



oxford atlas
WORKBOOK

MARK EASTON

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Introduction

The *Oxford Atlas Workbook* can be used in class or at home and is designed for students in lower to middle secondary school. Use of the *Oxford Atlas Workbook* will enhance students' understanding of geography with a focus on core geography skills and concepts.

Key features

- The Workbook is designed to be used with the *Oxford Atlas* or *Oxford Atlas eBook*.
- The Workbook is organised into two main parts: Geoskills and Geothemes, covering the core Geography skills and concepts.
- Each Geoskills unit has a specific skills focus. Units of work are designed so that students will master core geography skills. As students successfully complete each unit, they can tick it off on the map skills master checklist (on page 5).
- Activities are all levelled and organised to allow for graduated learning, commencing with foundation and comprehension questions moving on to higher order learning tasks.
- 'Deeper understanding' activities complete each unit of work. Many of these activities have a real-world focus, offering a more meaningful understanding of concepts and skills.
- Activities are hands-on, asking students to solve issue-based challenges as they go, writing directly into their workbook.
- Topical and engaging full-colour source material is used throughout.

Teacher support

Password-protected solutions are available online, free for adopting schools. Contact your Oxford Representative for full access details.

Become a map skills master

Have you mastered the skills of a geographer? As you successfully complete each of the Geoskills units in this Workbook, ask your teacher to acknowledge this by placing their signature or stamp and date in the table below. Once you have mastered all of the skills, you have become a map skills master.

SKILL I can ...	UNIT	I mastered this skill	Teacher's signature	Date
Use geographic photographs	Through geographer's eyes, pages 6–7			
Ask geographic questions	Through geographer's eyes (Deeper understanding), pages 8–10			
Interpret satellite images	Satellite images, pages 11–12			
Use satellite images to describe change	Satellite images (Deeper understanding), pages 13–15			
Use BOLTSS on all maps	What is a map?, pages 16–17			
Use the main features of maps	What is a map? (Deeper understanding), pages 18–20			
Interpret different types of maps	Different types of maps, pages 21–23			
Use maps in a variety of different ways	Different types of maps (Deeper understanding), pages 24–25			
Use compass directions and bearings	Direction, pages 26–27			
Interpret weather maps	Direction (Deeper understanding), pages 28–29			
Use alpha-numeric grids to locate places	Grid references, pages 30–32			
Draw an accurate map using grids	Grid references (Deeper understanding), pages 33–34			
Use latitude and longitude to locate places	Latitude and longitude, pages 35–36			
Use minutes and seconds of degrees to locate places	Latitude and longitude (Deeper understanding), pages 37–40			
Understand the way that scale is used	Using scales, pages 41–42			
Use a line scale to measure distance	Using scales (Deeper understanding), pages 43–44			
Understand the scale used on maps	Differing scales, page 45			
Construct an accurate scale map	Differing scales (Deeper understanding), pages 46–49			
Understand the ways in which height is shown on maps	Interpreting height on maps, pages 50–51			
Interpret contour lines to describe relief	Interpreting height on maps (Deeper understanding), pages 52–53			
Draw a cross-section	Interpreting height on maps (Deeper understanding), page 54			
Use six-figure grid references	Using topographic maps, pages 55–59			
Use a topographic map to describe a landscape	Using topographic maps (Deeper understanding), pages 60–63			
Construct a topographic map	Using topographic maps (Deeper understanding), pages 63			
Recognise common distribution patterns	Distribution patterns, pages 64–67			
Account for common distribution patterns	Distribution patterns (Deeper understanding), pages 66–67			
Compare the spatial patterns on maps	Comparing spatial patterns, pages 68–69			
Account for differences in spatial patterns	Comparing spatial patterns (Deeper understanding), pages 70–72			
Describe the ways in which environments change	Changing patterns, pages 73–74			
Classify change over time using a flow diagram	Changing patterns (Deeper understanding), pages 75–77			

Grid references

Alphanumeric grid

Geographers use grid references to locate places quickly and easily on a map. Maps are overlaid with a grid that divides the map into a series of squares or rectangles. By referring to the letters along the bottom of the map and the numbers on the side you can quickly reference any grid square on the map. A grid system that uses letters and numbers is known as an alphanumeric grid.

Street maps

1 The map of Melbourne's Central Business District (CBD) on page 97 of the *Oxford Atlas* (OA) uses a key and an alphanumeric grid to help you locate places. The MCG, for example, is located at H5.

a Name three other sporting facilities located in H5.

b What sporting facility is located in B9? _____

c Give the grid reference for Etihad Stadium. _____

d While H5 is dominated by sporting facilities, which leisure activity is dominant in F4?

e Not only map makers (cartographers) use grids. You may have noticed that the Melbourne CBD is laid out in a grid pattern. Which four streets form the perimeter of this grid?

f An example of this type of grid pattern is the streets of Manhattan Island in New York. You can see these in the satellite image and map on OA page 7. Many of the streets are known by a compass direction and a number. The Empire State Building, for example, is on West 34th Street. Can you work out the system used to name these streets?

Small-scale map grids

2 Grids are used not only on street maps but on other maps too, such as the map of your local shopping centre. Look at the Victoria Gardens Shopping Centre map on OA page 13.

a Which large department store is located at D1? _____

b Give the grid reference for the Hoyts cinema. _____

c If you are shopping at IKEA where is the nearest telephone? _____

d Can you park your bike next to Freedom? _____

Large-scale map grids

- 3** In your atlas large-scale maps that show whole countries or whole continents use grid references as well. Because the world is round, the grid lines are often curved on these maps. You must be careful to stay inside grid lines when using the grid system. Look at the Canada and Alaska map on OA page 12. Anchorage, for example, is located in grid E4.
- a** The world's 'polar bear capital' is located in J3. Beginning with 'C', what is the name of this town?

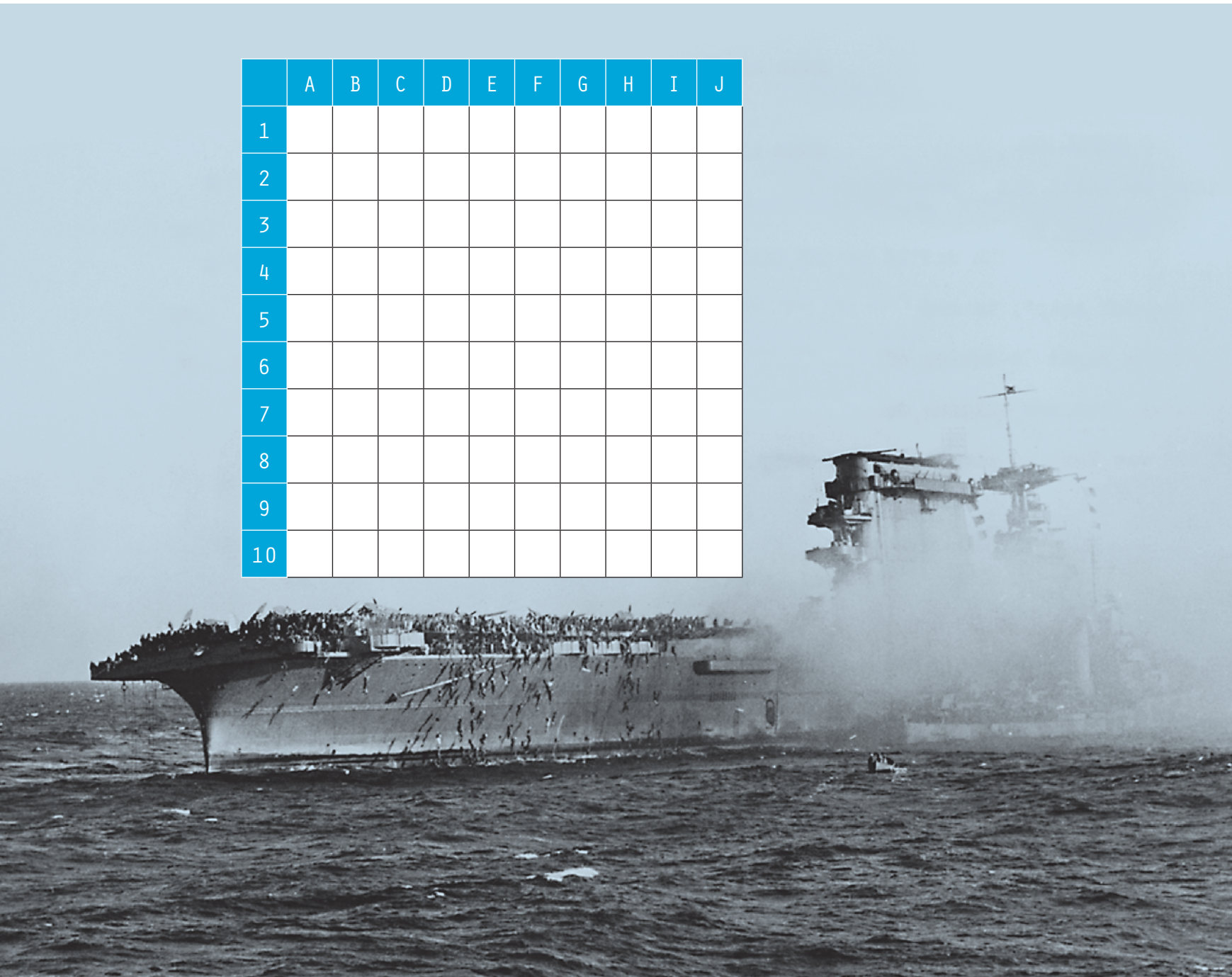
 - b** The largest uninhabited island in the world is located in K5. Beginning with 'C', what is the name of this island? _____
 - c** Give the grid reference for Mount McKinley, North America's highest mountain. _____
 - d** In which grid is the magnetic North Pole currently located? _____
 - e** The grid lines on this map also show which other method of locating places on a map?

- 4** Different grids are used for different maps and you must make sure that you refer to the correct grid when locating places on a map. Anchorage, for example, is located at E4 on the map of Canada and Alaska but is located at I6 on the World: Countries map on OA pages 244–245.
- a** Refer again to the street map of Melbourne's CBD on OA page 97. Give the grid reference for Albert Park Lake in Melbourne. _____
 - b** Now look at the map of Victoria on OA page 95. Give the grid reference for Albert Park Lake in Melbourne on this map. _____
 - c** Look at the Australia: Political map on OA page 35. Give the grid reference for Albert Park Lake in Melbourne. _____
 - d** Look at the World: Countries map on OA pages 244–245. Give the grid reference for Albert Park Lake in Melbourne. _____

Battleships

- 5 A popular board game that uses grid references is Battleships.
- a On the grid below shade in the following blocks of squares to represent your ships: 1 block of 4 squares, 2 blocks of 3 squares and 3 blocks of 2.
 - b Using grid references take turns with a classmate to try and hit and sink each others' boats. In order to sink a boat you must successfully name all squares occupied by that boat.

	A	B	C	D	E	F	G	H	I	J
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										



Grid references

Deeper understanding

Revisiting the basics

An alphanumeric grid is one of the easiest ways to locate places on a map. In this worksheet you will learn how to use these grids and to draw your own to make maps and satellite images more useful.

- 1 Give the grid references for Australia's state and territory capital cities, using the Australia: Political map on page 35 of the *Oxford Atlas* (OA).

Melbourne	_____	Perth	_____
Sydney	_____	Darwin	_____
Brisbane	_____	Hobart	_____
Adelaide	_____	Canberra	_____

Secret grid codes

- 2 You can use the grid on this map to devise a secret code that refers to places in Australia. Refer to each place by giving only the grid reference and a clue about the name of the place. Richmond in Queensland, for example, could be referenced with this code: E3 Go Tigers! Which places do the following codes refer to?

- a C2 Big Rock _____
- b B3 A real attraction _____
- c D2 Throw away the key _____
- d Write some clues of your own and see if your classmates can crack the code.

Satellite image grids

- 3 Grids can be used on satellite images as well as on maps in order to locate places easily and accurately.

-
- a** On this satellite image of Uluru draw a grid pattern of straight horizontal and vertical lines. Decide on a suitable space between each line (for example, 2 centimetres) and make sure you draw straight lines with even spaces between them. Label the spaces between the lines (not the lines themselves) with letters along the bottom and top and numbers up the sides.
- b** Refer to the Uluru walking tracks map on OA page 3. Give the grid reference for the sunrise viewing area on your satellite image. _____



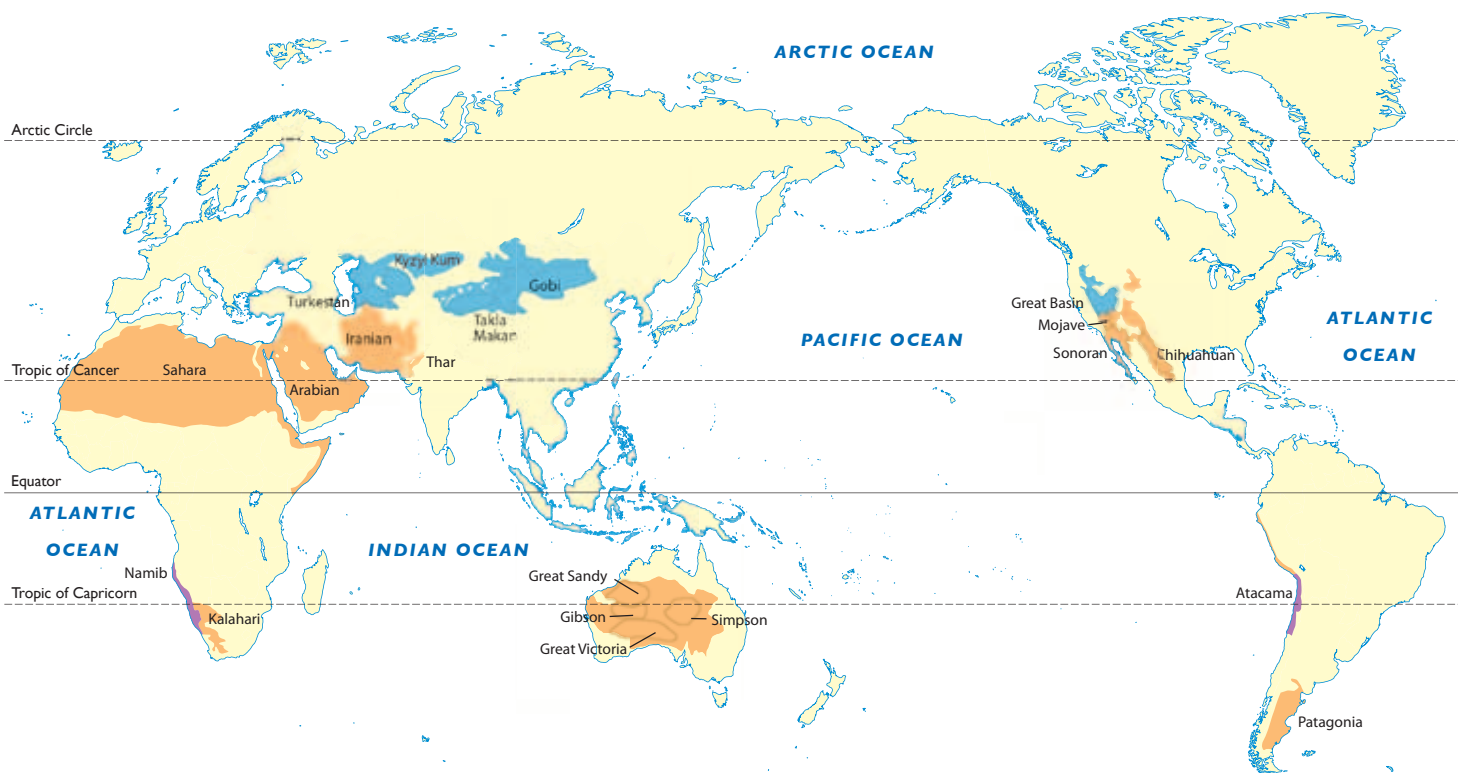
- c** Give the grid reference for the Cultural Centre and Park headquarters. _____
- d** Give the grid reference for the centre of Uluru. _____
- 4** Draw a scale map of your bedroom (you may need to tidy it first). Draw a grid onto your scale map, add a legend showing important features of your room and write a series of questions that require your classmates to use the grid in order to work out the answers.

What is a map?

A map is a simplified plan of an area that uses symbols and colours to represent the features in the real world.

BOLTSS

- 1 There are six key features that all maps should contain. To help remember these, their first letters make up the acronym BOLTSS: Border, Orientation, Legend (or Key), Title, Scale, Source. This is a copy of the map on page 26 of the *Oxford Atlas* (OA) with the BOLTSS elements removed. Can you replace them on the map?



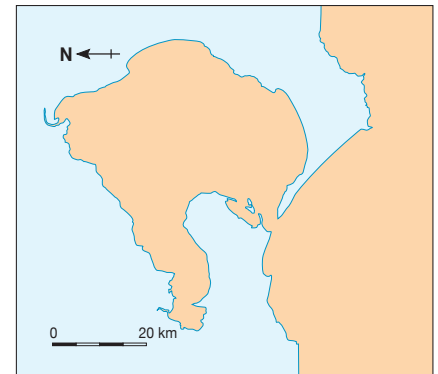
Border

- 2 A border is important because it shows the extent of the map. When you draw a map you should start by drawing the border.
 - a On the map of Manhattan Island on OA page 7 why do you think the map drawer (cartographer) has chosen to show a small part of the city of Hoboken?

 - b Apart from those on Manhattan Island, what other New York neighbourhoods are shown on the map?

Orientation

- 3** The north arrow on the map shows the orientation of the map. Most maps are drawn with north pointing to the top of the map. This helps us to recognise features. If the cartographer does not follow this convention the map can be very hard to understand, as you can see in the following map of part of the Victorian coastline.



- a** What geographic feature is shown in this map?

- b** Compare this to the map on OA page 96 of the same region with the map oriented correctly to the north. Which of these two maps is the easiest to understand? _____

Legend

- 4** The legend (or key) unlocks the code of colours and symbols used on the map to represent particular features. Look again at the Manhattan Island map on OA page 7.

- a** How many symbols are shown in the legend? _____
- b** How many important buildings are shown on this map? _____
- c** What symbol is used to show the Holland Tunnel? _____

Title

- 5** The title of the map describes what the map is showing. This map only shows part of Manhattan Island. Which part is it? _____

Scale

- 6** All maps are drawn to scale but they may be drawn to different scales. This is why the scale must be shown on every map. The scale allows us to work out how large each feature actually is, rather than how large it is on the map. Look at the map of the Arctic on OA pages 212–213.

- a** The world's two largest countries, Russia and Canada, are shown on this map. How has the cartographer been able to fit such huge countries on such a small map?

Source

- 7** Atlases generally don't include the source of their information on their maps as this would make each page too cluttered. If you use information from an atlas to draw your own map you should include the name of the atlas, the publisher, the date of publication and the place where it was published. Can you find all of this information on the imprint page in the *Oxford Atlas*? Practise writing the source here.

What is a map?

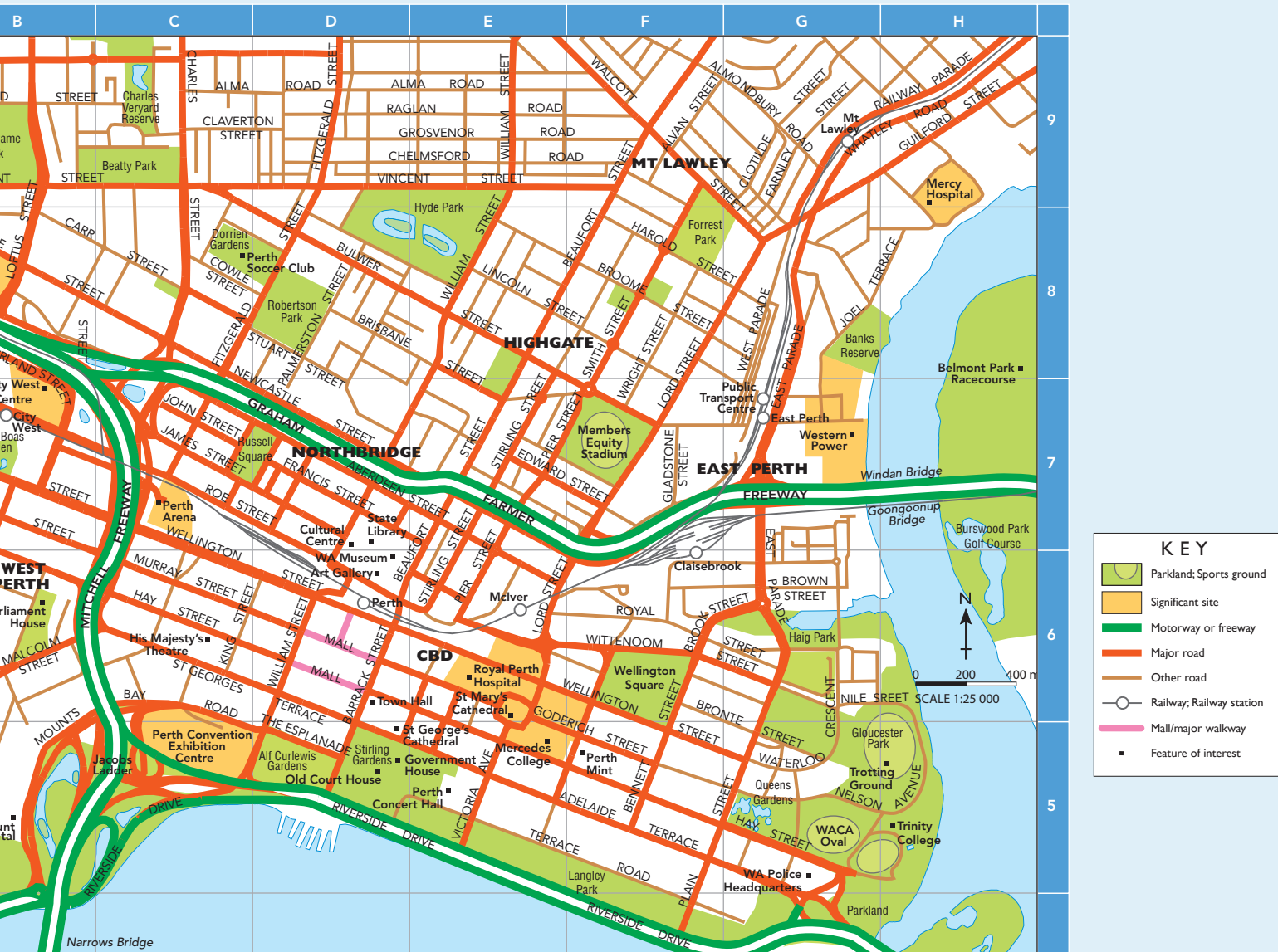
Deeper understanding

Not many people would plan a holiday without referring to a map. Soldiers use them, as do hikers, geologists, weather forecasters, pilots, sailors and city planners. In this worksheet you will discover some of the ways in which maps can be used.

Finding your way

One of the most useful features of maps is that they only show the most important details in a landscape. A city, for example, can be a confusing place to navigate. Traffic and pedestrian movement, shop signs and traffic jams can all distract us from finding our way around. A street map leaves out all of these details and shows us only what we need to know: the names of streets and important buildings.

» Perth: CBD



-
- 1 Look at the map of Perth's CBD.
 - a Draw a line showing the quickest route from Hyde Park to the Royal Perth Hospital.
 - b Now write out this route as if you were telling a friend how to travel to the hospital.

Planning an adventure

- 2 Maps are also useful because they are always drawn to scale, which makes them very accurate. In addition, maps are always drawn in plan view (from directly above) so that the scale is constant across the whole map. This accuracy can be very important, for example, for a hiker planning to walk the Kokoda Track. This is one of the world's most challenging walks and has become increasingly popular for Australians. Answer this hiker's questions using the Kokoda topographic map on page 117 of the *Oxford Atlas* (OA).

- a The track begins at Owen's Corner (GR187530). Can I drive to Owen's Corner from Port Moresby? _____
- b Is the terrain flat, reasonably flat, hilly or mountainous? _____
- c How high is the highest point on the track? _____
- d What major mountain range does the track cross? _____
- e Are there any roads out if I get into trouble on the track? _____
- f Are there any airstrips shown near the track? _____
- g What is the name of the town at the end of the Kokoda Track? _____

Predicting the weather

- 3 Another feature of maps is that extra information can be added to make them more useful. A weather map, for example, has various data about the atmosphere added to a base map so that information about the weather can be easily understood and communicated. Look closely at the weather map on the following page and use the explanation of the symbols on OA page 8 to complete these activities:

Desert environments

Desert types

About one-third of the Earth's land area can be classified as desert. Deserts contain some of the world's hottest places and also some of the world's coldest places.

1 Geographers classify (group together) deserts into three main types. Look closely at the World: Deserts map on pages 230–231 of the *Oxford Atlas* (OA).

a What are the three types of deserts found around the world?

b Examine the three photographs of desert regions listed in the table below. For each photograph, record the type of desert shown.

PHOTOGRAPH	DESERT TYPE
Namib coastal image (page 27)	
Uluru oblique aerial view (page 2)	
Mawson Station image (pages 210–211)	

2 All deserts are large areas with low rainfall and little or no vegetation. Compare the map showing the World: Deserts map on OA pages 230–231 with the World: Annual rainfall map on OA page 234.

a How much rainfall do most of the world's deserts receive each year? _____

b What is the spatial association between deserts and rainfall?

Subtropical deserts

3 Along which two lines of latitude are most hot deserts found?

4 Examine the Cairo climate graph on the right.

a What is the maximum temperature experienced in Cairo?

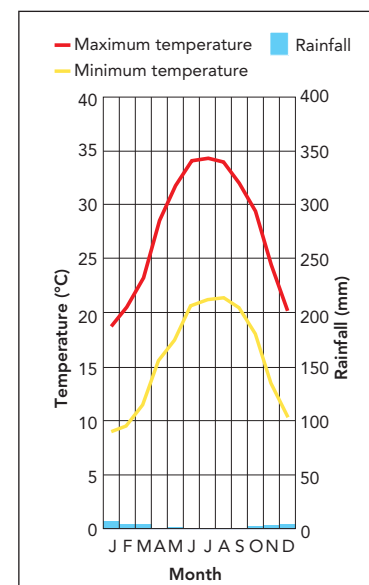
_____ °C

b How much rainfall does the city receive each year?

_____ millimetres

c How can this arid environment support a city with over 10 million inhabitants? Look carefully at this satellite image of the city on OA page 174 for the clue.

» Cairo: Climate graph



Cold winter deserts

5 Cold deserts are predominantly snow-covered mountain peaks or polar areas. Compare the World: Deserts map on pages 230–231 with the World: Landforms map on OA pages 218–219.

a Where are most of the cold winter deserts located?

b Most cold winter deserts are located how high above sea level? _____ metres

6 A large central Asian desert can be clearly seen in the top portion of the digital elevation model on OA pages 146–147.

a What is the name of this desert? _____

What differences do you notice between the land in the top of the image and the land south of the mountains?

Cool coastal deserts

7 Arica, a city of 180 000 people, is located in a desert region.

a Using the following climate data, fill in the blank climate graph below for this location.

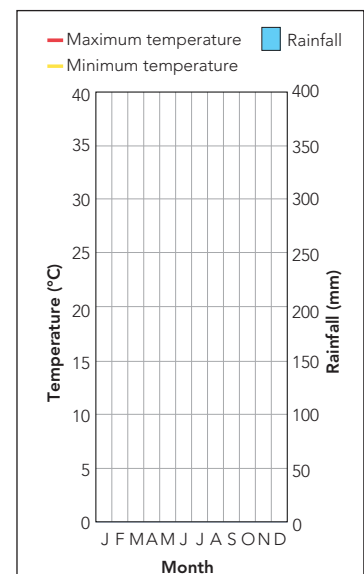
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Maximum temp (°C)	26	27	26	24	22	20	19	19	20	21	23	25
Minimum temp (°C)	18	18	17	16	14	14	13	13	13	14	16	17
Rainfall (mm)	0	0	0	0	0	0	0	0	0	0	0	0

b Arica is located at 18°30'S 70°20'W (OA page 200). In which desert is Arica located? _____

c Describe Arica's climate. Include a description of the rainfall, temperature and seasonal differences in your description.

d Where do you think the people of Arica get their water from?

» Arica: Climate graph



Desert environments

Deeper understanding

The world's desert regions are amongst the most inhospitable places on Earth. Low rainfall, searing or freezing temperatures and sparse vegetation would appear to make these places virtually uninhabitable. In this worksheet you will find out about the people who do live in the desert and the ways in which humans interact with and change these unique environments.

Population distribution

- 1 Compare the World: Deserts map on pages 230–231 of the *Oxford Atlas* (OA) with the World: Population density map on OA pages 252–253.
 - a What is the population density of most deserts? _____ per square kilometre.
 - b Why do you think relatively few people live in desert environments?

Living in a desert region

- 2 The obvious problem to overcome when living in a desert environment is a lack of water. How have each of these communities overcome this problem?
 - a Cairo, Egypt (see Cairo satellite image OA page 174)
 - b Sahara Desert, north Africa (see Sahara Desert image OA page 231)
 - c Buraida, Saudi Arabia (see OA pages 150–151)



» Water availability in Saudi Arabia

- d Use OA pages 150–151 to help you add the following labels to the above diagram:
Moist air from the ocean; Rainfall on highland region; Underground aquifer carries water; Water is accessed by deep wells; Large circular crop fields.

-
- 3 Many desert communities, particularly in the Middle East, obtain fresh water through the use of desalination plants that remove the salt from sea water. The photograph below shows the Ashkelon desalination plant in Israel. In the space provided, sketch this photograph and label the following features: freshwater storage tanks, separation tanks, access road, and power supply. Using the map on OA page 149 as a guide, label the body of water in the background. Add the three key pipelines of any desalination plant to your sketch.



Human impacts on desert regions

- 4 Some human activities have a major impact on desert environments. Examine the two scenes of Australian deserts on OA pages 58 and 78. Describe the human activities in these places and explain how they are changing the natural environment.

- 5 In many places around the world, deserts are expanding due to human activities in a process called desertification. These areas are shown on the World: Deserts map on OA pages 230–231.

a Describe the pattern of areas at risk of desertification as shown on your map.

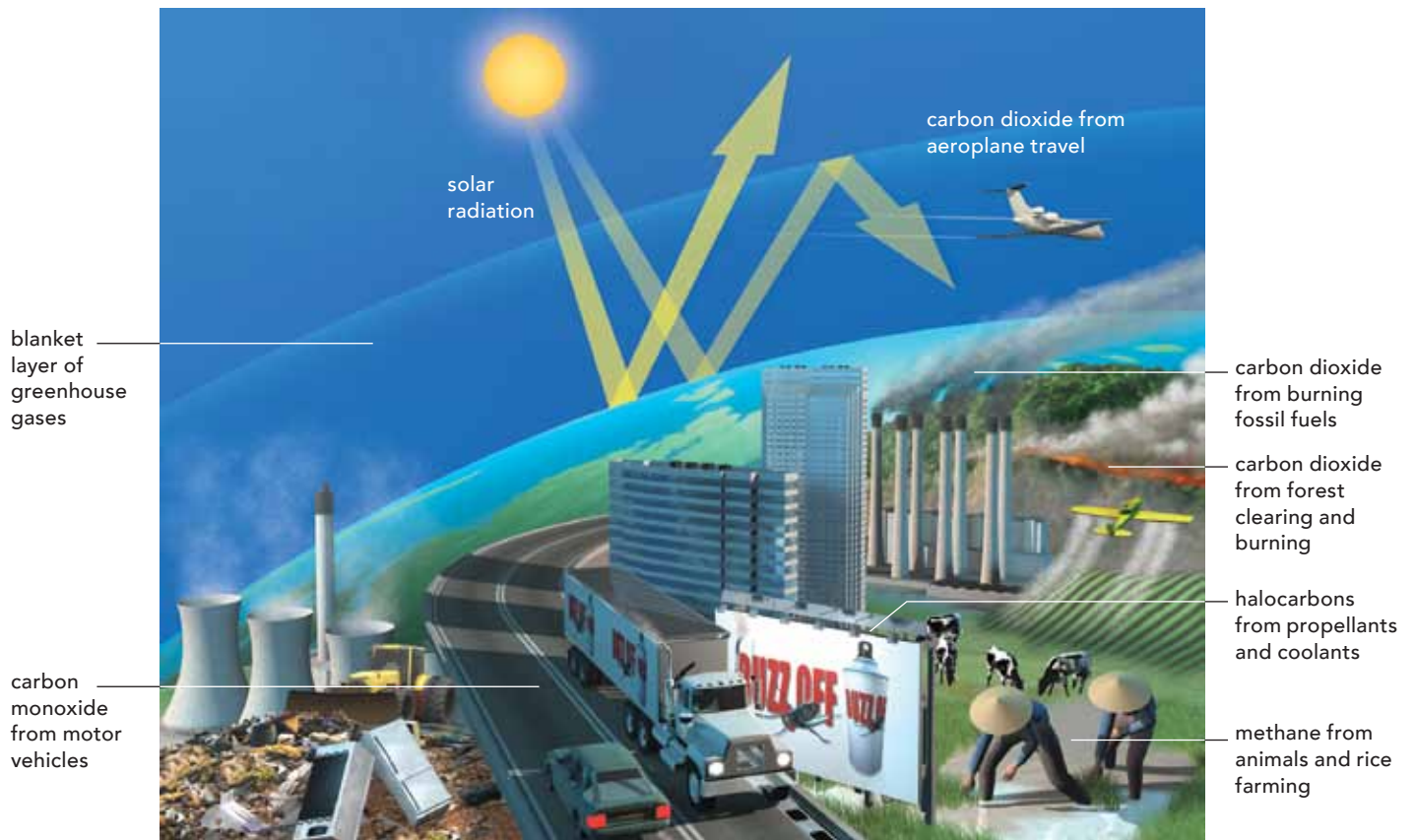
b Examine the image of Nouakchott on OA page 230. How has this process affected this African community?

c How would desertification affect communities that rely on farming for their food and livelihood?

Climate change

What causes climate change?

Climate change is considered by many geographers to be the greatest challenge we will face this century. It has the potential to change forever the natural systems and environments of our planet.



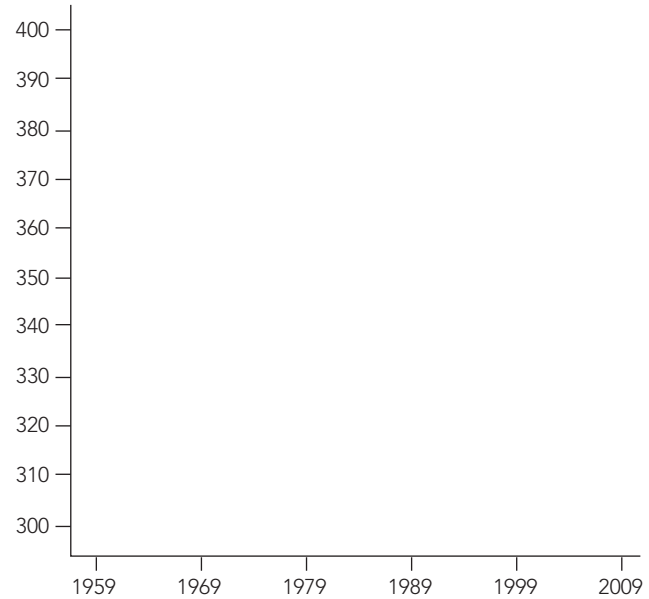
1 In this diagram you can see that solar radiation from the sun passes through our atmosphere to warm our planet. Describe what happens to the solar radiation once it reaches the Earth's surface.

2 What effect do greenhouse gases have on the outgoing solar radiation?

3 Highlight which of these natural processes you think produce greenhouse gases: ocean waves, rotting trees, evaporation of water, landslides, volcanic eruptions.

- 4 The main greenhouse gas produced by human activities is carbon dioxide. The following data shows how much carbon dioxide was in the atmosphere between 1959 and 2009 as measured on the top of a volcano in Hawaii. This is the longest continuous record of carbon dioxide concentrations we have. Use this data to construct a line graph showing the change over time in the amount of carbon dioxide in the atmosphere.

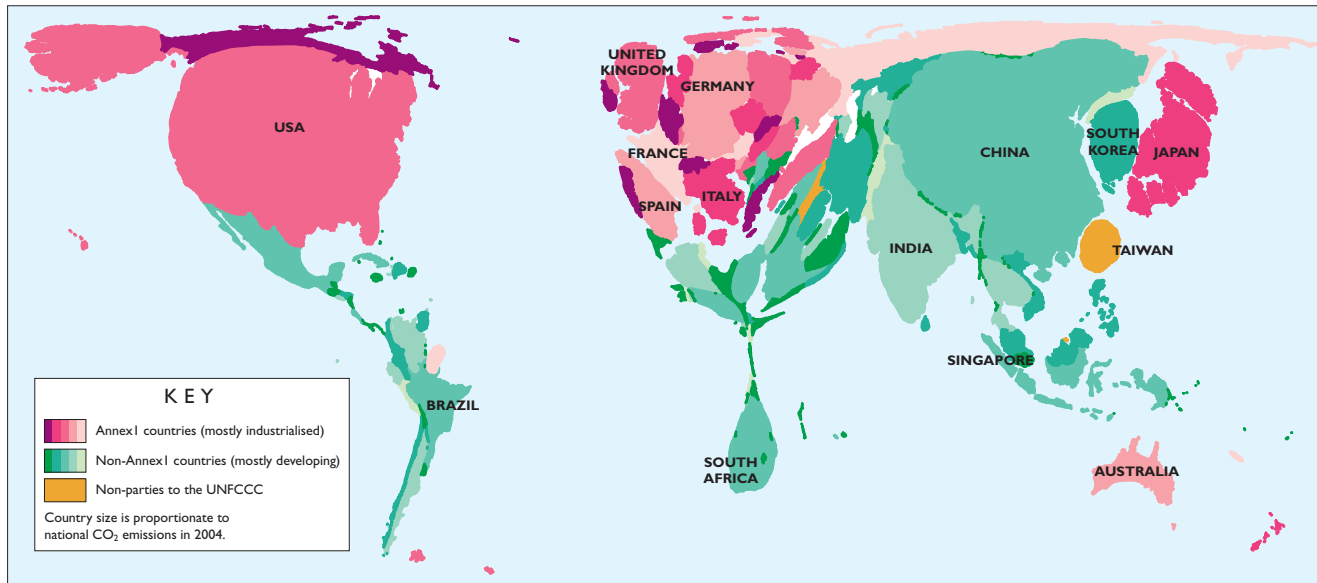
YEAR	ATMOSPHERIC CO ₂ (PPM)
1959	315
1964	319
1969	324
1974	330
1979	336
1984	344
1989	352
1994	358
1999	368
2004	377
2009	387



- 5 Describe the trend shown in your graph. Account for the changes you have described.

- 6 Some countries produce more of this gas than other countries. On the map on the following page, the countries are shown in their correct location but their size is determined by the size of their carbon dioxide emissions. What do you notice about the countries of Africa? Which two countries are the biggest producers of carbon dioxide?

» World: CO₂ emissions



7 Deforestation also leads to climate change because burning forests add greenhouse gases to the atmosphere and the forest trees are no longer able to remove the carbon dioxide and use it for growth. This satellite image shows the changes in a South American rainforest over time. In the 1980s, this region was largely covered by undisturbed rainforest. Describe how it looks now.

» Satellite image: Santa Cruz, Bolivia



8 Another underlying cause of climate change is the growth in the world's population. In 1950, the world's population was about 2.5 billion, by 2050 it is expected to be about 9 billion. Explain how the growth of the world's population leads to an increased threat of climate change.

Climate change

Deeper understanding

In this worksheet you will learn how the world is changing due to an increase in atmospheric greenhouse gases, and you will learn some of the ways in which we can reduce our reliance on fossil fuels to produce energy.

- 1 Look carefully at the Arctic Circle spread on pages 214 and 215 of the *Oxford Atlas* (OA).
- a Perhaps the most obvious impact of climate change is the increase in temperatures around the world. What percentage of the area shown on this map is expected to be warmer by 2090?

- b Are land areas or water areas expected to be much warmer in the Arctic by 2090?

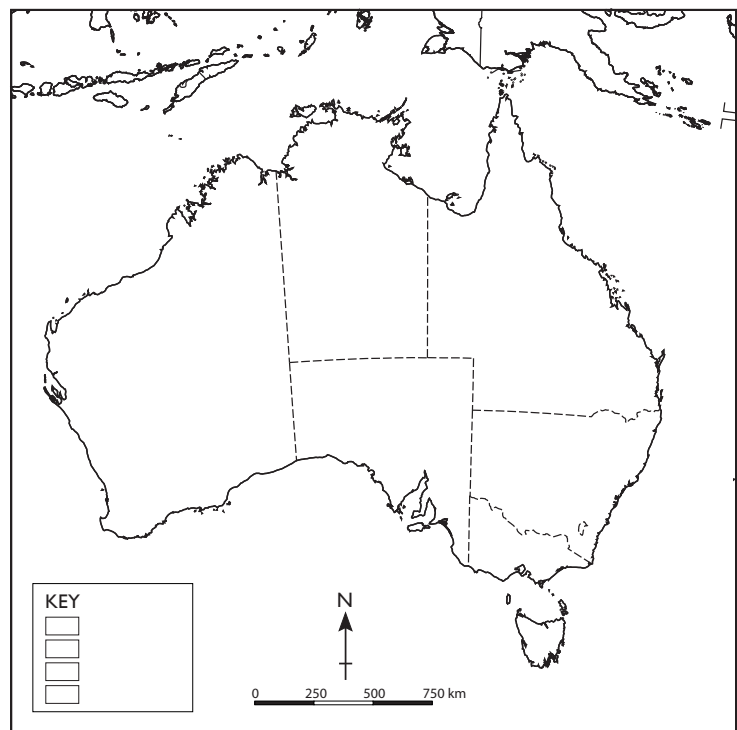
- c How have warmer temperatures affected the northern polar ice cap since 1980?

- d How would a reduction in sea ice affect polar bears, which mainly hunt on the ice?

- 2 When temperatures rise, rainfall patterns change. Examine the Australia: Rainfall variability map on OA page 52.

On this outline map of Australia, shade with light horizontal lines the regions that experienced a decline in rainfall in these years.

- 3 Compare your map to the Australia: Agricultural regions map on OA page 57. What types of farming have experienced the greatest decline in rainfall since 1950?



-
- 4 Compare your map with the Australia: Population density and distribution map on OA page 48. On your map, shade with vertical lines the regions of Australia with a population density greater than one person per square kilometre.
 - 5 Describe the spatial association between population density and regions becoming drier in Australia.

- 6 Finish your map with BOLTSS.
- 7 Perhaps the greatest way to reduce greenhouse gases in the atmosphere is to use alternative sources of fuel to produce energy. Many of these fuel sources, shown in the World: Renewable energy pie graph on OA page 262, are also renewable. This means that, unlike fossil fuels, they won't run out. What are the main sources of renewable energy used in the world today?

- 8 By far the most common form of renewable energy currently used is hydro-electric power. There is an illustration and a photograph of a hydro-electric dam on OA page 100. Explain how this type of electricity generation is a renewable form of energy.

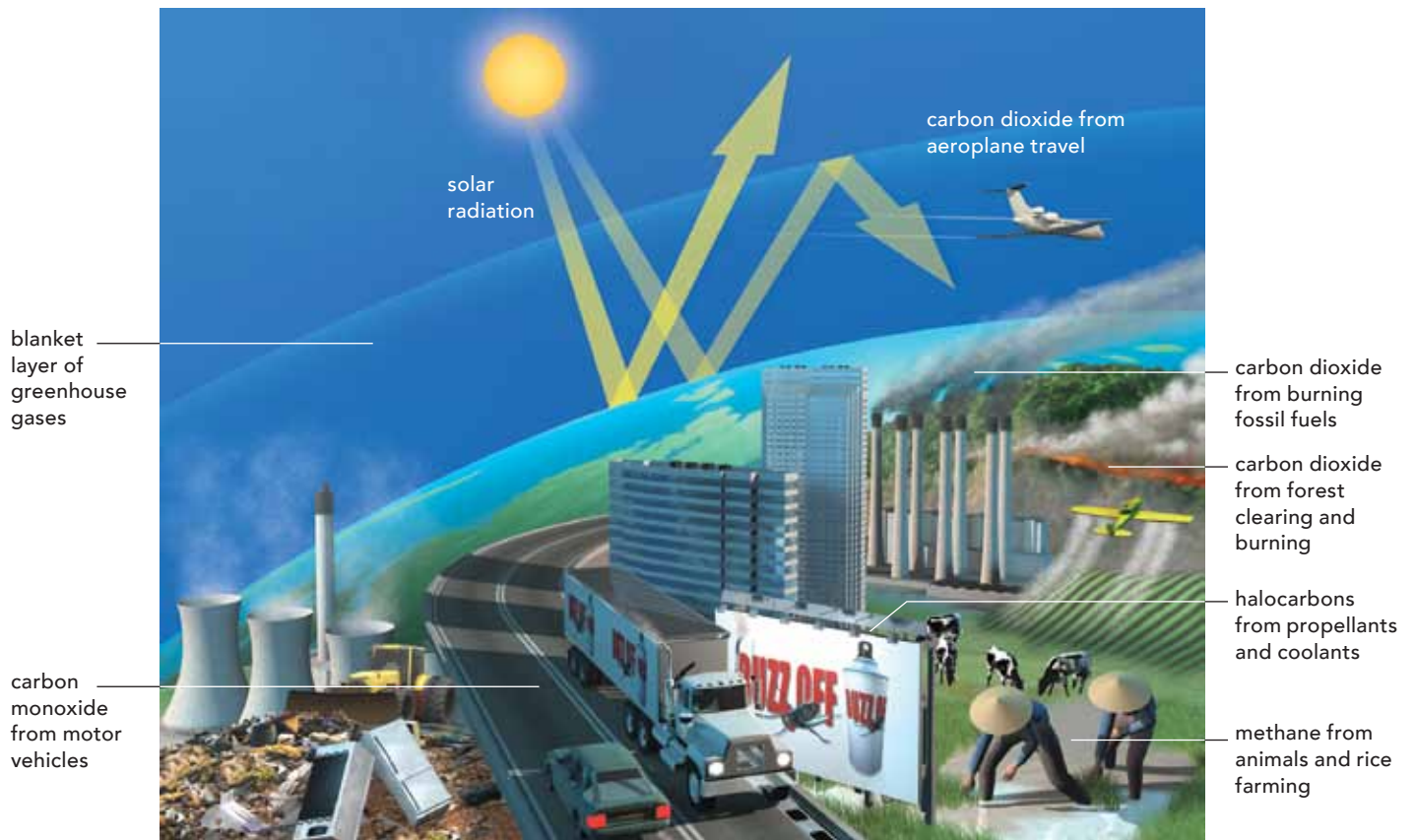
- 9 Where would you place a hydro-electric dam on the river in the illustration below? Add a dam to the illustration and show the extent of the lake behind it. Show the power lines leading from the dam and the access roads that would be needed for workers to reach the dam.



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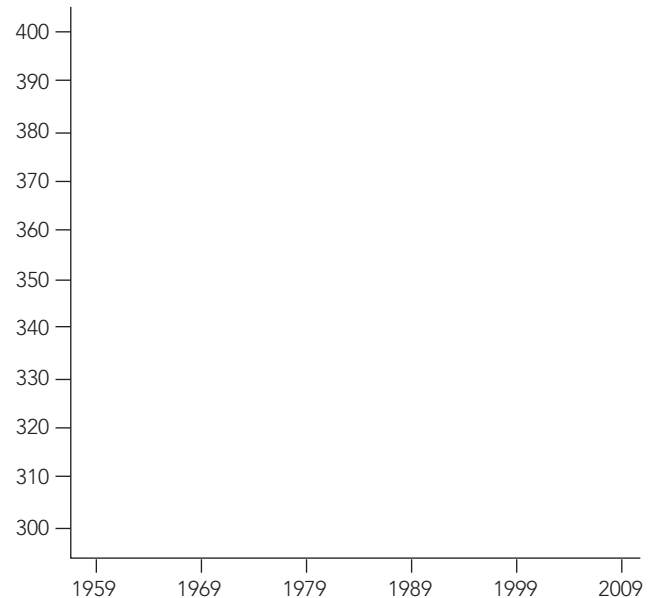
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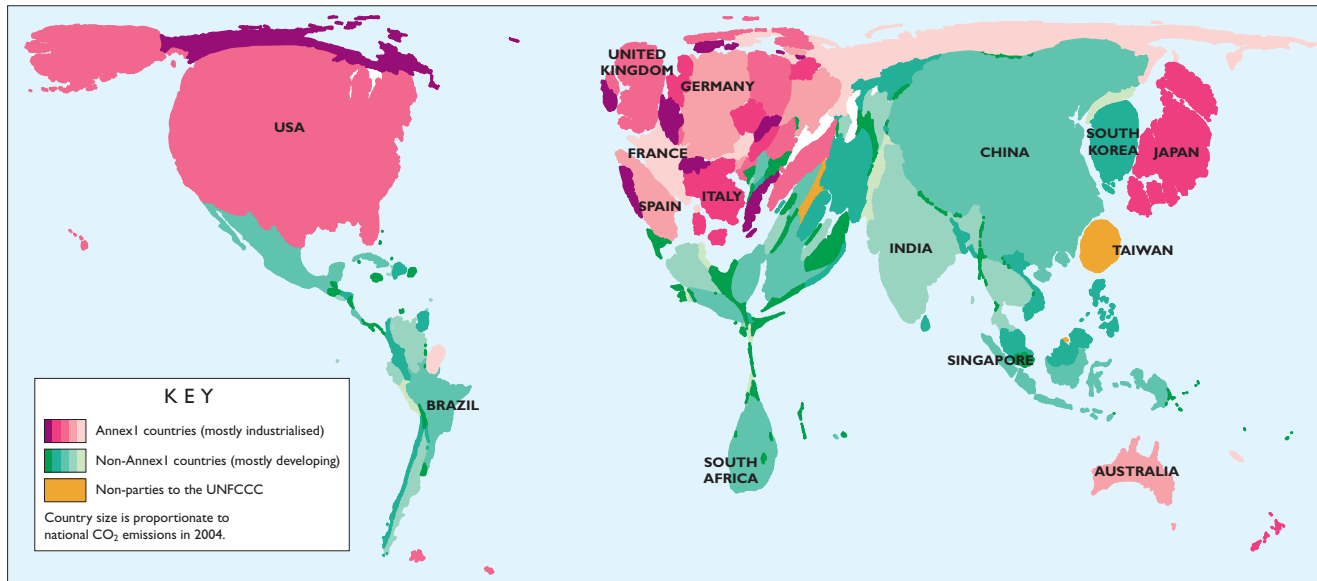
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Climate change

Deeper understanding

In this worksheet you will learn how the world is changing due to an increase in atmospheric greenhouse gases, and you will learn some of the ways in which we can reduce our reliance on fossil fuels to produce energy.

- 1 Look carefully at the Arctic Circle spread on pages 214 and 215 of the *Oxford Atlas* (OA).
- a Perhaps the most obvious impact of climate change is the increase in temperatures around the world. What percentage of the area shown on this map is expected to be warmer by 2090?

- b Are land areas or water areas expected to be much warmer in the Arctic by 2090?

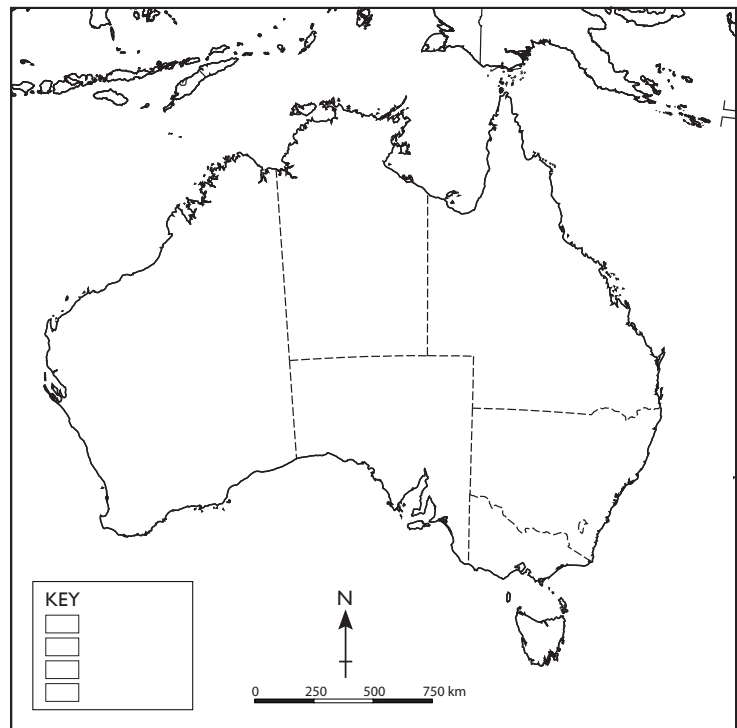
- c How have warmer temperatures affected the northern polar ice cap since 1980?

- d How would a reduction in sea ice affect polar bears, which mainly hunt on the ice?

- 2 When temperatures rise, rainfall patterns change. Examine the Australia: Rainfall variability map on OA page 52.

On this outline map of Australia, shade with light horizontal lines the regions that experienced a decline in rainfall in these years.

- 3 Compare your map to the Australia: Agricultural regions map on OA page 57. What types of farming have experienced the greatest decline in rainfall since 1950?



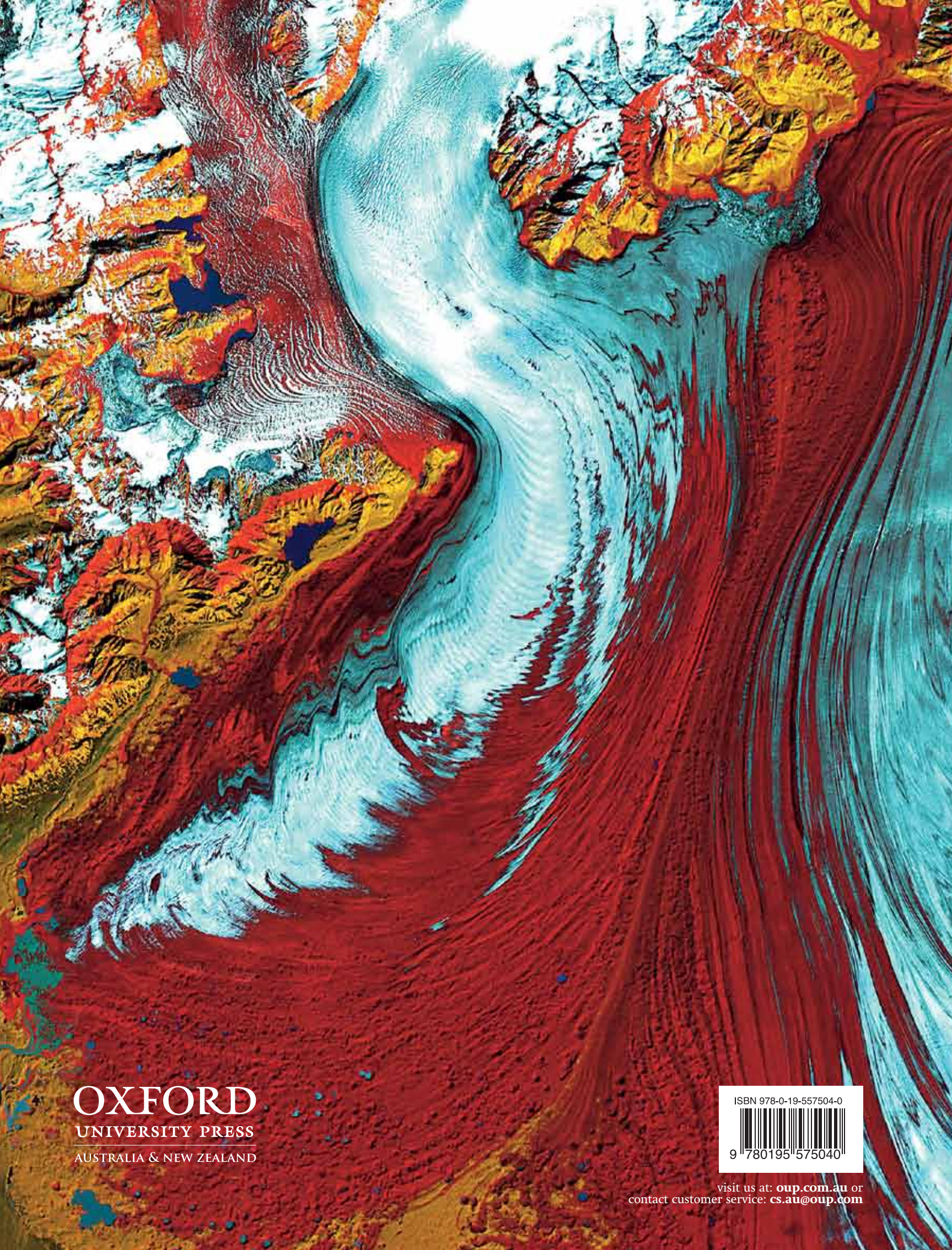
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- 4 Compare your map with the Australia: Population density and distribution map on OA page 48. On your map, shade with vertical lines the regions of Australia with a population density greater than one person per square kilometre.
 - 5 Describe the spatial association between population density and regions becoming drier in Australia.

- 6 Finish your map with BOLTSS.
- 7 Perhaps the greatest way to reduce greenhouse gases in the atmosphere is to use alternative sources of fuel to produce energy. Many of these fuel sources, shown in the World: Renewable energy pie graph on OA page 262, are also renewable. This means that, unlike fossil fuels, they won't run out. What are the main sources of renewable energy used in the world today?

- 8 By far the most common form of renewable energy currently used is hydro-electric power. There is an illustration and a photograph of a hydro-electric dam on OA page 100. Explain how this type of electricity generation is a renewable form of energy.

- 9 Where would you place a hydro-electric dam on the river in the illustration below? Add a dam to the illustration and show the extent of the lake behind it. Show the power lines leading from the dam and the access roads that would be needed for workers to reach the dam.





OXFORD
UNIVERSITY PRESS
AUSTRALIA & NEW ZEALAND

ISBN 978-0-19-557504-0



9 780195 575040

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