

A spit

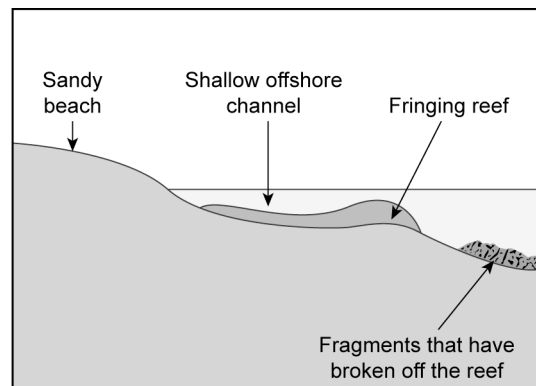
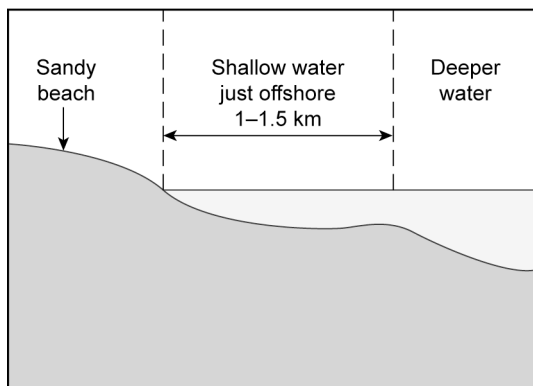


- A Sheltered area of water protected by curved hook at end of spit.
- B Salt marsh may develop into new land.
- C Waves approaching spit create a hook shape on the end (in some cases).
- D At low tide, water-tolerant and salt-tolerant plants start to take root.
- E As marsh surface is increasingly exposed, larger plants take hold.
- F Low-energy environment allows deposition.
- G Plants help trap more deposits of sand and mud, building up the level of the salt marsh.
- H Roots help deposits become more stable.

In the Student Book you have learned about the Great Barrier Reef as a case study of the world's largest coral reef, its problems and some possible solutions.

There are two other types of reef: fringing reefs and atolls.

Use the two diagrams below to help you describe the process of the formation of fringing reefs. You can also Google 'fringing reefs' (under 'Web' or 'Images') to help you here.



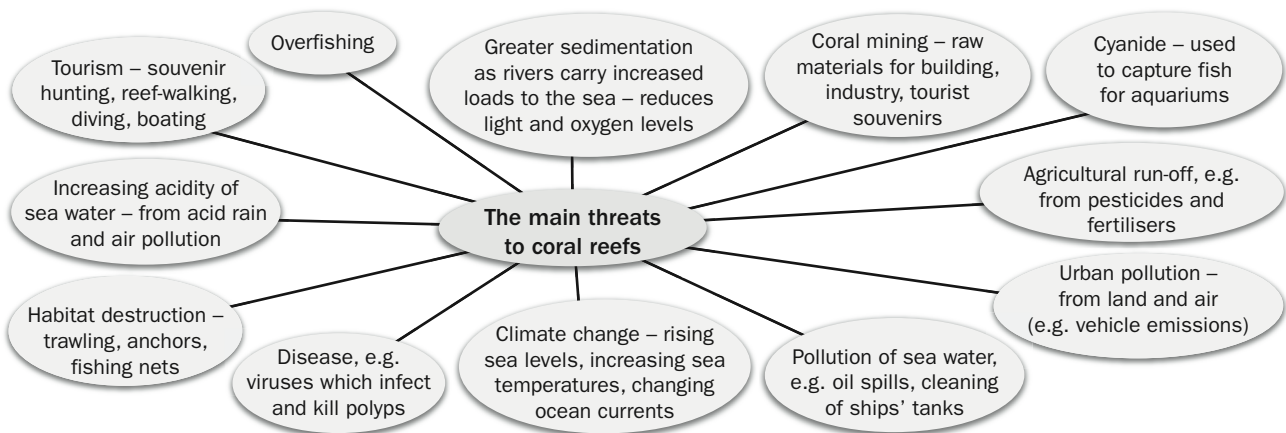
Whole island countries, such as the Maldives in the Indian Ocean, are made up of atolls. Read http://en.wikipedia.org/wiki/Atolls_of_the_Maldives to explore atoll formation. Write at least one paragraph to explain the key characteristics of atolls.

Read the text below and study the spider diagram.

Coral reefs have a major role in both the tourist and fishing industries within the tropics. They protect coastlines by absorbing wave energy, and so act as a defence against the sea. However, reefs are dying at an alarming rate – a process called coral bleaching. The polyps within coral die when the environmental conditions change, for example the sea temperature rises or the water becomes polluted. About 10 per cent of the world's reefs are already dead, and a further 60 per cent are endangered.

Marine Protection Areas (MPAs) are increasingly important for reef conservation. These MPAs restrict damaging activities whilst promoting reef restoration, biodiversity and protection. Traditional, sustainable fishing practices are also being re-introduced to reduce damage to reefs.

The main threats to coral reefs are from various forms of human activity and from global climate change. Tourism, fishing and coral mining all affect reef systems. Pollution creates many issues, including run-off from agriculture (pesticides and fertilisers) and from tour activities, as well as marine pollution (such as rubbish and oil spillage from ships). Climate change affects coral reefs in many ways, with rising sea levels, increasing sea temperature, the effect of greenhouse gases, acid rain and air pollution.



The main threats to coral reefs

- 1 Why is it important to protect coral reefs?
- 2 Suggest how coral reefs can be protected in the future.

1 Define what we mean by an atoll.

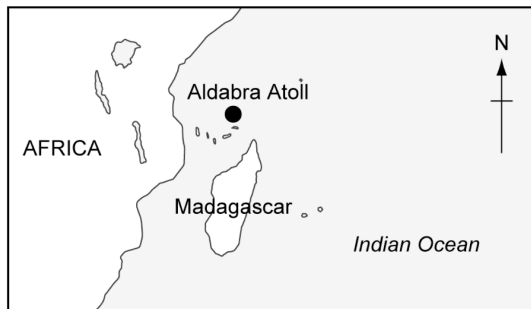
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2 Write down two examples of atoll coral reefs you have already discovered.

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.....
.....

3 Aldabra Atoll (map **A** below) is an example of an atoll coral reef. Describe its location. Use an atlas to help you if you need to do so.

A Aldabra Atoll: location



.....
.....
.....
.....
.....

4 The Aldabra Atoll coral reef is part of the Aldabra Marine Protected Area. Use the following website <http://en.wikipedia.org/wiki/Aldabra> (then click on 'Geography' and then on 'Conservation') to discover the:

- characteristics of the reef

.....

.....

.....

- strategies for conservation of the reef

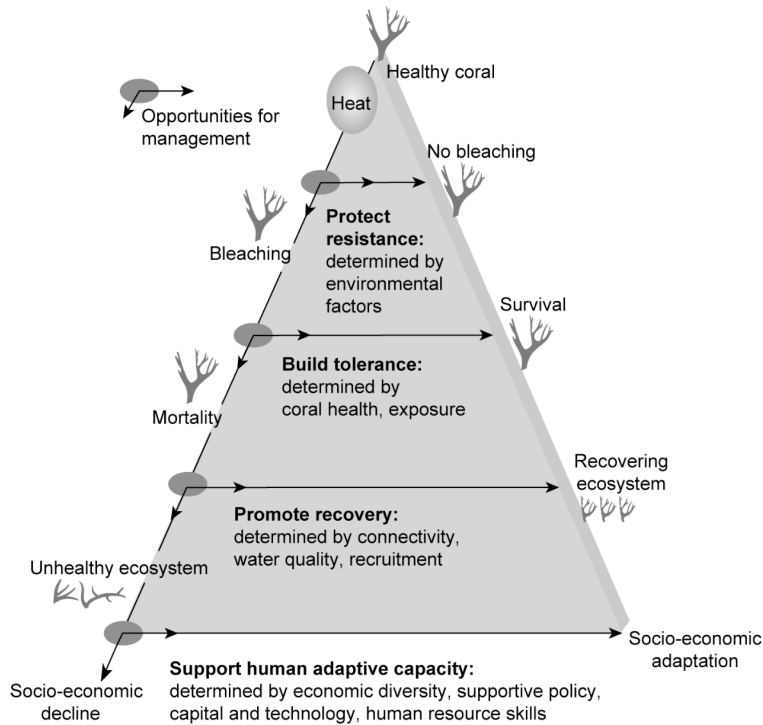
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5 Diagram B shows ways in which the atoll has been protected. Summarise the ideas in the diagram, and add details using the website above.

B How Aldabra Atoll is protected



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What decisions are influenced by the weather?

- 1** Think about how businesses are affected by the weather.

Consider each of the situations listed below and decide how the weather affects that person's decision-making and how they spend their day. Try to see all the implications of each situation.

- A** A farmer wakes up and switches on the radio to hear the weather forecast
- B** A sailor checks the weather forecast in the harbour-master's office before heading out to spend the day fishing
- C** The manager of a large food store is told that the next weekend is going to be hotter and sunnier than usual
- D** The air traffic control tower of a busy airport receives a phone call to say that the following day is likely to be foggy
- E** A teacher has planned some Geography fieldwork for her students but on arrival at school that day finds it is already raining very heavily
- F** A farmer is planning his work for the next week, including when to harvest
- G** A building developer is planning the time scale for a large construction project

- 2** Try to think of some more similar situations and try them on your friends.

On this worksheet you will find three cloud photos, three cloud names and three descriptions. You will have to link these into three groups. You can list each set of three that go together, or join them using coloured lines or shading.




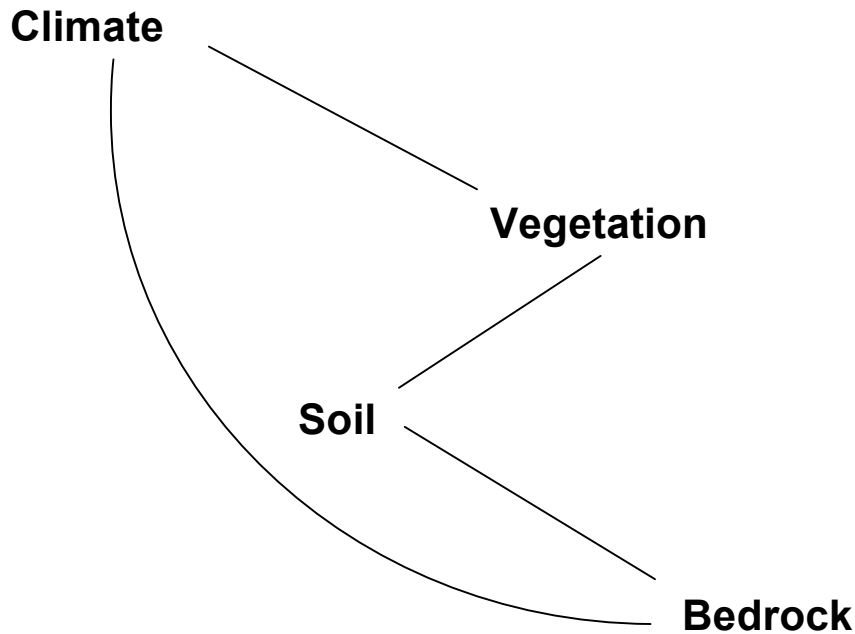
Names		
A Cirrus clouds	B Stratus clouds	C Cumulus clouds
Descriptions		
X Low-level cloud, covering, or almost covering, the whole sky: they may not bring any rain, but often produce drizzle. They are usually light to mid grey in colour.	Y Rain clouds that bring showers or more continuous rain: they range in colour from white to quite dark grey	Z High-level wispy clouds that do not cover much of the sky. Sometimes they appear slightly transparent. They do not bring rain but they come before other cloud types that do so.
Photos		
<p>1</p> 	<p>2</p> 	<p>3</p> 

Image 1: Piccolo Namek/CC by SA-3.0; 2 Simon Eugster/CC by SA-3.0; 3 Przemyslaw 'BlueShade' Idzkiewicz/CC by SA-2.0

What aspects of the environment affect natural vegetation?

Climate, vegetation, soil and bedrock all affect each other in a variety of ways.

Add the arrowheads to the diagram below to show how each element affects one or more others. Some lines need two arrowheads because the impacts operate in both directions. There are 6 arrowheads in total.



For each link (arrowhead) you have identified, write a short explanation of how that part of the natural environment affects the other.
1
2
3
4
5
6

The photo shows an early morning scene in the North Australian rainforest. What is the importance of the three labels?

Sunlight reaching the forest floor through the canopy



Damp vegetation from the previous day's rainfall

Surface water

Below is a series of statements about the diurnal rainfall pattern experienced in any rainforest. Place them in the correct order.

- A** Hot air rises, taking moisture with it
- B** Clouds build through the late morning and early afternoon
- C** This leads to condensation and cloud formation
- D** The same process happens every day
- E** During the morning the heat from the sun evaporates moisture from all wet surfaces
- F** Heavy rainfall occurs during the afternoon, usually around 2 or 3pm
- G** As hot air rises it cools, causing it to become saturated with moisture

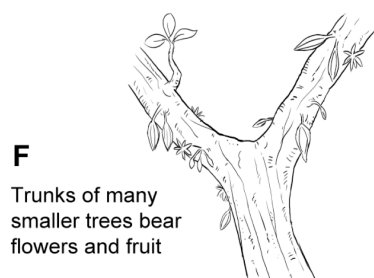
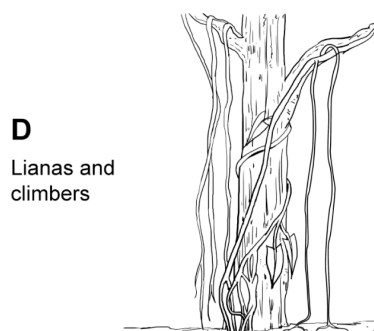
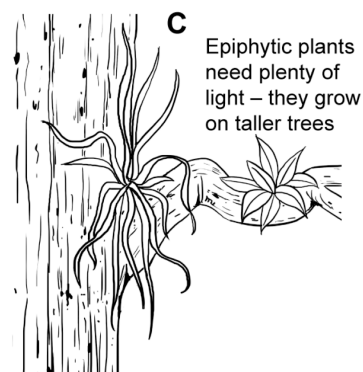
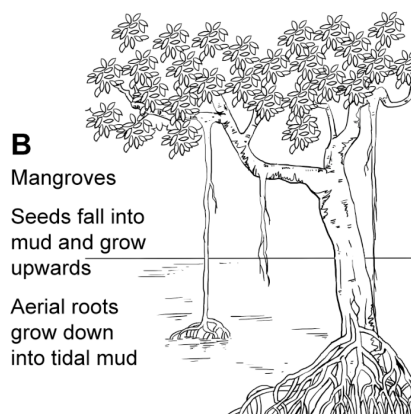
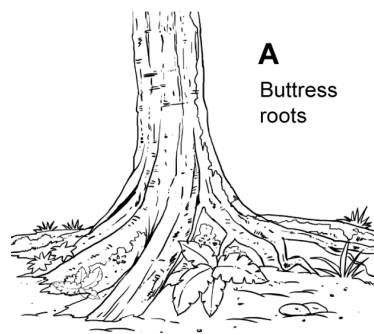
Write your chosen order here:

Explain why this type of rainfall is known as 'convectonal'.

Rainforest plant adaptations

Below are six sketches of adaptations for some rainforest trees and plants. For each one:

- describe the appearance of the adaptation
- suggest a purpose for it.



If you need more help, or think there may be more possible reasons, do some internet research. Useful website addresses include:

- <http://mbgnet.net/sets/rforest/plants/index.htm>
- www.kidcyber.com.au/topics/biomerainfor3.htm
- www.rainforest-alliance.org/kids/species-profiles

This annotated photograph shows how the camel is well adapted for life in the desert.

Eyelashes are extra long, to keep sand out

Lips are very tough so it can eat prickly thorn bushes

Large padded feet spread its weight so it doesn't sink into fine sand



Hump stores lots of fatty food

Thick, hairy coat protects camel from daytime heat and cold at night

Belly holds lots of water

- 1** List at least three ways in which camels can meet the needs of people who live in deserts, such as the nomadic Tuareg people of the Sahara.

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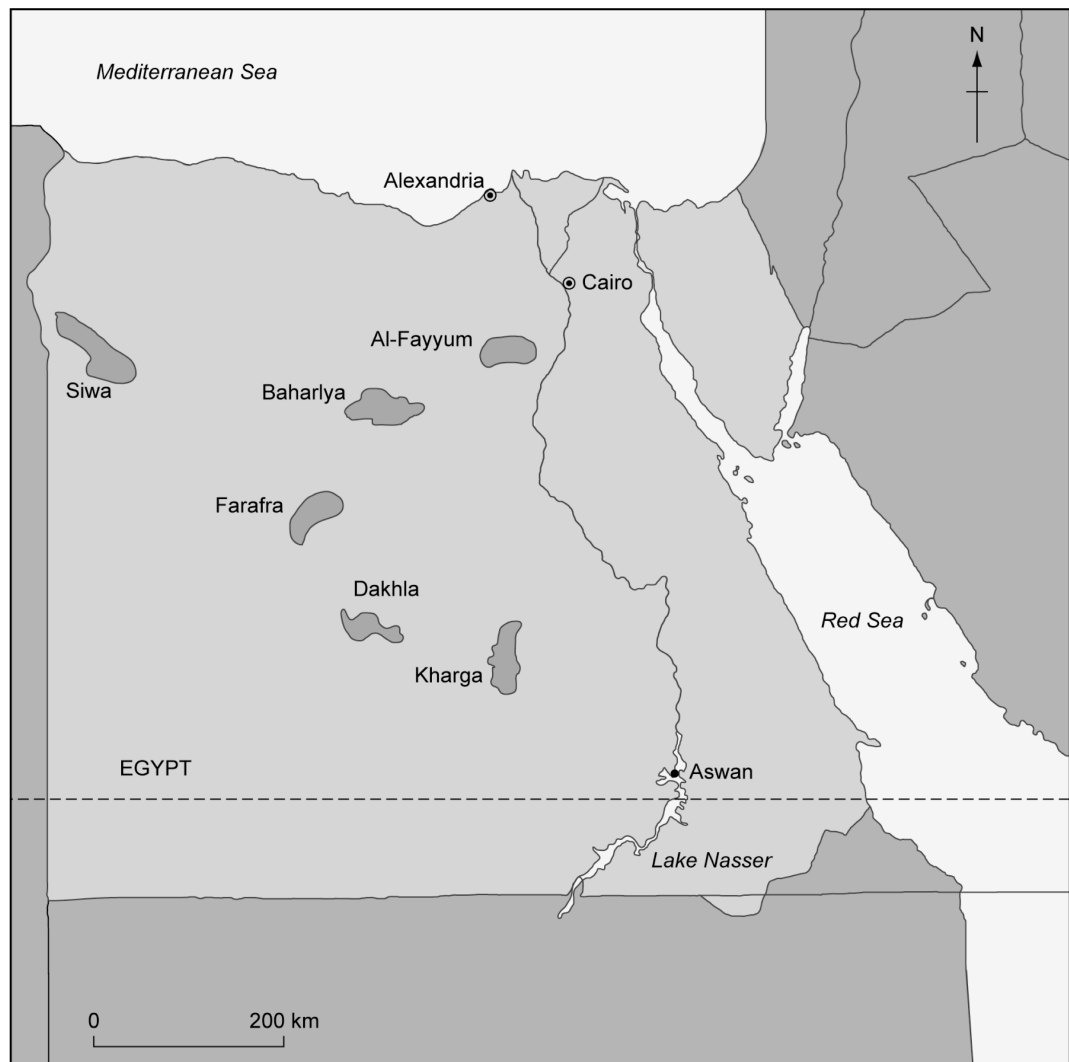
- 2** Research other desert animals. Choose one and describe how it is adapted to the desert environment. You may want to produce an annotated sketch, like the annotated photograph above.

Oases and artesian wells

Write your answers to the following questions on a separate sheet of paper.

- 1 Write a definition of an oasis.
- 2 Make a list of the reasons why oases are so important to vegetation, wildlife and people in the desert.
- 3 The map below shows the larger oases in the Egyptian part of the Sahara Desert. Oases are often caused by deflation – that is, the land surface is eroded by the wind, forming a hollow. If the surface is worn down to the water table, an oasis forms.
- 4 Research any one of the oases shown on the map to learn about their economic activities. For example, the website: http://en.wikipedia.org/wiki/Siwa_Oasis tells you about Siwa Oasis in the north-west of Egypt.

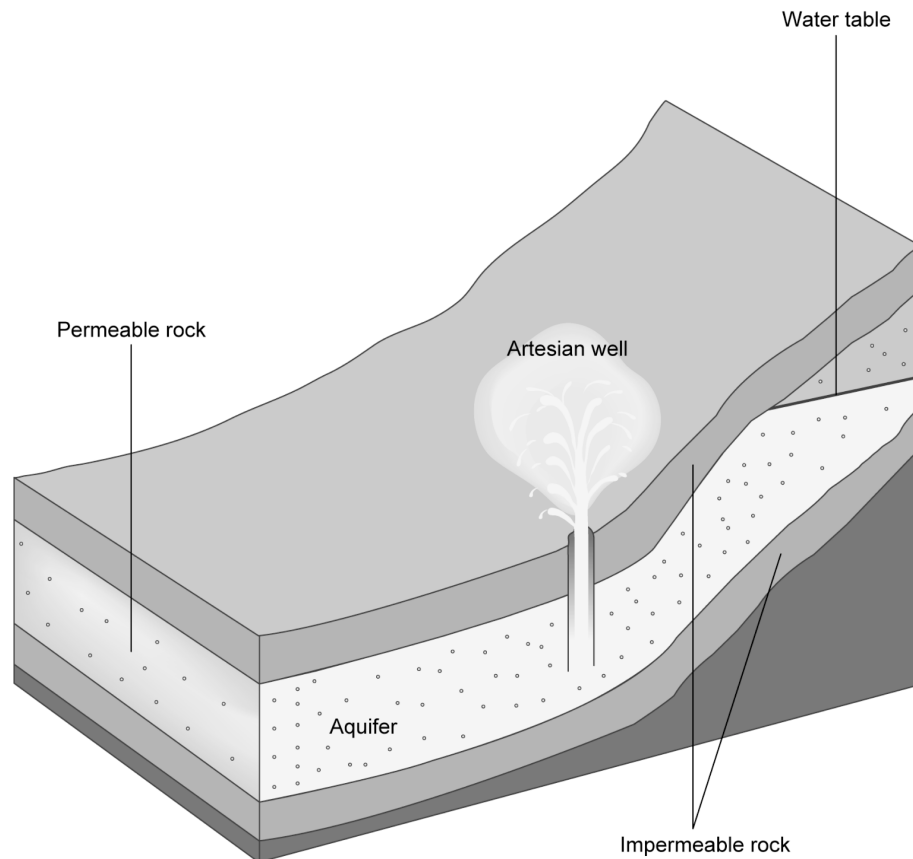
Oases in Egypt



Oases and artesian wells

- 5 Artesian wells are another source of water in deserts. Artesian water is an underground supply of water stored in permeable (porous) rock. Using the diagram below, try to explain how artesian wells work and suggest how they can be used by desert people.

An artesian well



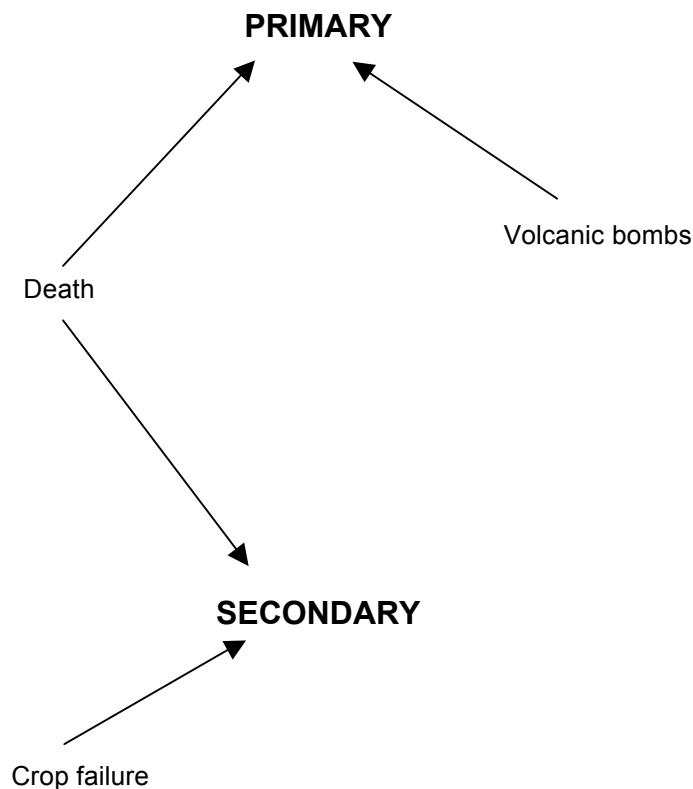
Primary and secondary hazard impacts

Definitions:

- A **primary impact** is something that happens during the event and it is a direct result of the event, for example a building collapses during an earthquake.
- A **secondary impact** is something that happens after the event but as a result of it – for example someone dies when the building falls down, or a child’s education is disrupted because of damage to school buildings.

Some impacts can be classed as both primary and secondary– for example a person could die by being swept away in a flood (primary), or later, from starvation resulting from crop destruction in the flood (secondary).

- 1 List as many impacts of hazard events as you can.
- 2 Decide to which category or categories each of these impacts belongs and add it to the diagram below. Use lines to show your decision. A few have been done for you.



Climate data for Bangladesh's monsoon climate is set out below.

- 1 Draw an accurate climate graph using this data. Note that the table has two sets of temperature details, the maximum and the minimum for each month. You should draw two temperature lines, which you may not have done before. We normally use red for the temperature line: in this case, use red for the maximum and orange for the minimum to show a clear distinction. Rainfall bars are always shown in blue. A frame has been drawn below to help you. Add a title and a key.
- 2 (a) Describe the rainfall pattern.
 (b) Identify the months in the monsoon season.
 (c) What relationship between temperature and rainfall is shown by the graph?

Climate data

	J	F	M	A	M	J	J	A	S	O	N	D
Max temp. (°C)	25.4	28.1	32.2	34.2	33.4	31.7	31.1	31.3	31.6	31.0	28.9	26.1
Min temp. (°C)	12.3	14.0	19.0	23.1	24.5	25.5	25.7	25.8	25.5	23.5	18.5	13.7
Rainfall (mm)	7.0	19.8	40.7	110.7	257.5	460.9	517.6	431.9	289.9	184.2	35.0	9.4

Source: www.virtualbangladesh.com/bd_geog_climate.html

Graph: _____

