
solutions for all
Social Sciences
M Friedman
P Ranby
E Varga
Learner's Book
8
CAPS
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Social Sciences

Grade 8

Learner's Book

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First published 2013

13 15 17 16 14
2 4 6 8 10 9 7 5 3 1

Published by
Macmillan South Africa (Pty) Ltd
Private Bag X19
Northlands
2116
Gauteng
South Africa

Design and typesetting by Resolution
Cover design by Deevine Design
Cover image by AAI Fotostock
Illustrations by: Tamara Joubert; Sean Strydom; Claudia Eckard; Daniella Levin

e-ISBN: 9781431026302
ISBN: 97814-3101-488-0
WIP: 4565M000

Acknowledgements
The publisher would like to thank the following for the use of their photographs:
(Key: b = bottom; l = left; m = middle; r = right; t = top)

AAI/Fotostock: pp. 1, 2m, 11t, 11l, 11m, 11mr, 21t, 31t, 38r, 42, 54t, 54m, 58b, 59m, 59b, 72t, 76, 81, 82, 84b, 89l, 89r, 90, 101t, 101br, 102, 113, 116b, 119, 139, 146, 149rl, 149tr, 149bl, 149br, 137, 171, 174l, 174r, 184, 185b, 194r, 199, 200, 203, 205, 208, 209, 223r, 223l; Afripics: p. 98; AKG Images: p. 114; Bigger Picture: pp. 95bl, 96; British Museum: p. 190; Cape Archives: pp. 156; Corbis: p. 11b, 27, 38l, 45, 70, 72t, 72b, 77, 80; Deirdre Hewitson: pp. 67, 68; Ditsong: p. 219; Gallo Images: pp. 19, 56, 94, 95tl, 95br, 100, 180; Granger: p. P. 194l; Greatstock: pp. 53, 58t, 62, 71, 72m, 72b, 143, 175l, 175r, 178, 185t, 187, 193, 194b, 195l, 195r, 211; INPRA: pp. 59t, 110, 111, 116t, 118, 130, 133, 152b, 164tl, 164tr, 166; Kobus Botha Weather: p. 23; Mary Evans: pp. 176, 210; Museum Africa: pp. 125, 145, 142, 143, 144, 145, 152t, 153, 154, 159. 160t, 190b, 161t, 161b, 165b, 186; Nation Building: p. 54b; NGI: pp. 61, 63, 64, 65, 88; Photo Access: 84t, 86, 95tr, 103, 221l, 221r, 229; Picture Desk: p. 96
Sat Image Corp: 21b, 22b; University of KwaZulu-Natal: p. 126

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GEOGRAPHY

HISTORY

Topic 1

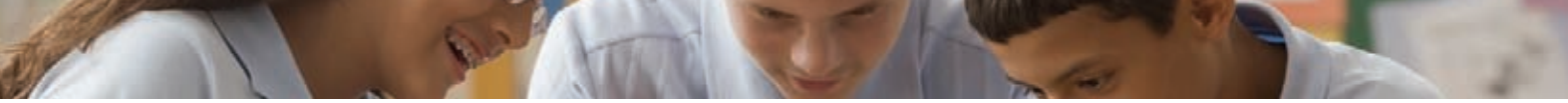
Maps and globes

What this topic is about

- Using latitude and longitude to locate places
- Map scales in atlases
- What causes day and night to happen
- Reasons for time differences around the world
- Why we have seasons
- Uses of satellite images

Look at the picture

1. What do we call the object that the children in the photograph are looking at?
2. Suggest reasons why this is a useful resource in a Geography class.
3. Name the continents and oceans you can see on the object.
4. What are satellites and why are they useful?

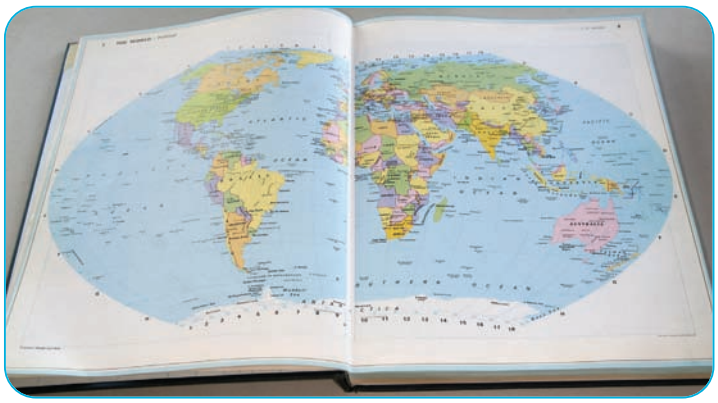


Unit 1 Maps and atlases

Word bank

distorted	changed so that it is no longer accurate
representations	in the case of maps these show parts of the earth in a way that we can see a lot of information easily

An atlas is a book of maps. Maps are accurate **representations** of different parts of the world. A globe is a round model of the earth. Globes are useful because they show the world the way it really looks from space. The continents are in the correct position and have the correct shape. When continents are shown on maps, their size, location and shape may be **distorted** because maps show the earth in a 'flattened' way. Maps show more detail than globes. Maps are also easier to use than globes.

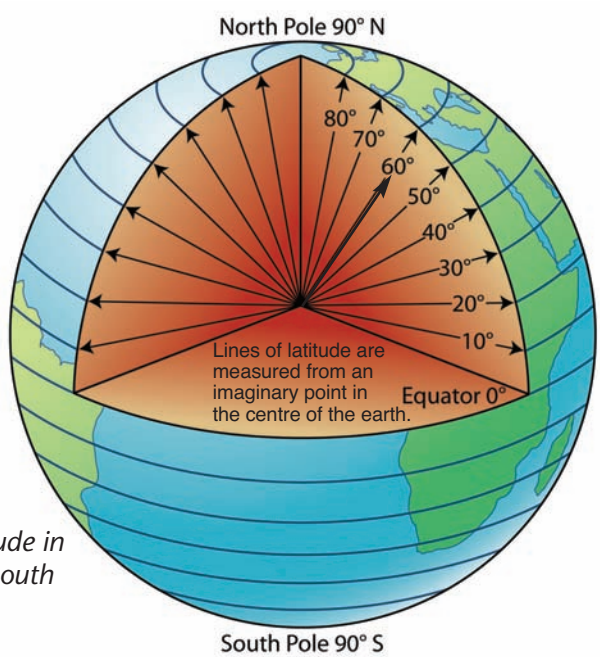


A world atlas is a book of maps that show different parts of the world.

1. Latitude and longitude – degrees and minutes

Lines of latitude

Lines of latitude are imaginary lines that circle the globe from east to west. They are used to locate places on the earth's surface. The equator is the line of latitude with the greatest diameter as it is the 'fattest' part of the earth. We give values to lines of latitude in degrees. The equator is the 0° line of latitude. We measure the angle of each line of latitude from the equator.



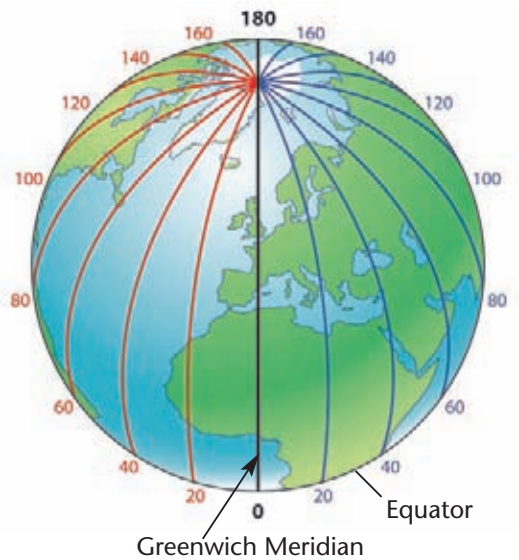
We measure lines of latitude in degrees both north and south of the equator.

Word bank

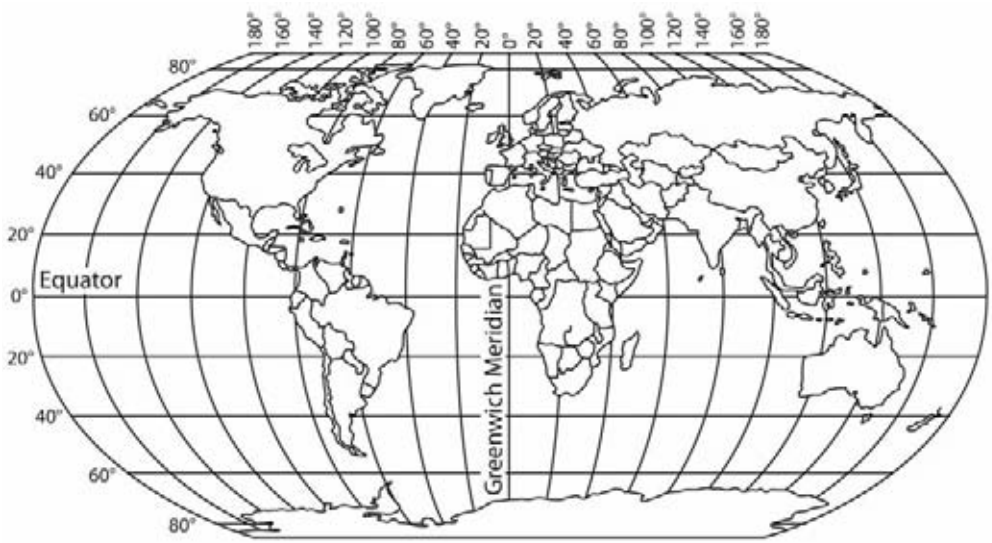
estimate an approximate or rough judgement

Lines of longitude

Lines of longitude are imaginary lines that circle the globe from north to south. Lines of longitude are also called meridians. Each line of longitude passes through the North Pole and the South Pole. You should remember that the Greenwich Meridian (or Prime Meridian) is the 0° line of longitude. We calculate world time in zones from the Greenwich Meridian. There are 360 degrees of longitude on the globe that represents the earth. This is divided equally into 180 degrees east and 180 degrees west of the Greenwich Meridian.

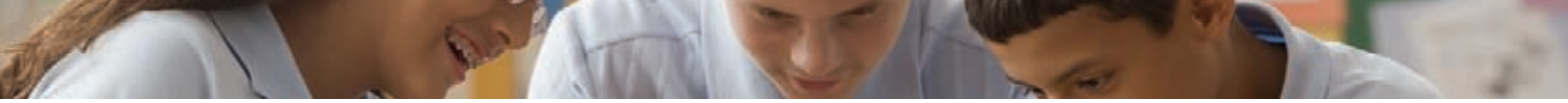


Lines of longitude are measured to the east and to the west of the Greenwich Meridian.



We use lines of latitude and longitude on maps and globes to help locate places on the earth more accurately. For example, we can say a place is 30 degrees south (of the equator) and 10 degrees east (of the Greenwich Meridian). Maps only show certain lines of longitude. Most world maps only show lines of longitude and latitude 10 degrees or 20 degrees apart. You need to **estimate** where the lines that lie between these will be.

On maps that show larger areas such as a province, we may show lines of latitude and longitude in one-degree intervals.



Word bank

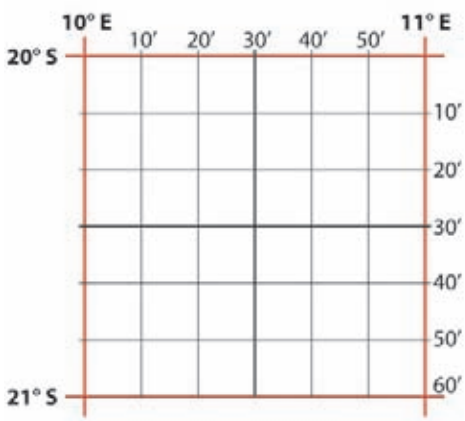
co-ordinates	the point where one line of latitude and one line of longitude cross or meet

Locate places on maps using degrees and minutes

Maps that show larger areas have big spaces between each degree of latitude and longitude. To make locating places easier on these maps, we divide each degree into smaller units called minutes. There are 60 minutes in one degree – that's a lot of lines!

How to divide a degree into minutes

- Divide the space between one degree line and the next degree line in half – this is 30 minutes.
- Next divide the space in each half into three columns – these are ten-minute columns.
- Then divide each 10-minute column into ten equal one-minute lines.

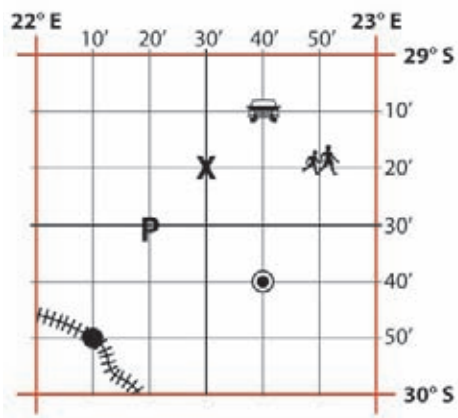


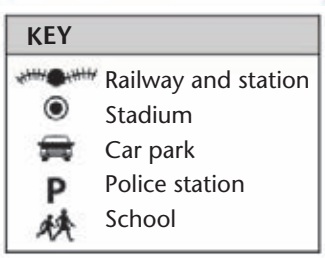
There are 60 minutes in one degree.

We use degrees and minutes to locate places on the earth more accurately. We do not show minutes on maps because all the lines would block out the detail of the map. You have to estimate where the minutes will go.
The symbol for degrees is ° and the symbol for minutes is ′.

Follow the instructions to help you give accurate degree and minute references for places on maps.

1. The latitude position of point X on the drawing to the right is 29 degrees and 20 minutes south. We can write this as **29° 20′ S**.
2. The longitude position of point X is 22 degrees and 30 minutes east. We write this as **22° 30′ E**.
3. When we combine latitude and longitude position we have the **co-ordinates** of a place. The co-ordinates for point X are: **29° 20′ N, 22° 30′ E**. (Note: We usually state the latitude position first.)





Classroom activity 1.1

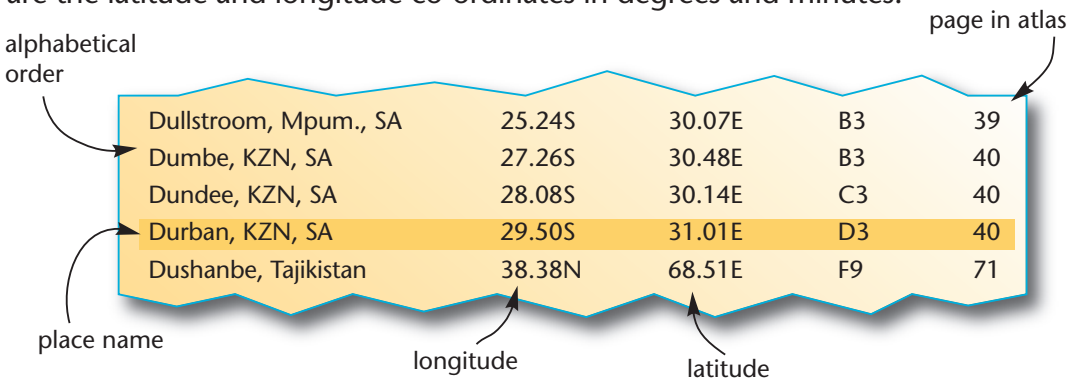
Work on your own and study the same map grid above.

1. Identify the symbols at:
   a) 29° 50′ S, 22° 10′ E
   b) 29° 10′ S, 22° 40′ E
2. Give the latitude and longitude positions for:
   a) the police station
   b) the school.

2. Using the atlas index to find places on a map

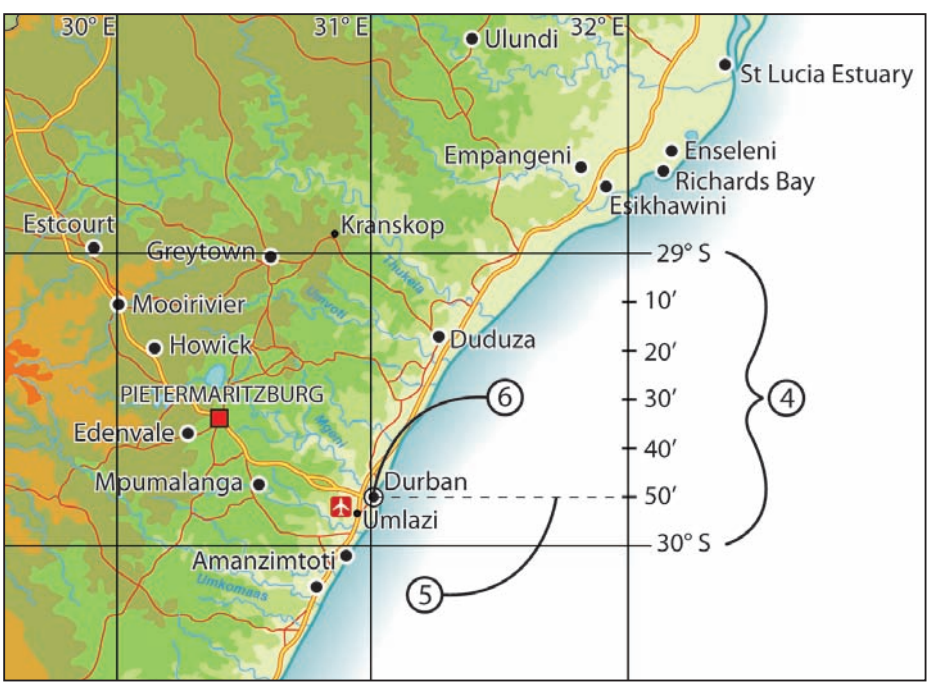
An index lists names of places in alphabetical order. The atlas index is at the back of the atlas. You will see a set of numbers next to each place name in the index. These are the latitude and longitude co-ordinates in degrees and minutes.

Part of an index from an atlas

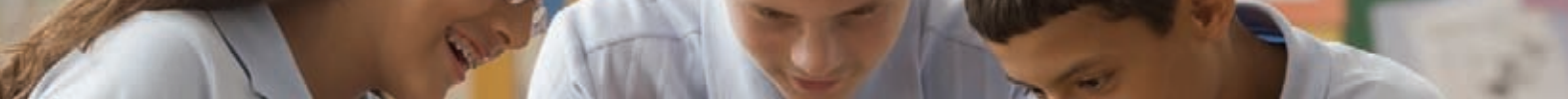


When you give the co-ordinates of a place, you state the latitude position first and the longitude position second. The following steps will help you locate places using an atlas. The city of Durban is used as an example.

1. Find the name of the place you want to locate in the alphabetical index. Durban will be under 'D'.
2. Write down the page number in the atlas and the latitude and longitude co-ordinates, e.g. 29° 50′ S, 31° 01′ E.
3. Go to the correct page in the atlas; in this case, page 40.
4. Look for the 29° and 30° lines of latitude. You know that Durban is between these two lines of latitude from its position: 29° 50′ S.
5. Find the latitude position: Durban's latitude is 29° 50′ S. You need to estimate where the minutes will be. You can estimate where the 50-minute line of latitude will be by finding the 60 minute line. You know that 60 minutes takes you to the next degree, which is 30°. So, 29° 50′ S will be close to 30° S.



6. Find the longitude position: Durban's longitude is 31° 01′ E. This means that Durban is one minute east of 31°, so it is very close to the 31° line.
7. The point where the latitude and longitude co-ordinates meet gives you the location of the place you looked up in the atlas index. In the example of Durban, you will find the city at 29° 50′ S and 31° 01′E.

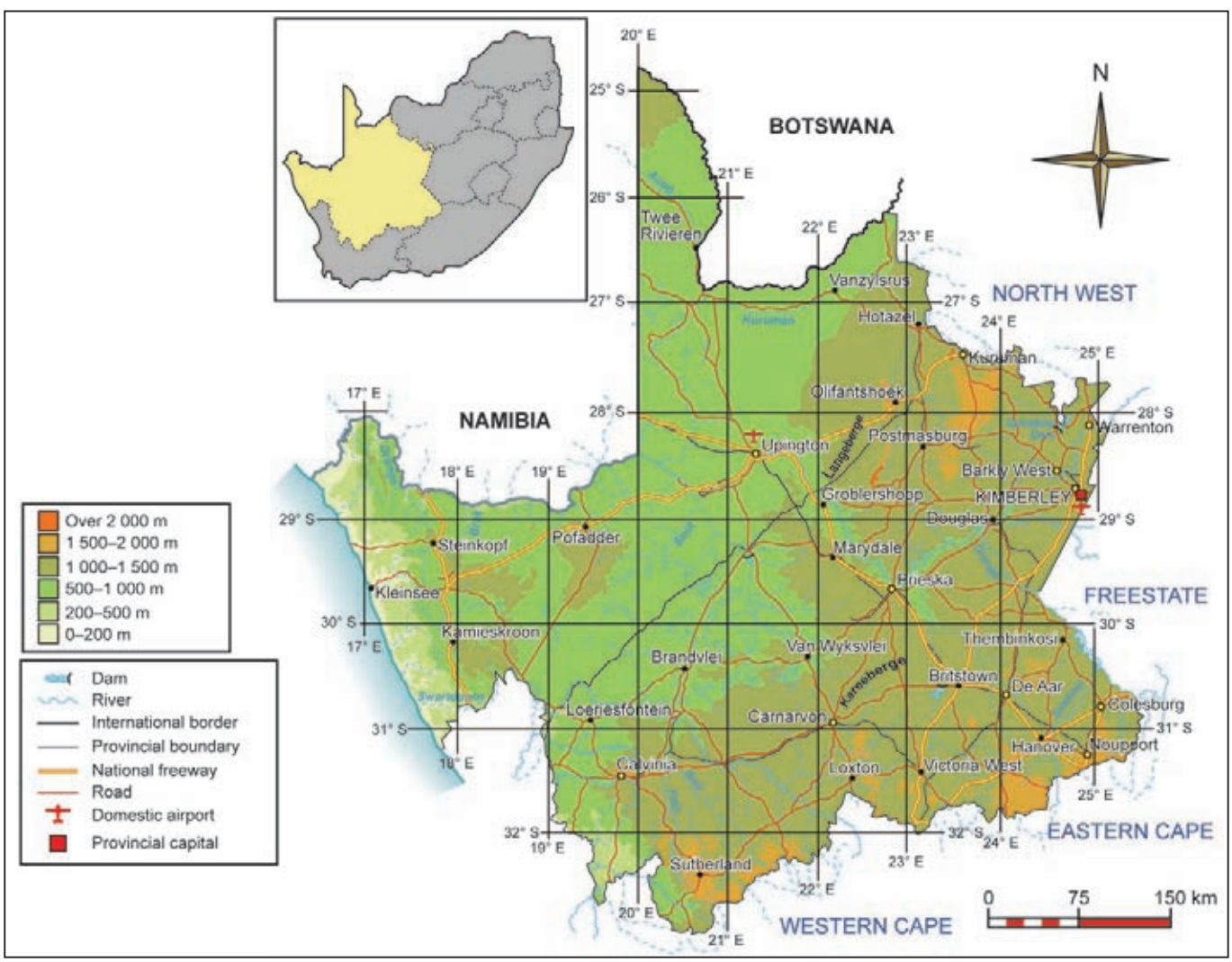


Classroom activity 1.2

Work with a partner to complete these tasks. Study the index and the map that follows. The map index shows a list of six places in the Northern Cape Province.

1. Write out the co-ordinates for:
   a) Upington
   b) De Aar.
2. Use these co-ordinates to locate Upington and De Aar on the map of Northern Cape. Point them out to another pair.
3. Create your own map index like the one on the right. Use the example to guide you.
   a) Give the latitude and longitude co-ordinates for Pofadder, Britstown, Barkly West and Calvinia.
   b) Add any two other places shown on the map. Give the latitude and longitude position for these places.

Places	Co-ordinates
Carnarvon	30° 55′ S, 22° 10′ E
Colesberg	30° 40′ S, 25° 08′ E
De Aar	30° 38′ S, 24° 02′ E
Kimberley	28° 40′ S, 24° 43′ E
Kuruman	27° 26′ S, 23° 27′ E
Noupoort	31° 15′ S, 24° 55′ E
Prieska	29° 40′ S, 22° 45′ E
Upington	28° 25′ S, 21° 15′ E
Victoria West	31° 25′ S, 23° 10′ E



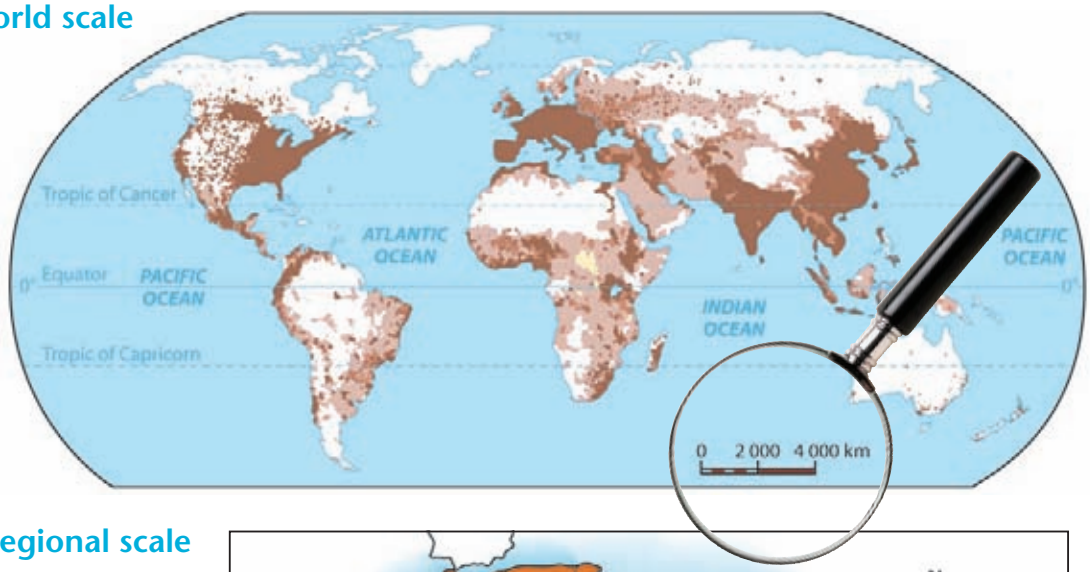
An atlas map of the Northern Cape

3. Kinds of scale in an atlas

Scale means making things smaller. You should remember from Grade 7 that not all the maps in an atlas have the same scale. The scales are different because the maps show different areas of land. Some maps in an atlas show the whole world. Some maps show countries, provinces or smaller regions. The scale of a map changes with the size of the area the map shows. Most atlases include maps at the following three scales:

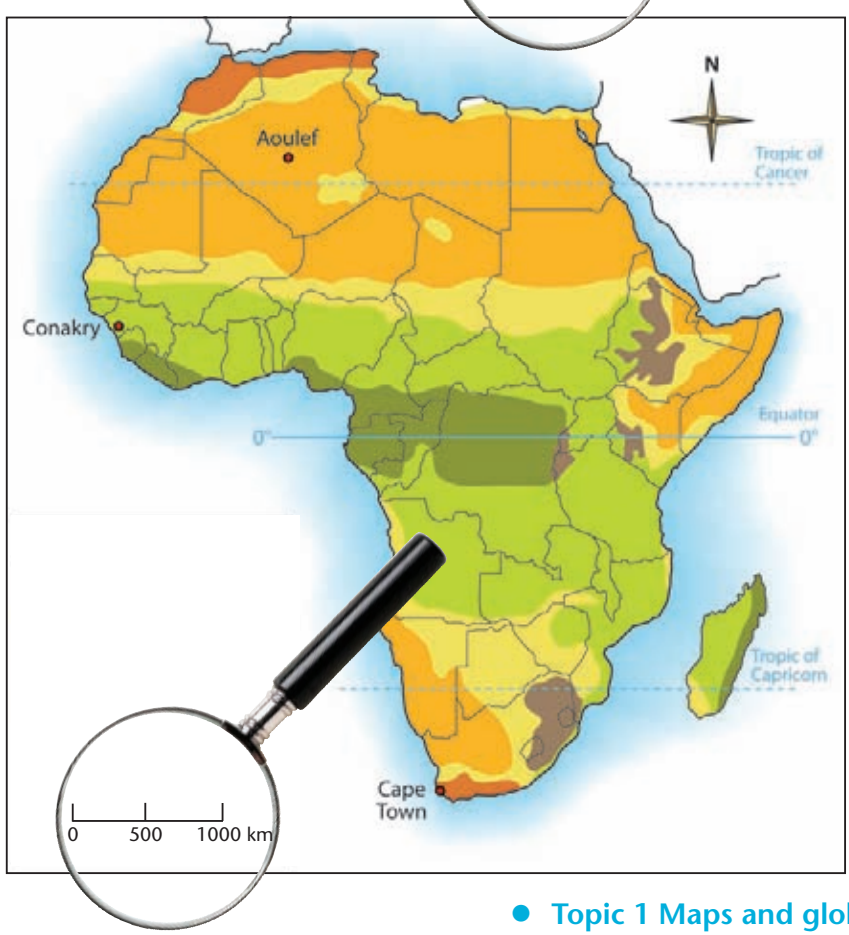
- world scale
- regional scale, such as maps of part of a continent
- local scale, such as maps of a country or province.

World scale

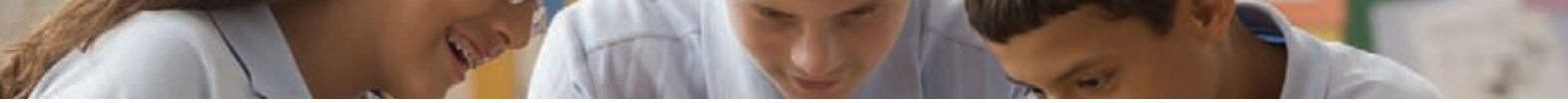


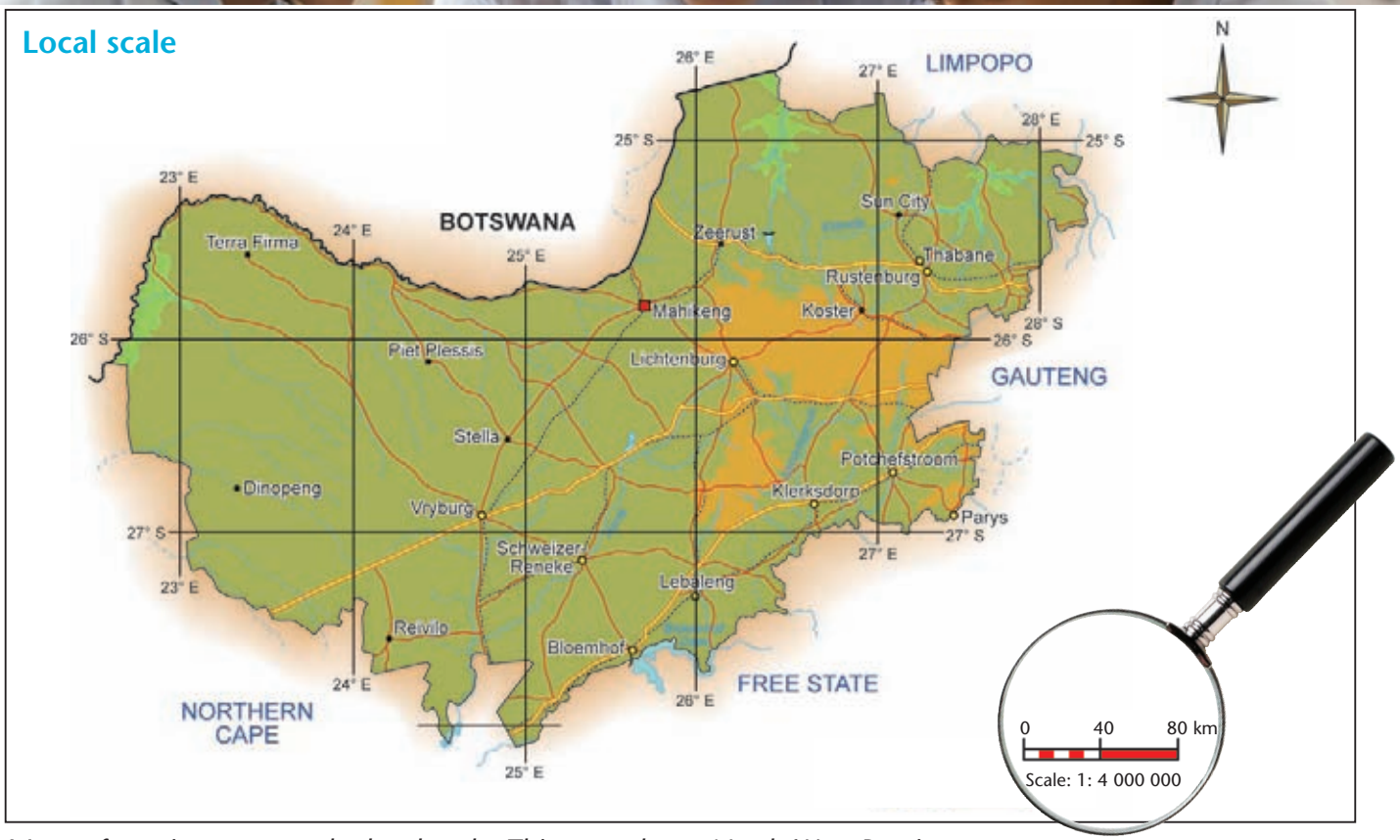
This world scale map shows population density.

Regional scale



This is a regional map that shows the natural vegetation of Africa.





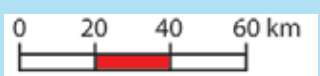
Maps of provinces are at the local scale. This map shows North West Province.

4. Scale

Maps are accurate, smaller representations of areas on the land. The map scale converts real distances on the ground to smaller distances on the map. You learnt in Grade 6 how to describe scale using a word scale and line scale.

We can describe a world scale in words, for example: *One centimetre on the map represents 20 kilometres on the ground.*

We can show the scale of the map as a line. The line scale shows the distance on the map compared to distance on the ground. For example, a line scale may show kilometres on the ground as centimetres on the map.



Classroom activity 1.3

Work on your own and answer these questions.

1. Match the two maps on page 7 and the map above with:
   a) regional scale b) local scale c) world scale.
2. Write down whether each of the following scales is for a world map, a regional map or a local map:
   One centimetre on the map represents:
   a) 25 km on the ground b) 2 000 km on the ground c) 500 km on the ground.
3. Explain why atlas maps are not all drawn to the same scale.

Word bank

ratio	relationship between two amounts based on the number of times one number can contain the other

Ratio scale or number scale

Ratio scale is another way of showing map scale. Ratio scale represents the scale in the same unit of measurement on the map and on the ground.

Example:
1 mm on the map represents 1 000 mm on the ground.
This shows us that one unit of measurement on the map represents 1 000 units of the same measurement on the ground.

We use the symbol **:** to show the ratio between the measurement on the map and the measurement on the ground.
We write the ratio scale as: **1:1 000**.

With a ratio scale we can change the kind of measurement we use. The ratio between the numbers on the map and on the ground will stay the same.
With a ratio scale of 1:1 000, we can say that:

- One millimetre on a map will represent 1 000 millimetres on the ground.
- One centimetre on the same scale map will represent 1 000 centimetres on the ground.

The ratio scale is the same provided we measure the same unit of measurement on the map and on the ground.

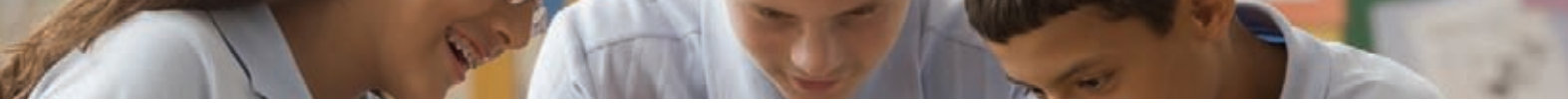
Using ratio scale to calculate distances on a map

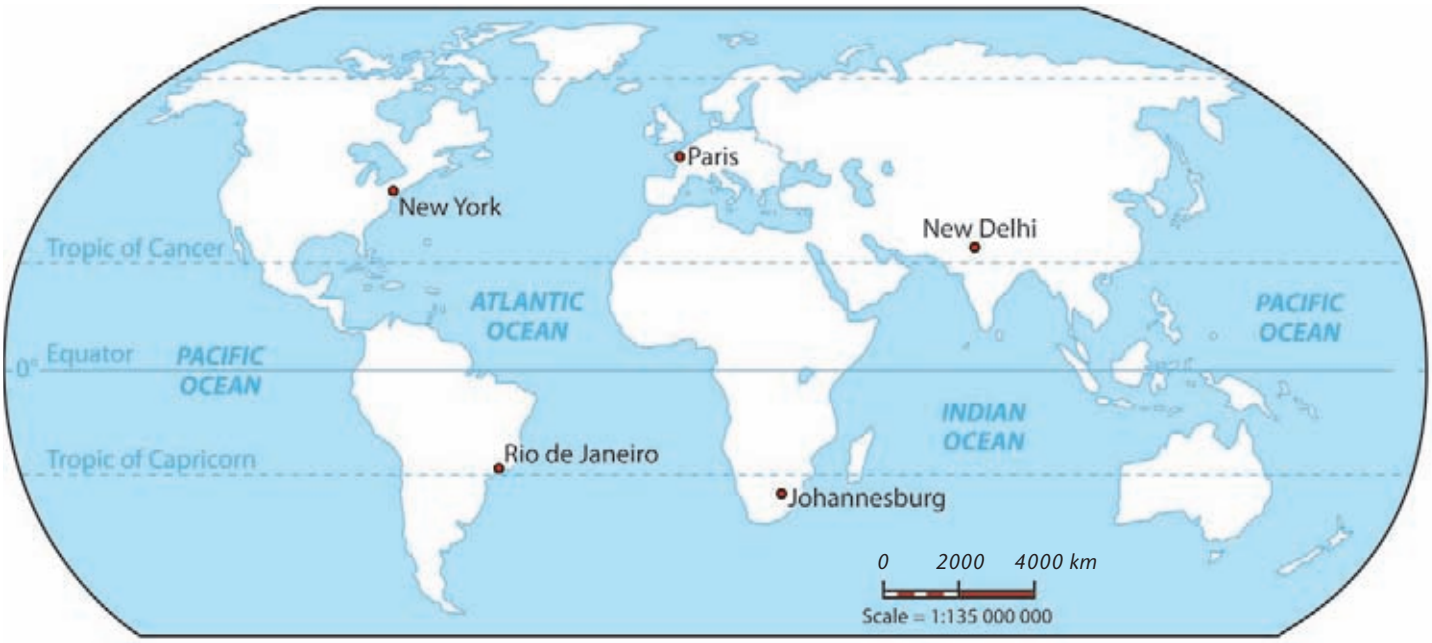
1. Measure the distance between two places on a map, e.g. **20 mm**.
2. Note the ratio scale of the map, e.g. **1:10 000**.
3. Convert the map distance to ground distance. In this example:
   1 mm on the map represents 10 000 mm on the ground.
   20 mm on the map will represent 20 mm multiplied by 10 000 mm on the ground = 200 000 mm.
4. We convert millimetres to a more useful measurement, such as metres or kilometres.
   We convert millimetres to metres by dividing by 1 000.
   200 000 mm ÷ 1 000 = 200 m.
5. We convert millimetres to kilometres by dividing by 1 000 000.
   2 000 000 m ÷ 1 000 000 = 2 km. Look at the measurement table on the left.

Measurement table
10 mm = 1 cm
100 mm = 10 cm
1 000 mm = 1 m
1 000 000 mm = 1 km

Classroom activity 1.4

1. Convert the following measurements to metres:
   a) 100 000 mm b) 500 000 mm c) 1 000 000 mm
2. Convert the following to kilometres:
   a) 1 000 000 mm b) 550 000 000 mm c) 500 000 cm
3. Write the following word scale as a ratio scale: one centimetre on the map represents 10 000 centimetres on the ground.
4. Write out the ratio scale 1:10 000 in:
   a) metres b) kilometres.





The ratio scale on a map of the world

Calculate distances between settlements using different scales

Classroom activity 1.5 will help you to practise converting map distances to ground distances using different scales.

Classroom activity 1.5

Work with a partner and study the map of the world on this page, as well as the map of the North West Province on page 8.

1. How many millimetres on the ground are represented by one millimetre on the map of the world on this page?
2. Use the line scale on the map of the world to help you calculate the straight line distances between:
   a) Rio de Janeiro and Johannesburg
   b) Paris and New Delhi.
3. Examine the map of North West Province on page 8. Use the line scale to calculate the straight line distances between Mahikeng and the following places:
   a) Rustenburg
   b) Lebaleng
   c) Vryburg.
4. Use the ratio scale on the map of the world to calculate the distance in kilometres between New York and Paris. Show all your calculations.
5. Use the ratio scale on the map of North West Province to calculate distances between the following places in kilometres. Include all the calculations for each answer.
   a) Vryburg and Bloemhof
   b) Mahikeng and Parys
   c) Thabane and Klerksdorp.

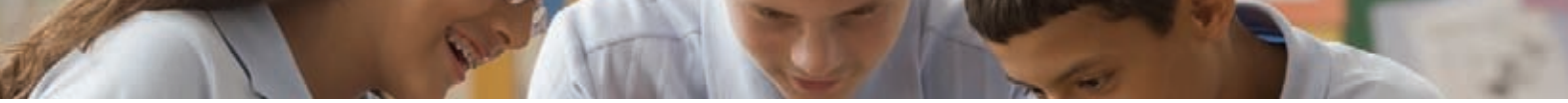
5. Places in the news

In Grades 6 and 7 you located different news events on a map of the world. You should continue keeping a world map of news events this year. It helps you to learn about the world and practise your map skills.

A news map of the world

Homework activity

1. Find at least three news stories about events that are happening in the world. You can use newspapers and magazines, television, radio programmes and the internet as sources of news stories.
2. a) Make a short summary of each story. Write the summaries in your exercise book. Number each summary (1 to 3).
   b) Write each number on a blank map of the world in the correct place.
3. Give the co-ordinates in degrees and minutes for the places where the news stories happened. You can use an atlas to give the exact co-ordinates of the places named in each of your news stories.



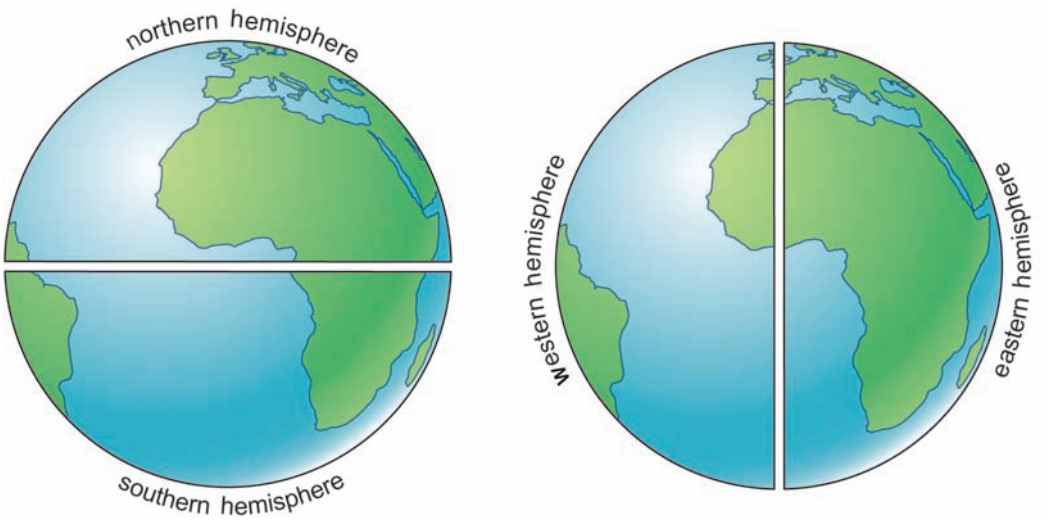
Unit 2 The globe

Word bank

axis	an imaginary line through the earth, between the North Pole and South Pole, around which the earth rotates
hemisphere	one half of the earth
rotates	to spin or turn around a fixed point

1. Hemispheres

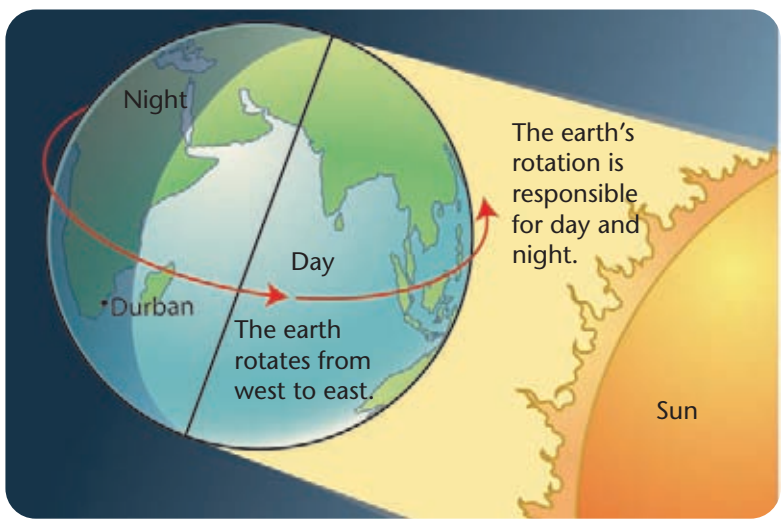
In Grade 6 you learnt that the world has four **hemispheres**. The equator divides the earth into the northern and southern hemispheres. The Greenwich Meridian and the 180° line of longitude also divide the world into the eastern and western hemispheres. Every point on the surface of the earth is in two hemispheres.



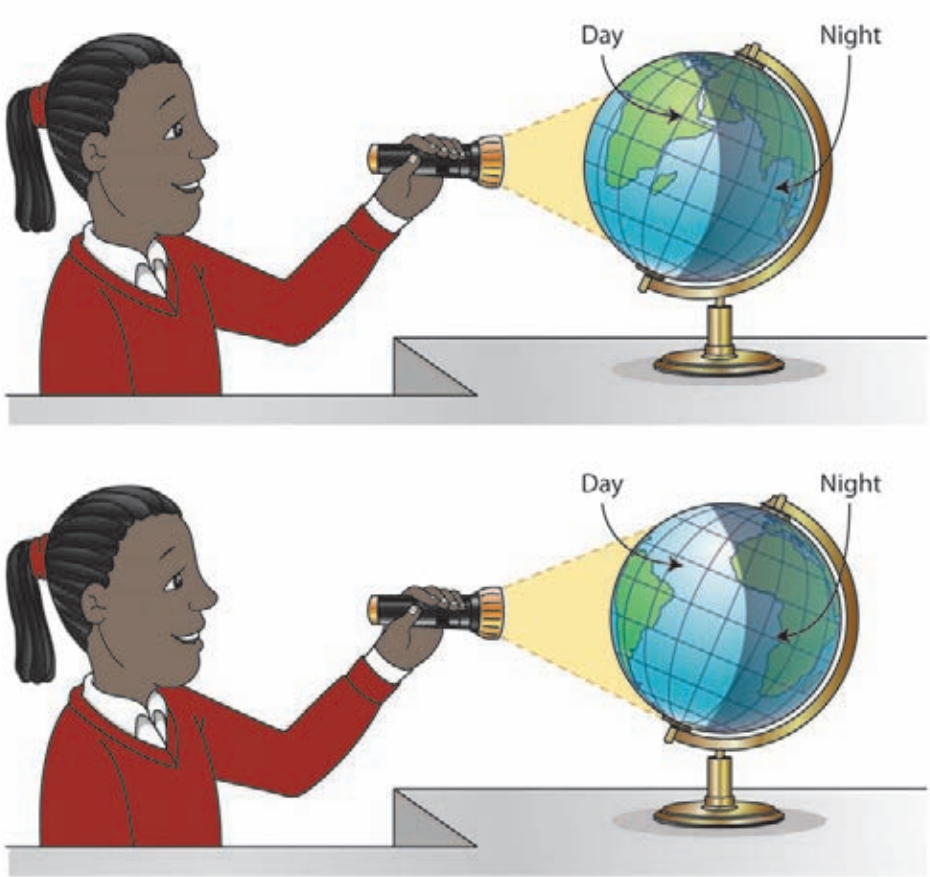
The earth's four hemispheres

2. The earth's rotation on its axis – day and night

The earth **rotates** on its **axis**. We cannot feel the earth's rotation but we know it rotates because the position of the sun in the sky changes during a day. The earth takes 24 hours to complete one 360-degree rotation. At the equator the earth rotates at a speed of 1 722 km per hour. During 24 hours, different places on the earth move into the sun's rays.



As the earth rotates, different parts of the earth's surface come into the sun's rays.

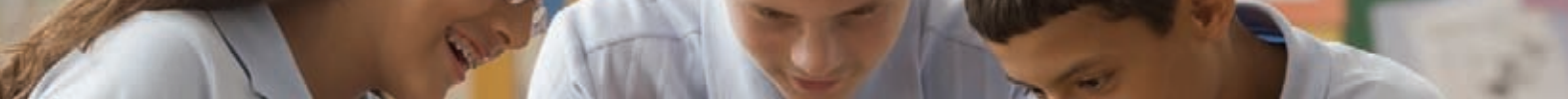


A simple experiment to demonstrate how the rotation of the earth causes day and night

Classroom activity 1.6

Work in small groups to complete this activity.

1. Use a torch and globe to do the experiment shown in the drawings above.
   a) Move the globe or ball from west to east.
   b) Notice which parts of the globe go in and out of the torch light or 'sun's rays'.
   c) Identify a place that experiences sunrise and a place that experiences sunset at the same time.
2. In which direction does the earth rotate?
3. How long does the earth take to rotate 360 degrees?
4. Name the two hemispheres where each of the following cities are located:
   a) Cape Town
   b) Moscow
   c) Los Angeles.
5. Write a paragraph to explain how the rotation of the earth causes day and night.

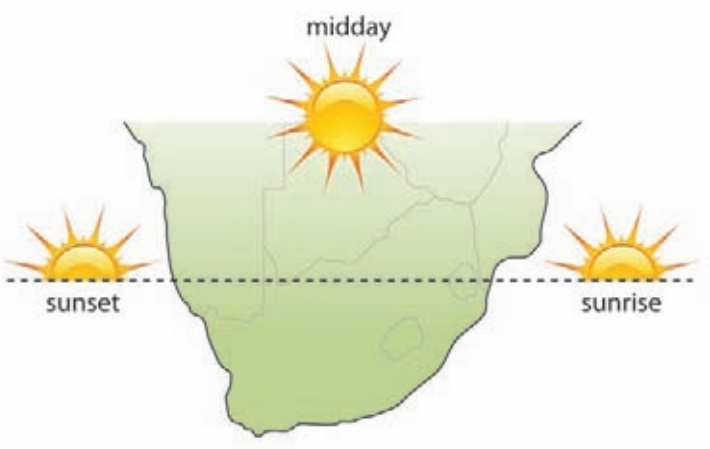


3. World time, time zones and the International Date Line

It is a different time in different parts of the world. An evening football match in Japan will happen at lunch time in South Africa. Time in Japan is seven hours ahead of time in South Africa.

Each place on the earth has day and night. Time is a measurement worked out by people. Even if you don't have a watch you can estimate the time by looking at the position of the sun in the sky.

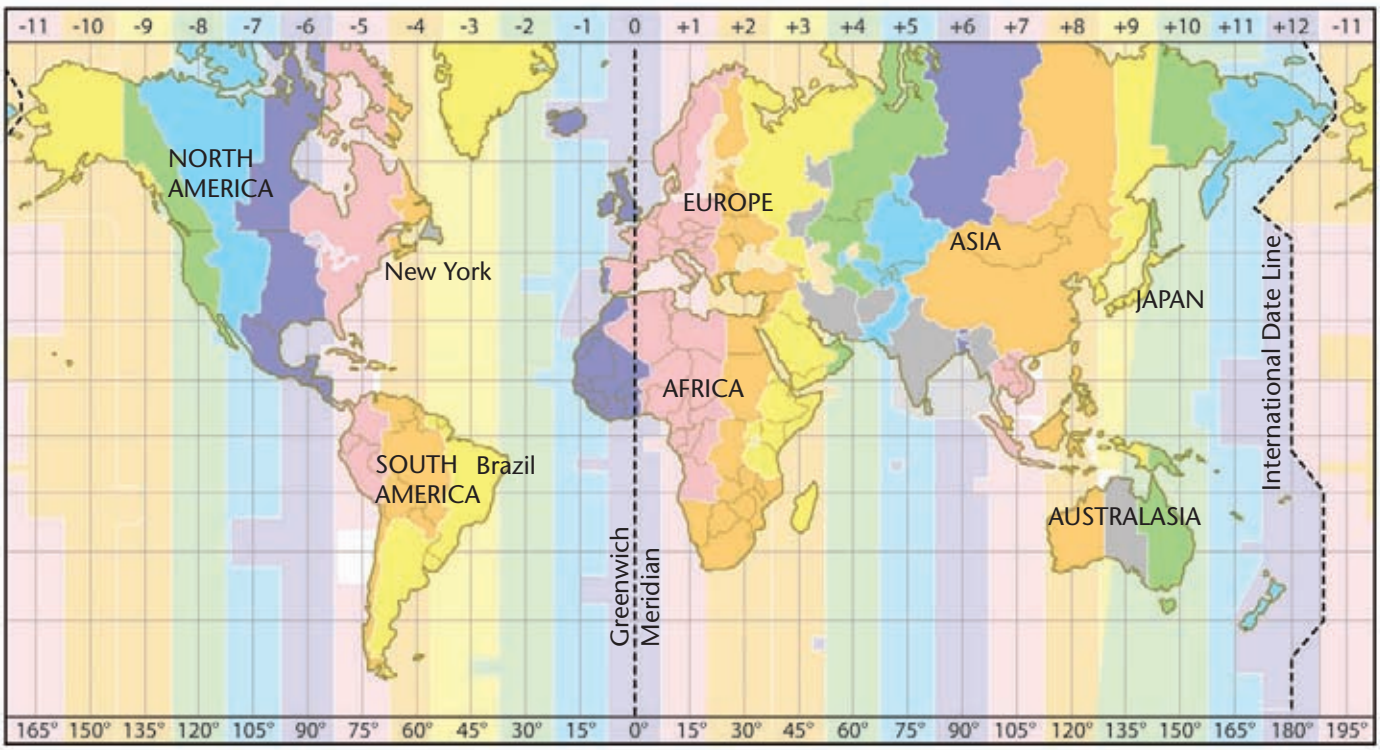
People have calculated that it takes 24 hours for the earth to complete one rotation. This means that time changes by one hour for every 15 degrees of longitude. This sum shows how to calculate time changes:
The earth takes 24 hours to complete one rotation on its axis.
360 degrees are covered in one rotation.
360° divided by 24 = 15°



The rotation of the earth from west to east means that places across the world have different times according to the sun.

World time zones

The world's time zones should change by one hour for every 15 degrees of longitude. Most countries adjust the time zones to fit in with the shape of their borders.



World time zones

Classroom activity 1.7

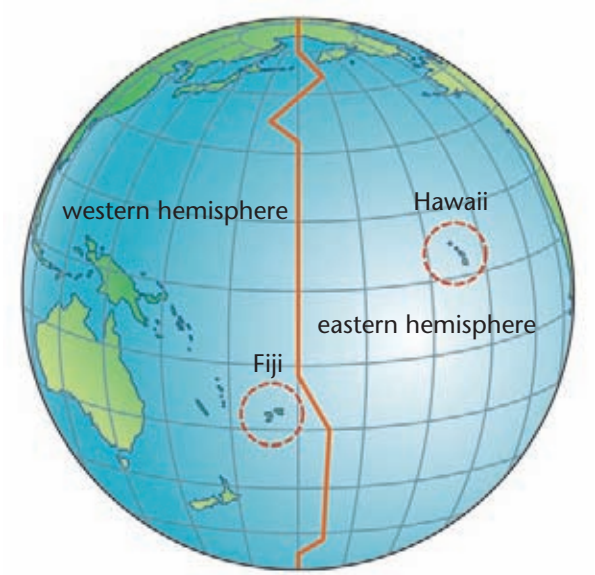
Work with a partner and answer the questions.

1. Are times earlier or later compared to South Africa in:
   a) Australia?
   b) South America?
2. What time will it be in South Africa if it is 8 p.m. in Japan?
3. Calculate the time difference between South Africa and Western Australia.
4. When it is 8 a.m. in Brazil, what time is it in South Africa?
5. Paul phoned his cousin in New York at 5 p.m. South African time. What time was it in New York?

Countries that cover a wide area of longitude have several time zones. Examples are the United States and Australia. According to longitude, China should have five time zones but in 1949 the Chinese government decided that China should have only one time zone.

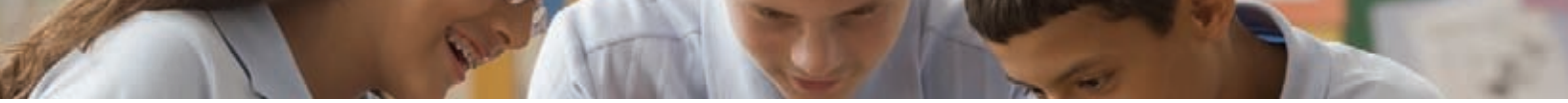
The International Date Line

The International Date Line follows the 180° line of longitude. This line divides the world into the eastern and western hemispheres on the Pacific Ocean part of the world. The International Date Line is adjusted to fit in with the location and shape of countries and islands. Places in the eastern hemisphere are a day earlier than places in the western hemisphere.



The date changes either side of the International Date Line.

Fiji and Hawaii have a time difference of two hours, but they are one day apart. This is because Fiji is in the eastern hemisphere, on the opposite side of the International Dateline, to Hawaii, in the western hemisphere. So, when it is 6 p.m. on Saturday in Fiji, it is 8 p.m. on Friday in Hawaii.



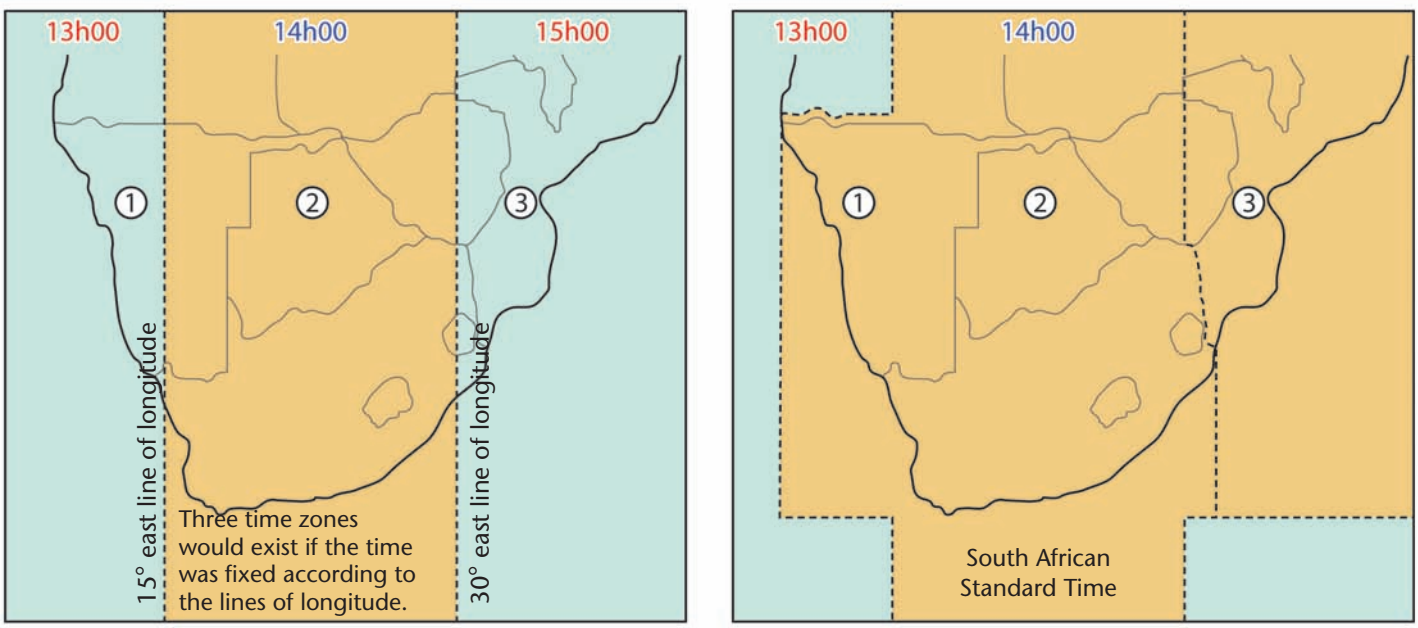
Classroom activity 1.8

Work on your own and answer these questions.

1. Name the line of longitude that the International Date Line is based on.
2. Why do countries adjust the International Date Line?
3. Explain why China should have five time zones.
4. If it is Wednesday in Fiji, what day is it in Hawaii?
5. Explain why Fiji and Hawaii have a different date.

4. South African Standard Time

The time zone in South Africa is called South African Standard Time (SAST). South Africa should have two time zones as the 15° and 30° lines of longitude both pass through the country. The South African government decided to adjust the time zones to fit the country's borders and use one time zone based on the 30° line of longitude.



South African Standard Time is adjusted to fit the shape of the country's borders. South African Standard Time is based on the 30° line of longitude.

Classroom activity 1.9

Work on your own and answer these questions.

1. Give the line of longitude from which South African Standard Time is based.
2. Which part of South Africa should have a different time zone, according to longitude?
3. Why do you think the government decided to have only one time zone in South Africa?
4. Name two other countries in southern Africa that have the same time as South Africa.
5. Namibia adjusts its time by one hour during winter, making time one hour earlier than South African Standard Time. Suggest reasons why Namibia adjusts its time in this way.

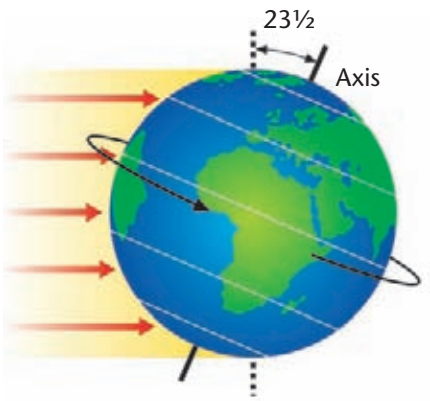
Word bank

perpendicular	a vertical line that forms a right angle with the horizontal
revolves	moves in a circular pathway around an object
tilted	leaning at an angle

5. The earth's revolution around the sun

It is important to understand the earth's relationship to the sun in order to understand seasons.

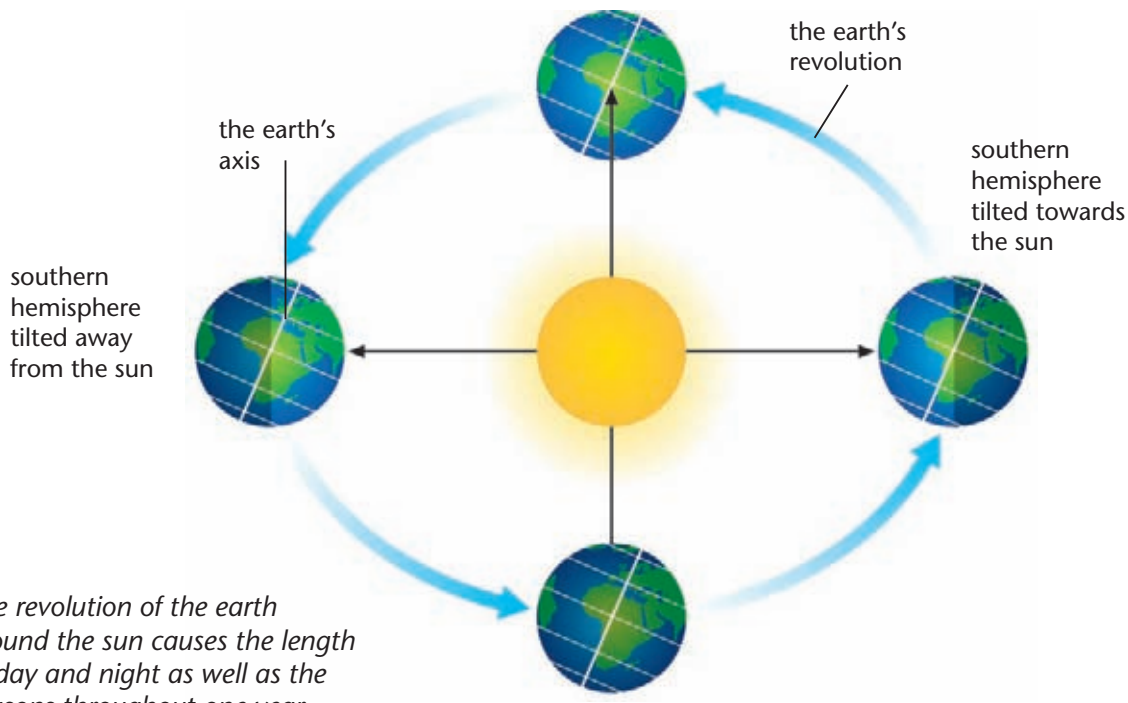
Angle of earth's axis



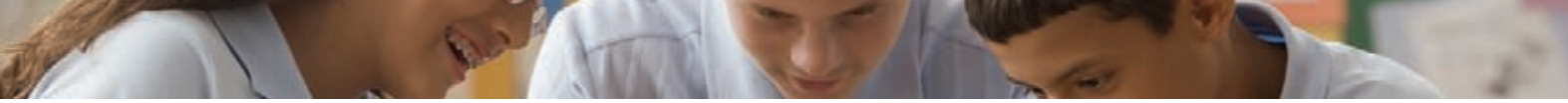
The earth tilts on its axis at an angle of 23½°.

The earth is not positioned parallel with the sun in space. It is **tilted** at an angle on its axis, 23½ degrees away from the **perpendicular**. The angle of the earth's axis affects the length of day and night and causes the different seasons. At certain times of the year different parts of the earth lean towards the sun, while at other times of the year these parts of the earth lean away from the sun. When a part of the earth leans away from the sun, this area is in the shadow of the earth for longer. This is the winter season. Days are shorter in winter.

The earth is always moving. It rotates on its axis, and it also **revolves** around the sun. Rotation causes day and night. The earth takes 24 hours to rotate on its axis. The earth takes 365 and one-quarter days to make one revolution around the sun. The diagram below shows how the earth's revolution and the tilt of the earth's axis cause the seasons.



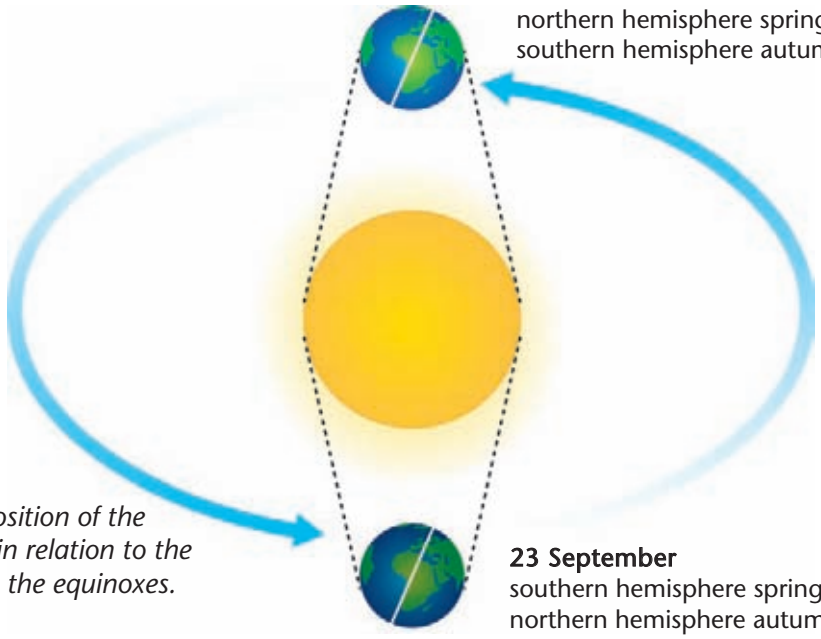
The revolution of the earth around the sun causes the length of day and night as well as the seasons throughout one year.



Equinoxes, solstices and angle of the midday sun

Equinox

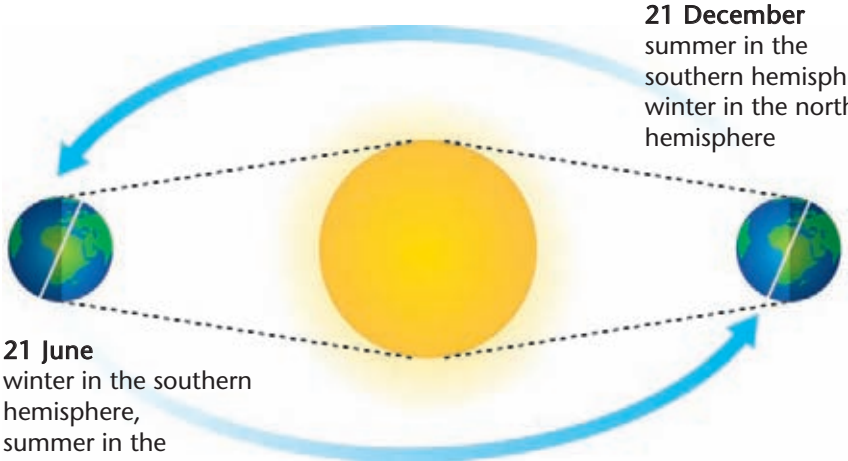
The equinoxes are the times of the year when day and night are the same number of hours for all places in the world. There are two equinoxes each year. The first is on 21 March and the second is on 23 September. On these dates, the sun is directly overhead at the equator. The earth does not tilt towards or away from the sun. The equinoxes occur in the spring and autumn seasons.



The position of the earth in relation to the sun at the equinoxes.

Solstice

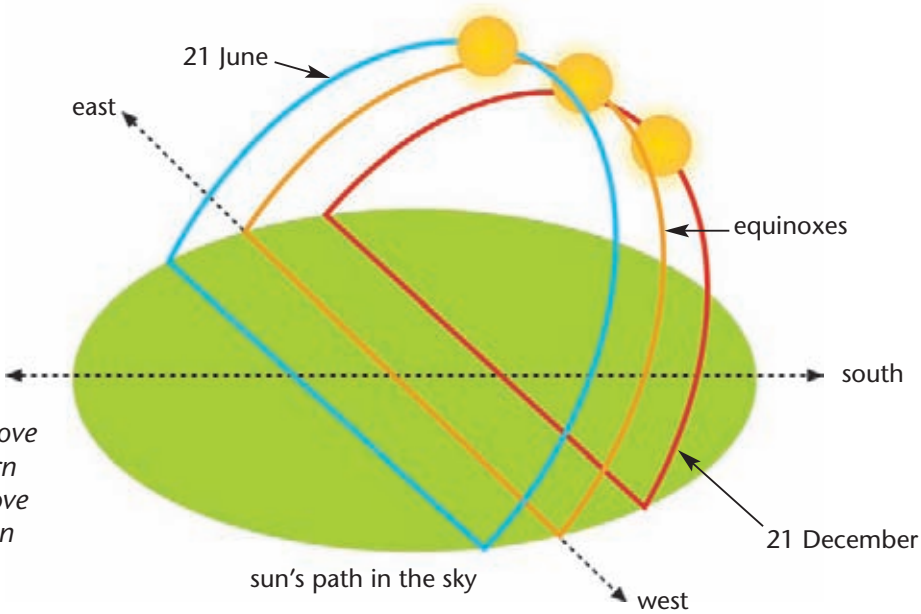
The solstices occur on 21 June and 21 December each year, when either the southern hemisphere or northern hemisphere is tilted towards the sun. On 21 June the northern hemisphere leans towards the sun. The sun's rays fall directly on the Tropic of Cancer, which is north of the equator.
On 21 December the southern hemisphere leans towards the sun. The sun's rays fall directly on the Tropic of Capricorn, which is south of the equator. The solstices happen in the summer and winter seasons.



The position of the earth in relation to the sun during the solstices.

Angle of the midday sun

You know that the temperature is hottest close to midday, even in winter. You may also have noticed that the sun does not get as high in the sky at midday in winter as it does in summer. The height of the sun in the sky depends on the position of the earth in its revolution around the sun. For places in the northern hemisphere, the sun reaches its highest point at midday on 21 June. This is when the sun is positioned over the Tropic of Cancer. For places in the southern hemisphere, the sun reaches its highest angle in the sky on the summer solstice on 21 December. This is when the angle of the sun is 90°, or perpendicular to the earth over the Tropic of Capricorn. At the equinoxes the sun is directly above the equator at an angle of 90° to the earth.



The sun is directly above the Tropic of Capricorn in December and above the Tropic of Cancer in June.

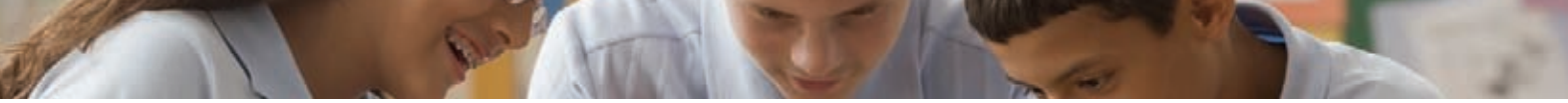
At the summer solstice the sun does not appear to set for places inside the Arctic and Antarctic circles. This photo shows the same place at different times during the day. The sun does not go below the horizon.

Seasonal changes in lengths of day and night

The angle of the earth's axis influences the number of hours of sunlight that different parts of the earth receive at different times of the year. In December, the parts of the southern hemisphere that are furthest from the equator receive long hours of sunlight. At this time of the year, the northern hemisphere receives less sunlight and has shorter daylight hours. In June the opposite is true. The northern hemisphere receives more hours of sunlight and longer daylight hours.

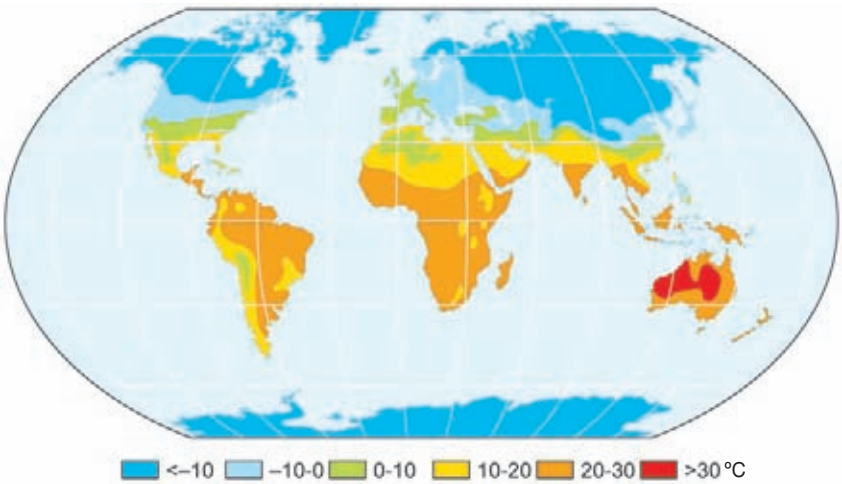
Homework activity

1. Copy the following paragraph into your exercise book and fill in the missing words.
   During the December solstice, the _____ hemisphere is tilted _____ from the sun more than at any other time of year. As a result, the sun does not rise as _____ in the sky and days are _____.
2. Write a paragraph to explain how the tilt of the earth's axis and the revolution of the earth cause the length of day and night to change at different times of the year.

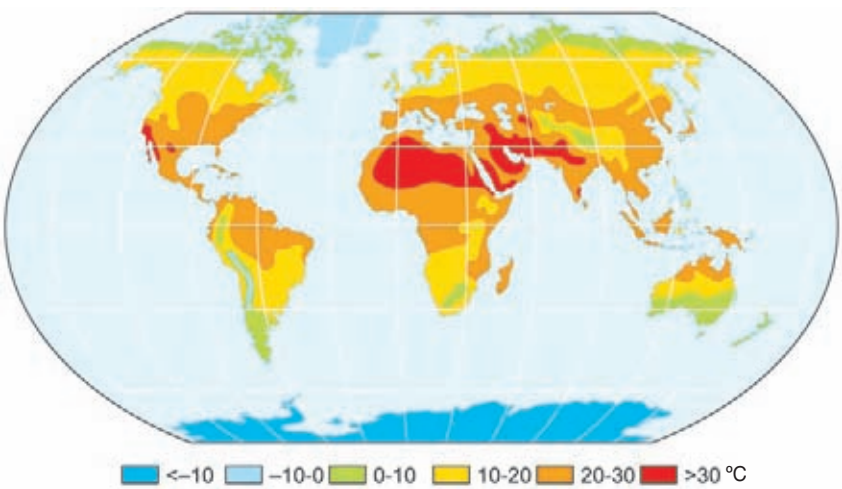


Seasonal temperature changes

Some parts of the earth are hotter than others. Heating from the sun causes the temperature of places. Areas located between the tropics receive the most heating from the sun throughout the year. Places closer to the poles receive less heating from the sun. During the long dark months of winter they are very cold. In summer, long hours of daylight help to keep these areas warm, even though the strength of the sun is weak because it is spread over a wide area.



Average temperature at certain latitudes in January



Average temperature at certain latitudes in July

Classroom activity 1.10

Work on your own and answer these questions.

1. What is the coldest part of the world in January?
2. a) Give the average temperature for much of South Africa in January.
   b) What is the temperature of the same area of South Africa in July?
3. Explain why temperature changes with the seasons.

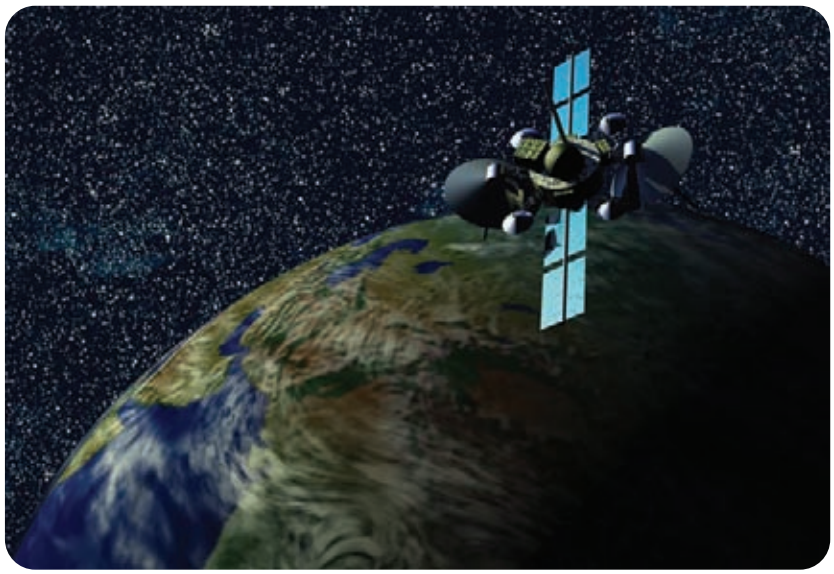
Unit 3 Satellite images

Word bank

images	pictures that are put together from different kinds of electronic data
sensors	instruments that are sensitive to things such as light, movement and heat

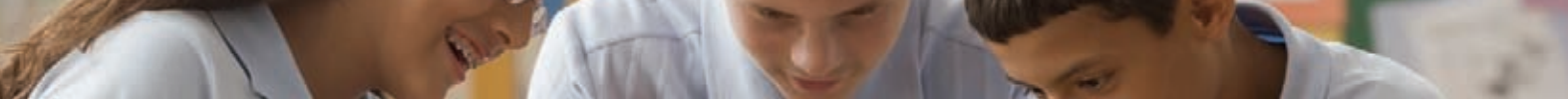
1. What satellite images look like

Satellite **images** are pictures (not photographs) put together from information gathered by satellites positioned above the earth in space. **Sensors** and cameras on satellites send electronic data to receiving stations on the ground. Computers process this data to produce different kinds of satellite images.



Satellites collect information about the earth.

A satellite image showing part of the harbour in Rio de Janeiro, Brazil



Word bank ABC

zoom in	make something appear closer than it actually is

2. Information from satellite images

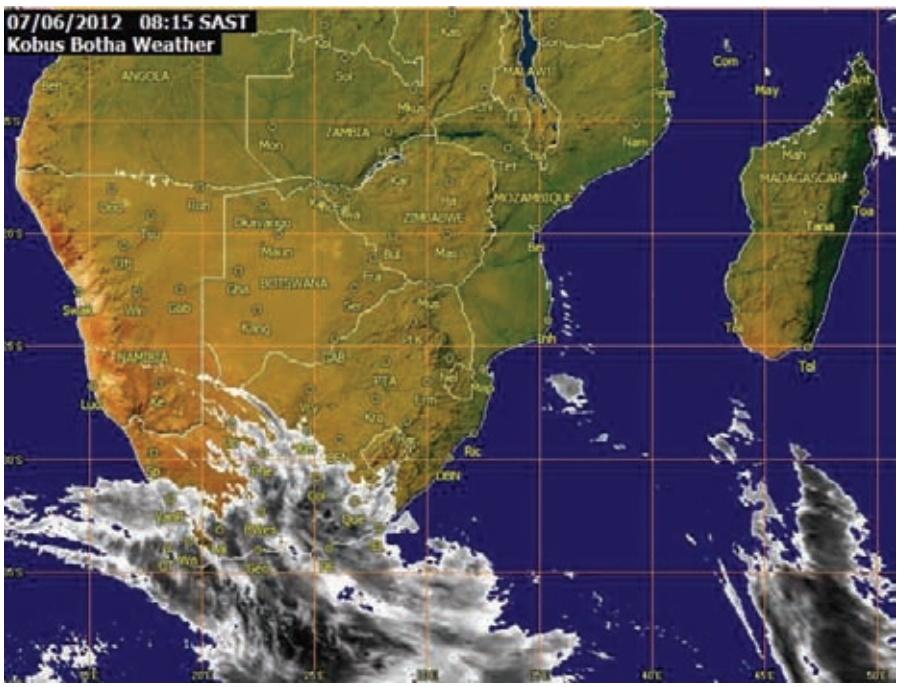
Satellite images can be used to examine many conditions about the earth, including soil erosion, land use, vegetation and cloud patterns. Satellites images can also **zoom in** to show smaller areas of the earth's surface.

This is a satellite image of Hurghada holiday resort on the Red Sea in Egypt. Deep water appears dark on satellite images.

Word bank

forecast	to study data (in this case, about the weather) and state what is likely to happen a few hours or days later
meteorologists	scientists who study scientific data related to the weather

3. How satellite images are used



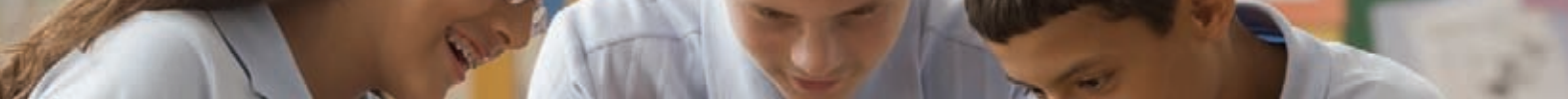
A weather satellite showing clouds and rain moving eastwards across South Africa.

Information from weather satellites shows the position and types of clouds in the atmosphere. Sensors on board satellites can also determine temperature, wind speeds and cloud cover. A weather satellite gives information about conditions in the atmosphere every few hours. This helps **meteorologists** to **forecast** likely weather conditions on the ground. The satellite image on the left shows a band of cloud bringing wet weather to the south-west part of South Africa.

Classroom activity 1.11

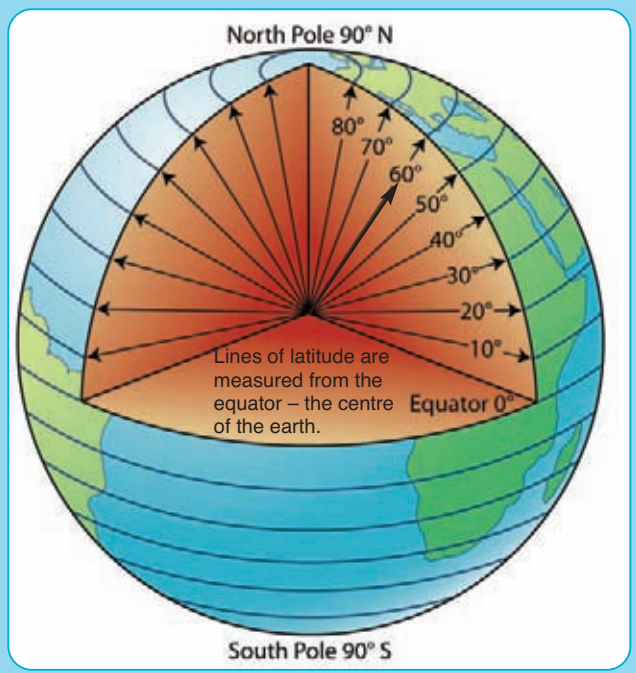
Work with a partner and answer these questions.

1. Examine the satellite image above.
   a) In which season was this information recorded? Look at the date on the image to help you.
   b) What has been added to this satellite image to make it more useful?
   c) Between which latitudes are there clouds?
   d) Use an atlas to help you name settlements in three provinces that could experience rain at this time. The letters on the image will guide you.
   e) What do you think the weather is like in the rest of southern Africa?
   f) Look for differences in vegetation cover in the satellite image. What does vegetation indicate about rainfall?
2. How do you know that the satellite image of Rio de Janeiro on page 21 shows a harbour area?
3. Which satellite image on pages 21–23 shows the smallest area? Who do you think might find this image useful? Give your reasons.
4. On the satellite image of Hurghada on page 22 identify the areas of deep water and shallow water.
5. Write a few sentences in which you compare land use in the Hurghada image to land use in the Rio de Janeiro image. Look at the kinds of roads, buildings, open space and areas of water in each image.



Summary

- Lines of latitude circle the globe from east to west. Lines of longitude circle the globe from north to south.
- We measure the angle of each line of latitude from the equator, which is at 0°. There are 90 degrees of latitude north and south of the equator.
- Longitude lines are also called meridians. The 0° line of longitude is the Greenwich Meridian.
- We measure the other lines of longitude east and west of the Greenwich Meridian.
- There are 180 degrees of longitude east and 180 degrees of longitude west of the Greenwich Meridian.
- We use degrees and minutes to locate places more accurately on maps.
- Each degree of latitude and longitude can be divided into 60 minutes.
- The index of an atlas lists places in alphabetical order. The index also gives the latitude and longitude position of each place in degrees and minutes.
- All maps are drawn to a scale. The scale shows how much smaller the map is than the same area on the ground.
- We can show scale in words, as a line and as a ratio.
- Ratio scales show us what one unit of measurement on the map represents on the ground, e.g. 1 mm on the map represents 10 000 mm on the ground. We write this scale as 1:10 000.



- The shape of the earth means that one half of the earth will always be facing away from the sun while the other side faces the sun.
- The earth rotates on its axis. It takes 24 hours to complete one 360-degree rotation.
- The rotation of the earth means that all parts of the earth's surface move into and out of the sun's rays.
- The most obvious experience of the earth's rotation is day and night.
- Time changes by one hour for every 15 degrees of longitude.
- Time is measured from the Greenwich Meridian. Places to the east of the Greenwich Meridian have earlier times. Places to the west have later times.
- The angle of the earth's axis affects both the length of day and night and it causes the different seasons.
- The earth takes 365¼ days to complete one revolution around the sun.
- The solstices occur on 21 June and 21 December, when the sun is directly above the tropics.
- The equinoxes occur on 21 March and 23 September, when the sun is directly over the equator on the earth's revolution around the sun.
- Satellite images are made up of information sent from satellites in space to receiving stations on the ground.
- Satellite images can be used to examine a variety of conditions about the earth, including soil erosion, land use, vegetation and cloud patterns.

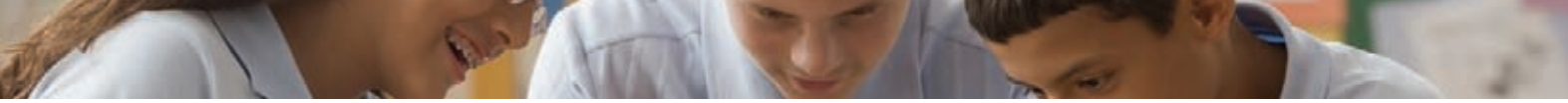
Formal assessment tasks

Activity 1 (20 marks)

Examine the map of southern Africa on this page.

1. Name two countries that the Tropic of Capricorn passes through. (2)
2. Identify the cities at these locations:
   a) 25° 58′ S, 32° 35′ E
   b) 15° 26′ S, 28° 20′ E
   c) 8° 50′ S, 13°, 15′ E (3)
3. Give the latitude and longitude co-ordinates in degrees and minutes for:
   a) Harare
   b) Windhoek. (2)
4. Calculate the straight line distances between the following cities using the line scale.
   a) Cape Town and Lusaka
   b) Windhoek and Harare
   c) Luanda and Maputo (3)
5. Give the scale of the map of southern Africa as a word scale. (1)
6. Measure the distance between Cape Town and Maputo in millimetres. Use the ratio scale to calculate the distance between these two cities in kilometres. Include your calculations in your answer. (4)
7. a) Explain why the map on this page is a small scale map. (2)
   b) Would a large scale map show a smaller area or a bigger area than the map on this page? (1)
   c) Suggest two uses of large scale maps. (2)

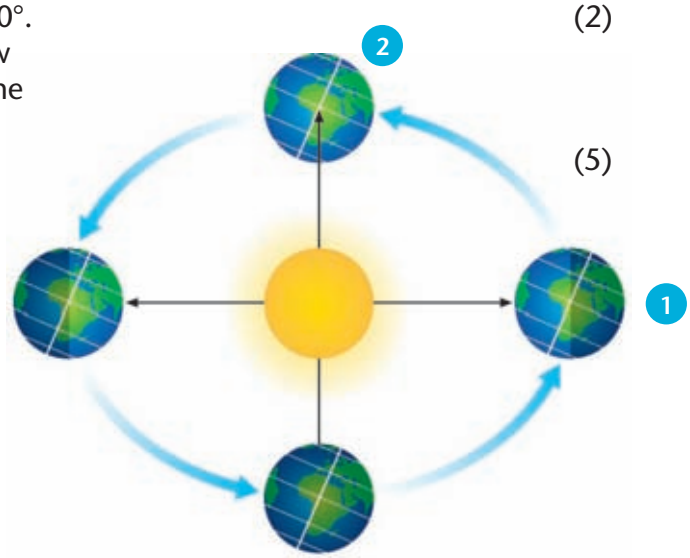
Southern Africa



Activity 2 (10 marks)

Study the diagram that follows.

1. Match the numbers on the diagram with the words *equinox* and *solstice*. (2)
2. On what date is the summer solstice in South Africa? (1)
3. Match two of the following numbers with *rotation* and two numbers with *revolution*: 24, 23½°, 365 ¼, 360°. (2)
4. Write a paragraph to explain how the revolution of the earth and the tilt of the earth's axis cause the different seasons. (5)

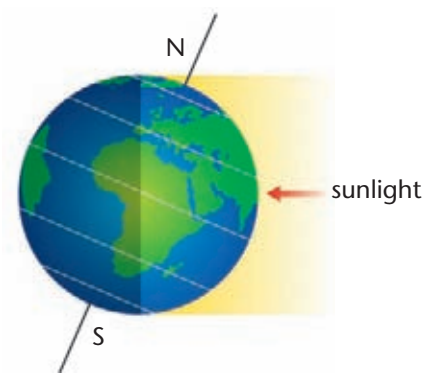


Activity 3 (10 marks)

1. Match the words and meanings in the table below. Write out your answers as complete sentences. (4)

Words	Meanings
Equinox	The position of the sun in the sky above the horizon
Solstice	The times of the year when the sun is directly above one of the tropics
Earth's axis	The times of the year when the sun is directly above the equator
Angle of the midday sun	The angle the earth is tilted away from the perpendicular

2. Copy and complete the following sentences.
   a) Time should change by one hour for every _____ degrees of longitude.
   b) The date is different by one day either side of the _____.
   c) Places to the east have _____ times than places to the west of South Africa. (3)
3. Make a copy of the diagram on the right.
   a) Label the earth's axis.
   b) Mark an X in a place where the days are long.
   c) Shade the side of the earth that is experiencing night. (3)



Total: 40 marks

Topic 2

Climate regions

What this topic is about

- Factors that influence temperature and rainfall
- South Africa's different climate regions
- Difference between weather and climate
- Different kinds of world climates

Look at the picture

1. Suggest a place in South Africa where this place could be.
2. Describe what you think the temperature and rainfall of this area are like.
3. Make one statement about the weather in this place.
4. Make a statement about the climate of the area.

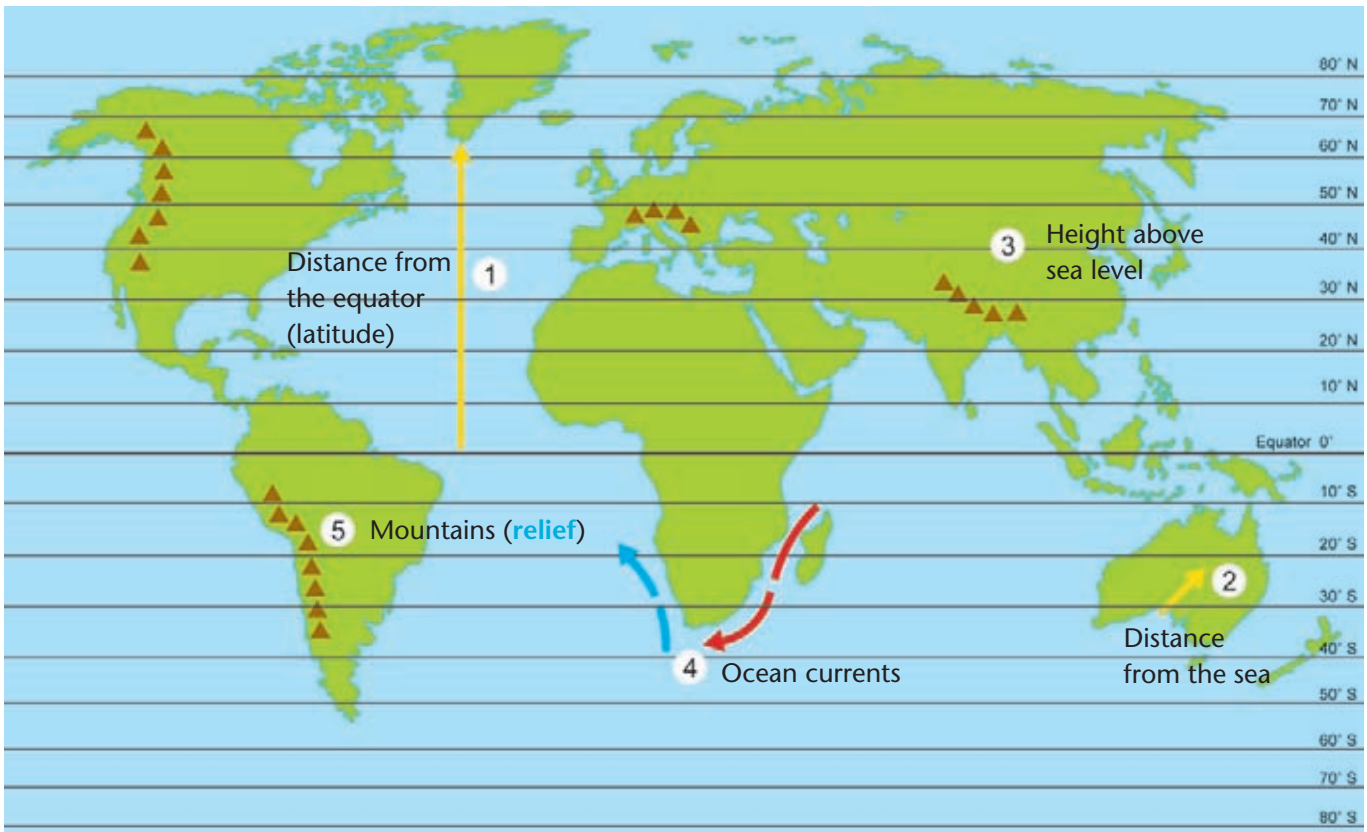
Unit 1 Factors that influence temperature and rainfall

Word bank

climate	the usual conditions in the atmosphere over a long term
relief	the shape of the land
weather	the short term, or day-to-day conditions in the atmosphere

Temperature and rainfall are the most important parts of both **weather** and **climate**. When we describe the climate or weather of a place we always include statements about temperature and rainfall. Temperature describes how hot or cold a place gets. The water cycle continuously circulates water from the oceans into the air and back onto the earth's surface as rainfall.

The following five factors each have an influence on temperature and rainfall. You will learn about each of these factors in this unit.



Factors that influence temperature and rainfall

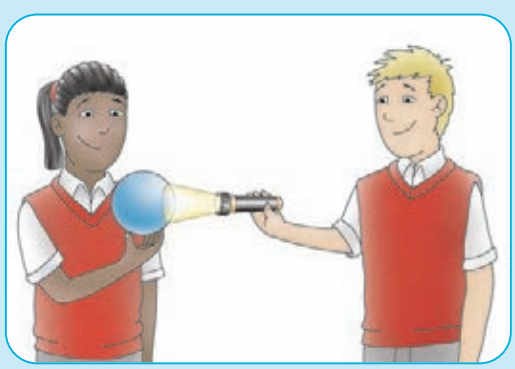
1. Distance from the equator (latitude)

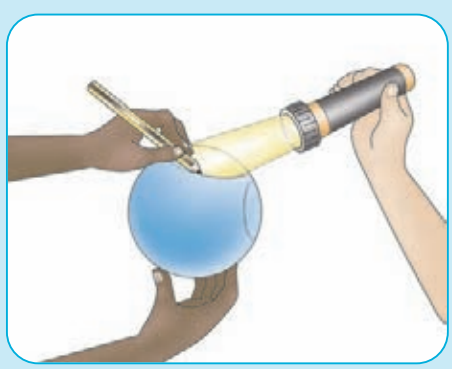
Places close to the equator have higher temperatures than places close to the poles. The further away from the equator you go, the lower the average temperatures. The reason for the difference in temperature is explained by the amount of heating the earth receives from the sun. You should remember this from Topic 1.

Different heating by the sun is responsible for temperatures that are higher near the equator and lower at the poles.

Classroom activity 2.1

1. Work in small groups.
   Follow the instructions below to demonstrate how the sun heats the area close to the equator more than the area close to the poles. You will need a torch and a ball. Draw a line around the middle of a ball to represent the equator.





   - Hold a torch about 10 cm away from the ball.
   - Shine the torch on the line representing the equator.
   - Use a pen or a piece of chalk to mark the area where the light falls on the ball.
   - Keep the torch the same distance from the ball. Shine the torch on the area near one of the poles.
   - Mark the area where the light falls.
   - Discuss with your group what this experiment shows about temperature and distance from the equator.
2. On your own, write three sentences to explain how latitude influences the temperature of places.

Word bank

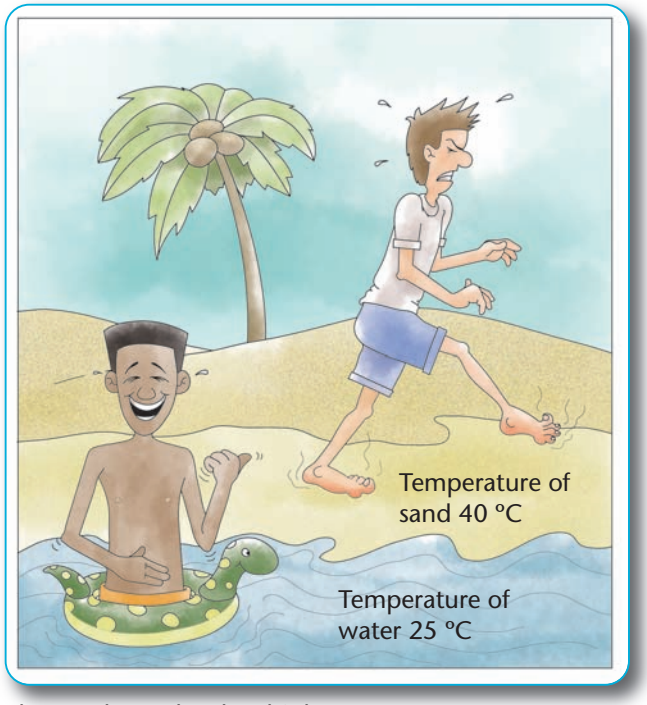
inland	far from the coast
penetrate	go into something

2. Distance from the sea

Land and water heat up in a different way. Land is a solid. Heat from the sun can raise the temperature of the land's surface quickly and to a high temperature. If you walk without shoes on sand or concrete on a very hot day you will feel how hot the earth's surface can get!

Water is a liquid. It has very different properties to that of solid land. Heat from the sun can **penetrate** water and heat a deep layer. It takes time to heat such a large amount of water, but for the same reason, water stays warmer for much longer than land.

In winter the land cools down quickly and to a lower temperature than water. The temperature of the oceans and the temperature of the land affect the temperature of the air above them. Warm air from the oceans warms the land next to the coast. Cool air from above the oceans cools the land next to the coast.



The sun heats land to higher temperatures than water.

Places next to the sea have cooler summers and warmer winters than places **inland**. This is because inland places heat up quickly and have high summer temperatures. Inland places also cool down and have lower winter temperatures than places close to the sea. The closer a place is to the sea, the greater the influence the sea has on its temperature.

Classroom activity 2.2

Work on your own.

1. Complete the following sentences:
   a) Inland places have _____ winters than places closer to the sea.
   b) Land heats up more _____ than water.
   c) Water cools down more _____ than land.
2. Use the information on this page to explain why places close to the sea have cooler summers and warmer winters than places inland.

Word bank

altitude	height above sea level
radiation	heat from the sun

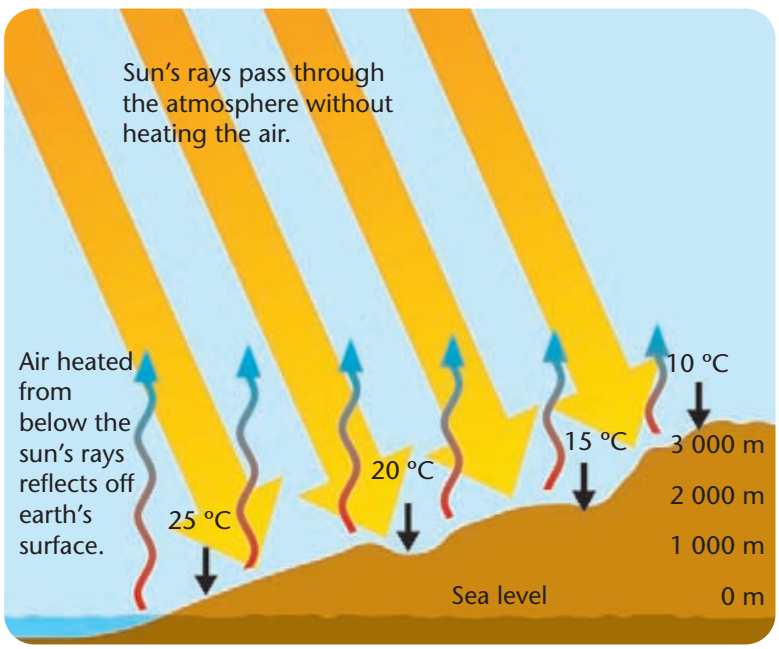
3. Height above sea level (altitude)

Mount Kenya is on the Equator. It is 5 199 m above sea level. Temperatures on top of Mount Kenya are always below 0 °C.

Temperature decreases with **altitude** (height above sea level). The higher up you go, the colder it gets. On average, temperature drops by 6.5 °C for every 1 000 metres of altitude. For example, a place that is 2 000 metres above sea level should be 13 °C cooler than a place at sea level at the same latitude.

The reason temperature decreases with altitude has to do with the way the sun heats the earth and the atmosphere. We call heat from the sun solar **radiation**. Solar radiation travels as short waves that pass through the atmosphere without heating it. When they reach the earth, the sun's rays heat the earth's surface. The earth's surface then heats the air above it.

- There are more air molecules in the air that is close to the earth's surface. Heat passes easily between these molecules thereby warming the air.
- Air that is high above the earth's surface is less dense. Heat does not pass easily between the air molecules. This air remains much cooler.



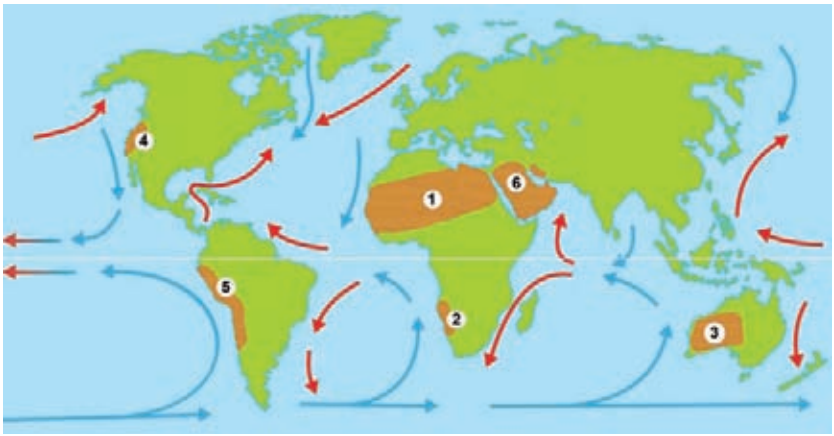
How the air is heated.

Word bank

intensely very strongly

4. Ocean currents

We have seen how the sun heats areas close to the equator more **intensely** than areas at the poles. Oceans close to the equator are heated more strongly by the sun's rays, so they have much warmer temperatures than oceans close to the poles. But water in the oceans does not stay still. The water in the oceans moves and spreads the heat throughout the oceans, across different parts of the earth. We call this movement of water, ocean currents. The temperature of ocean currents affects the temperature of places next to them. Ocean currents also influence the amount of rain that falls in an area.



KEY

Warm current raises coastal temperatures and increases amounts of rain.

Cold current lowers coastal temperatures and decreases amounts of rain.

① Sahara
② Namib
③ Great Australian Desert
④ Great Basin Desert
⑤ Peruvian
⑥ Arabian

The world's warm and cold ocean currents

Cold ocean currents

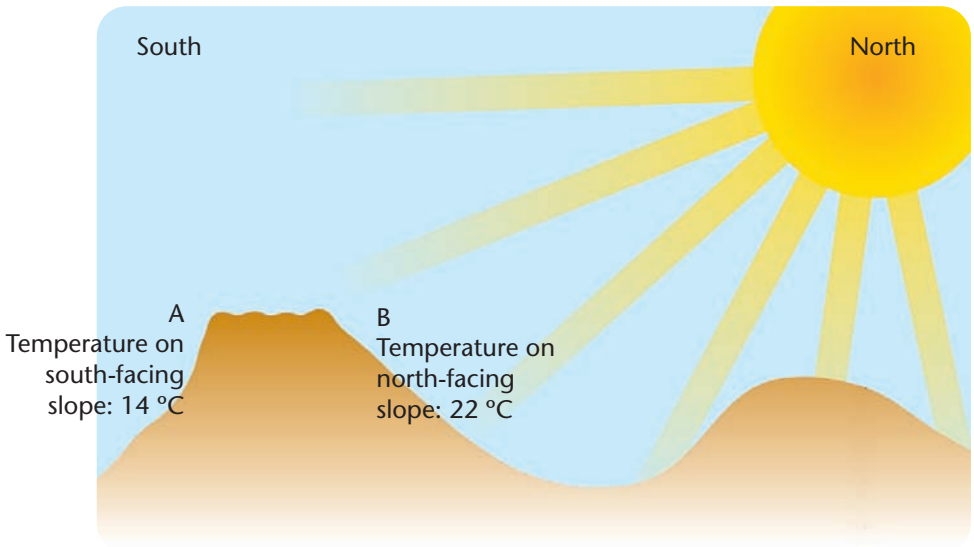
- Cold ocean currents cool the air above the cold water.
- Cooling causes the air to release moisture as rain.
- Winds blow cool dry air towards the land, lowering temperatures and reducing rainfall.
- Deserts are common on the west coasts of continents next to cold ocean currents.

Warm ocean currents

- Warm ocean currents warm the air over the warm water.
- Warm air raises the temperature of places next to the coast.
- Warm air can hold more moisture than cool air.
- Places next to warm ocean currents often receive heavy rainfall.

5. Mountains (relief)

Relief influences the amount of radiation and rainfall that places receive. The slope of the land created by mountains and valleys affects the angle that the sun's rays hit the earth's surface. Places that receive more hours of radiation during the hottest times of the day will have higher temperatures. Slopes that face the Equator receive more hours of radiation than slopes that face the poles. This means that north-facing slopes in the southern hemisphere, where we live, receive more sun and are warmer than south-facing slopes.



How relief influences temperature

Mountains can block winds that contain moisture and force this air to rise. When the air rises it cools and releases moisture as rain. The sheltered side of the mountain receives much less rain because the air contains less moisture. We say that this side of the mountain is in the 'rain shadow'.

Classroom activity 2.3

Work in pairs and examine the information on these two pages.

1. How do ocean currents affect temperature?
2. How do ocean currents affect rainfall?

Homework activity

Write down your answers to the following questions and then discuss them in class.

1. Where are the warmest classrooms in your school? Work out what direction these classrooms face.
2. Which are the coolest classrooms in your school in summer? Find out which direction they face.
3. Should people in South Africa build their houses facing north or south? Give reasons for your answer.

Unit 2 South Africa's climate

Word bank ABC

physical regions areas that have one dominant natural feature or landscape

1. Physical map of South Africa

In earlier grades you learnt about South Africa's different **physical regions**: the plateau, escarpment, lowlands and coastal plain. Different physical regions have different climatic conditions.

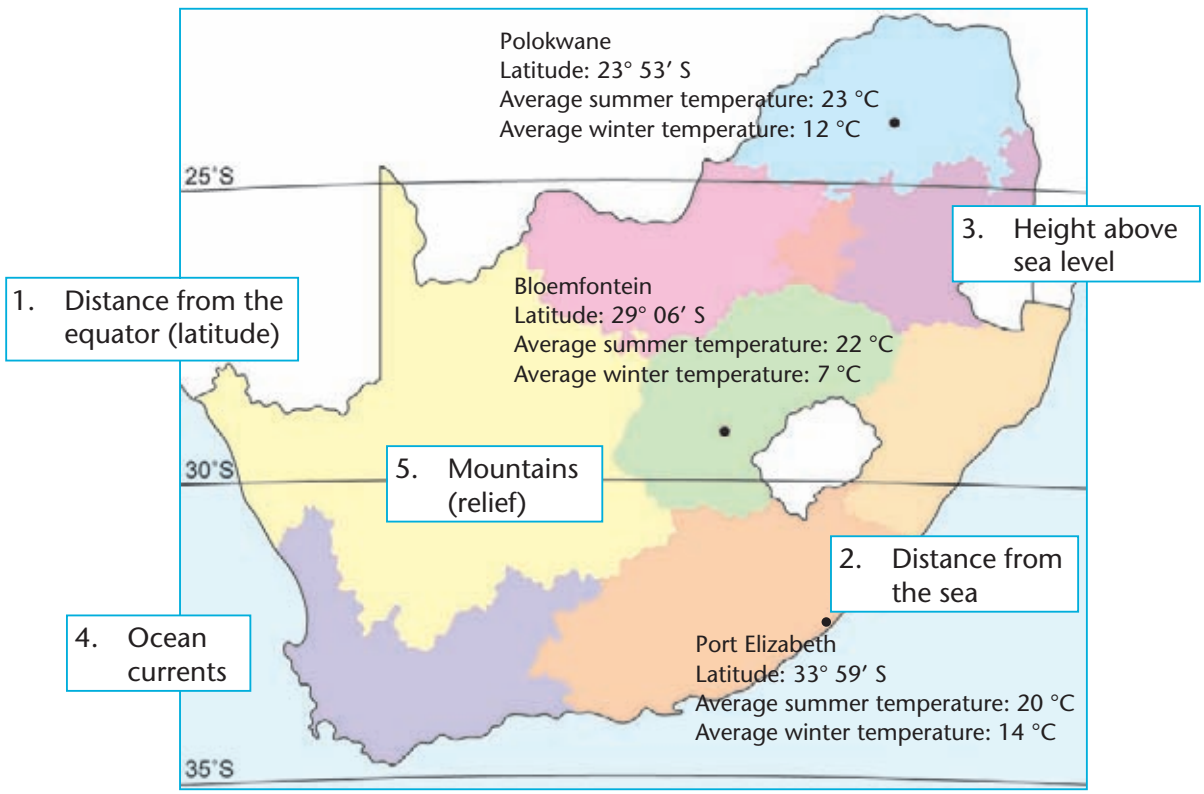
A physical map of South Africa

2. Factors that influence temperature and rainfall in South Africa

We will examine how each of the influences shown on the map below affects temperature and rainfall in South Africa. These are the same influences we examined in Unit 1.

Distance from the equator (latitude)

Temperatures decrease with increasing distance from the equator. South Africa covers about 10 degrees of latitude. So you would expect places further south to be cooler. The information on the map that follows shows how latitude affects the temperatures of Polokwane, Bloemfontein and Port Elizabeth.



Factors that influence South Africa's climate

Word bank

extreme	big difference between highest and lowest values
moderate	to keep in the middle or prevent extremes

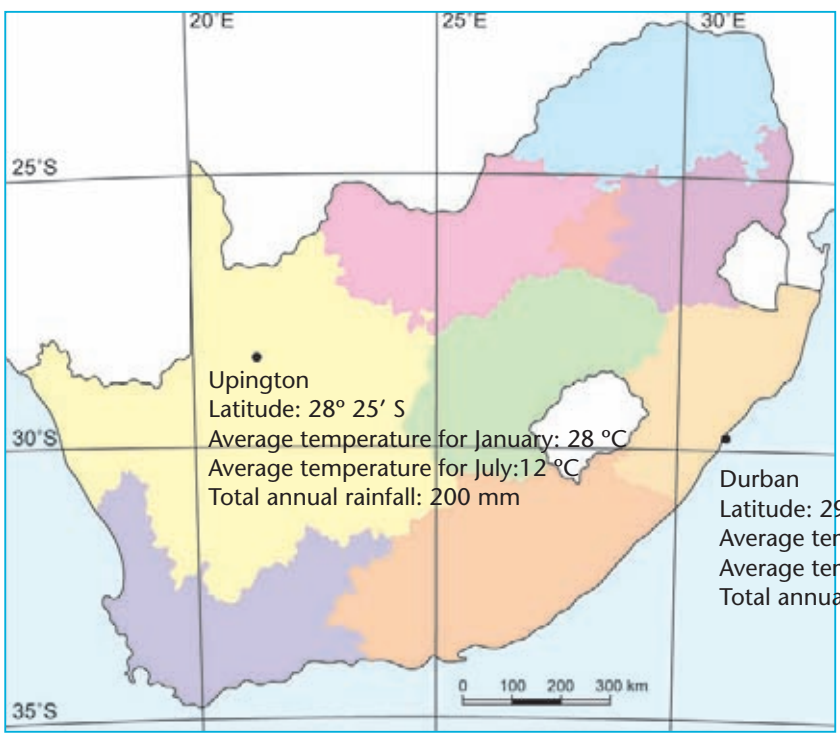
Classroom activity 2.4

Work with a partner and answer the following questions:

1. Study the map on page 35.
   a) Calculate the difference in latitude between Polokwane and Port Elizabeth.
   b) In which season do all three cities show a decrease in temperature with latitude (increased distance from the equator)?
   c) Give one other factor besides latitude that could influence the temperature of each city.
   d) What influence could make winter temperatures in Port Elizabeth warmer than other cities at the same latitude? Explain your answer.
2. Read the information that follows about the influence of distance from the sea. Use the words ***extreme*** and ***moderate*** to explain the difference between the summer and winter temperatures of Upington and Durban.

Distance from the sea

Places away from the sea have more **extreme** temperatures than places close to the sea. Upington is 400 km from the Atlantic Ocean. In summer the land around Upington heats up quickly. Heat from the land warms the air above it. In winter, heating from the sun is less intense because the sun is overhead at the Tropic of Cancer in the northern hemisphere. The land remains cold. Winter temperatures at Upington are quite low for a place which is 28° S (not that far from the equator).



The influence of distance from the sea on temperature and rainfall for Upington and Durban

Word bank

frosts ice crystals that form on outdoor surfaces when temperatures drop below 0 °C

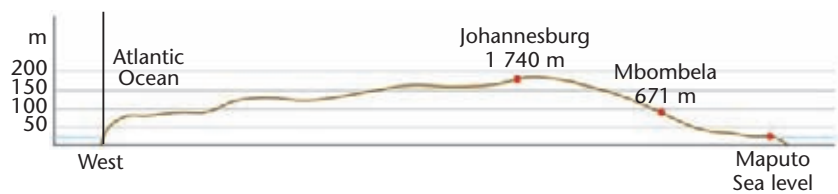
The warm air over the sea helps to keep winter temperatures higher in Durban. In summer the sea is cooler than the land. This helps to lower summer temperatures. Durban's temperatures are moderated by the influence of the ocean.

Upington's position far away from the sea means it is not in the path of winds that bring rain. Durban, however, is right next to the warm Indian Ocean where much of South Africa's rain comes from.

The influence of altitude

Temperatures decrease with altitude. The three cities in the table below have similar latitude positions. Note the altitude of each city.

Johannesburg	**Mbombela**	**Maputo**
Altitude: 1 740 m Average summer temperature: 20 °C Average winter temperature: 10 °C Total annual rainfall: 713 mm **Frosts** can occur during four months of the year.	Altitude: 671 m Average summer temperature: 26 °C Average winter temperature:16 °C Total annual rainfall: 667 mm Frosts are very rare.	Altitude: sea level Average summer temperature: 26 °C Average winter temperature: 20 °C Total annual rainfall: 800 mm



The influence of altitude on the temperatures

Classroom activity 2.5

Work with a partner and answer these questions.

1. a) Make a copy of the following table. Use the climate data for Mbombela and Johannesburg to complete your table.

	Altitude	**Average summer temperature**	**Average winter temperature**	**Average annual rainfall**
Mbombela				
Johannesburg				

   b) Calculate the difference in altitude between Mbombela and Johannesburg.
   c) How does altitude influence summer and winter temperatures?
   d) Does altitude influence the rainfall of these two cities?
2. What are frosts? Consider how having no frosts in Mbombela could benefit this area.

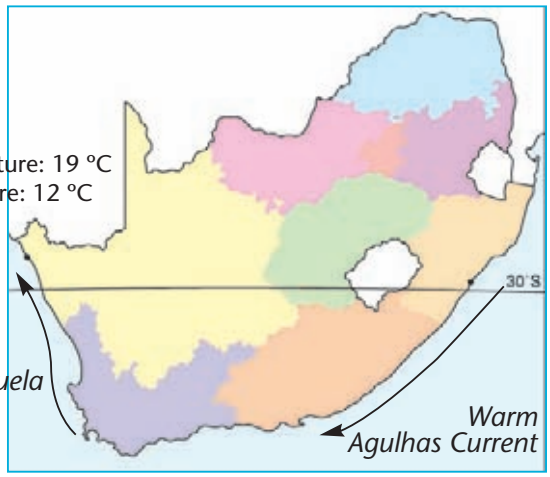
Word bank

condense	when the air cools to 0 °C or lower, causing water to change from a gas (vapour) state to a liquid state (droplets)
fogs	condensed moisture in the air which makes it difficult to see
humid	moist and damp air
mild	not very hot or very cold

The influence of ocean currents

The warm Agulhas Current flows southwards past the east coast of South Africa. The Agulhas Current brings warm Indian Ocean water from tropical regions near the equator. One part of the Agulhas Current is called the Mozambique Current. The cold Benguela Current flows northwards along the west coast of southern Africa, from the colder polar area to the south.

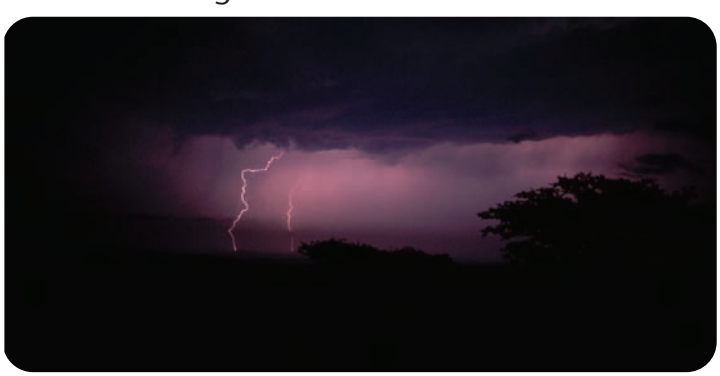
Port Nolloth
Average summer temperature: 19 °C
Average winter temperature: 12 °C
Total rainfall: 60 mm



Durban
Average summer temperature: 25 °C
Average winter temperature: 20 °C
Total rainfall: 1 009 mm

Ocean currents influence the temperature of places near the coast.

The Agulhas Current warms the air above it. Warm air can hold more moisture than cold air. This warm, moist air brings rain to Durban in summer. In winter the warm air keeps the winter temperatures in Durban **mild**. Air above the cold Benguela Current is cooled. Cooling causes moisture to **condense** out of the air in the form of rain above the ocean. Winds blow this cool, drier air over the west coast. In this way the dry cool climate of Port Nolloth is caused by the influence of the cold Benguela Current.



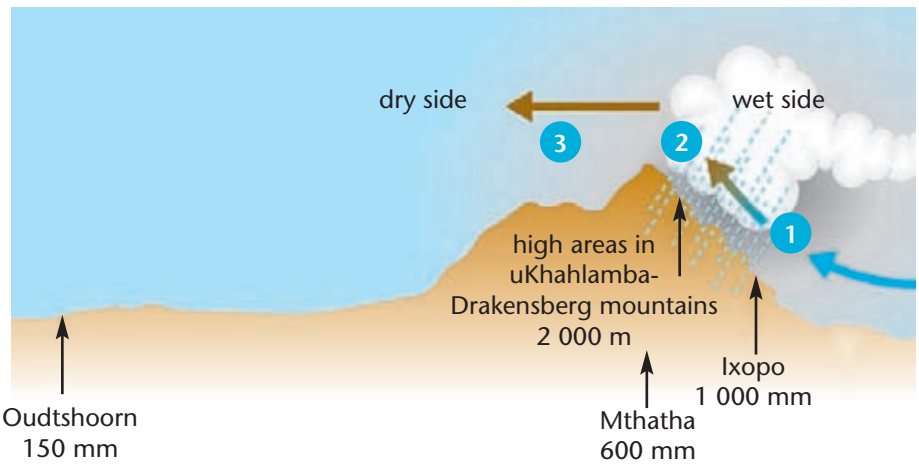
*The warm and **humid** coastal climates of KwaZulu-Natal and the Eastern Cape are partly due to the influence of the warm Agulhas Current.*

*Air is cooled over the cold Benguela Current off South Africa's west coast, causing rain to fall over the Atlantic Ocean and **fogs** along the coast.*

The influence of relief

We have seen how north-facing places are warmer than south-facing places in South Africa. The uKhahlamba-Drakensberg range forms part of the relief of the eastern and southern part of South Africa, as shown on the map on page 34. These mountains cause the east-facing slopes to have high rainfall and the inland areas to be drier.

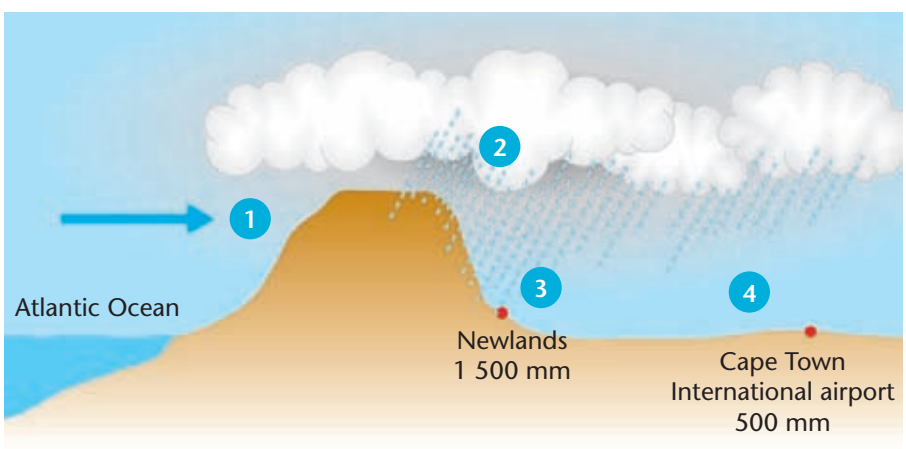
1. The uKhahlamba-Drakensberg mountains force the warm, moist air to rise.
2. The air cools and releases rain.
3. Winds blow the drier air west of the mountains.



How the uKhahlamba-Drakensberg brings rain to the eastern and southern areas and shelters other inland areas such as Mthatha and Oudtshoorn

The situation in Cape Town is slightly different to the uKhahlamba-Drakensberg because Table Mountain is much lower than the uKhahlamba-Drakensberg mountain range.

1. Strong north-westerly winds blow wet air over Table Mountain in winter.
2. The air is cooled and water condenses on the top and eastern side of the mountain.
3. The suburb of Newlands is the wettest area in Cape Town.
4. The air is drier away from the mountain, and rainfall is much lower.



The influence of relief on rainfall in Cape Town

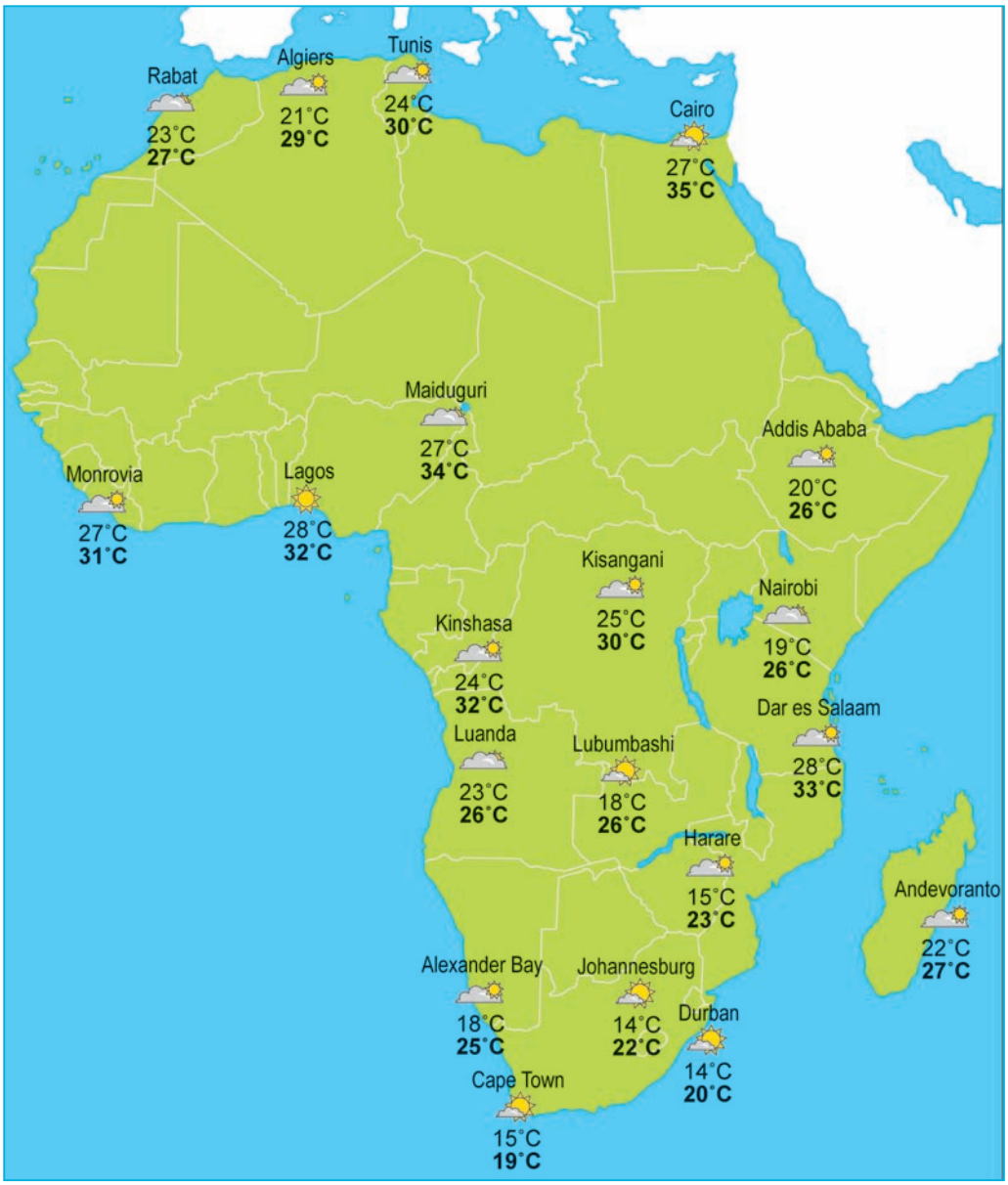
Unit 3 Climate around the world

1. Difference between weather and climate

So far in this chapter we have studied climate. Climate describes the general or usual conditions in the atmosphere. Weather is about the day-to-day conditions in the atmosphere. If we say that today is a cold and rainy day, we are describing the weather. When we say a place usually has cold and rainy winters, we are describing the climate.

The map on this page is a weather map. Weather maps tell us about present or expected conditions in the atmosphere.

The map on page 41 is a climate map. Climate maps show us what the conditions in the atmosphere are usually like. Climate maps are based on information collected over a long period of time, usually about thirty years.



Africa weather map

Word bank

elements	main parts
humidity	how much moisture is in the air
precipitation	types of water in the atmosphere, e.g. rain, hail, frost, snow

2. The elements of weather

The main **elements** of weather are temperature, **precipitation**, **humidity** and winds. We examined temperature and precipitation when we looked at the climate of different places in units 1 and 2.

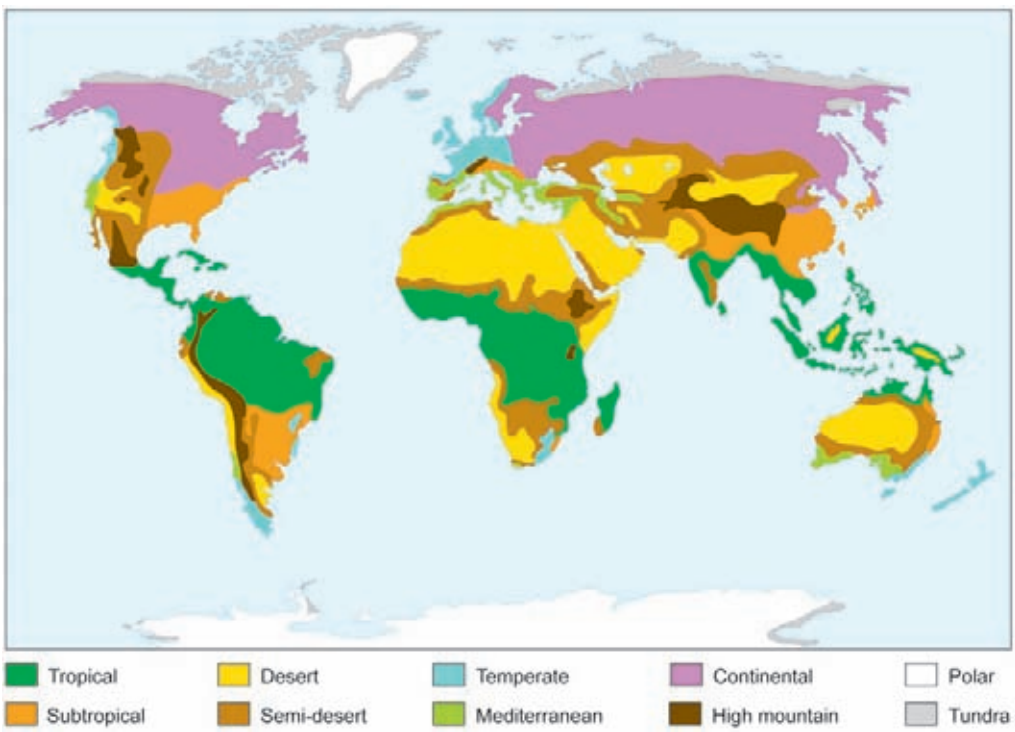
Classroom activity 2.6

Work with a partner, study the weather map on page 40 and answer these questions.

1. Name a city in Africa that is experiencing summer and another city that is experiencing winter.
2. Name two cities where rainfall is likely.
3. The maximum and minimum temperatures are shown for the main cities.
   a) Give the maximum and minimum temperatures for Lagos.
   b) Give the maximum and minimum temperatures for Cape Town.
   c) Why is it important to know the maximum and minimum temperatures of places?
4. In your own words, explain the difference between weather and climate.

3. Kinds of climate

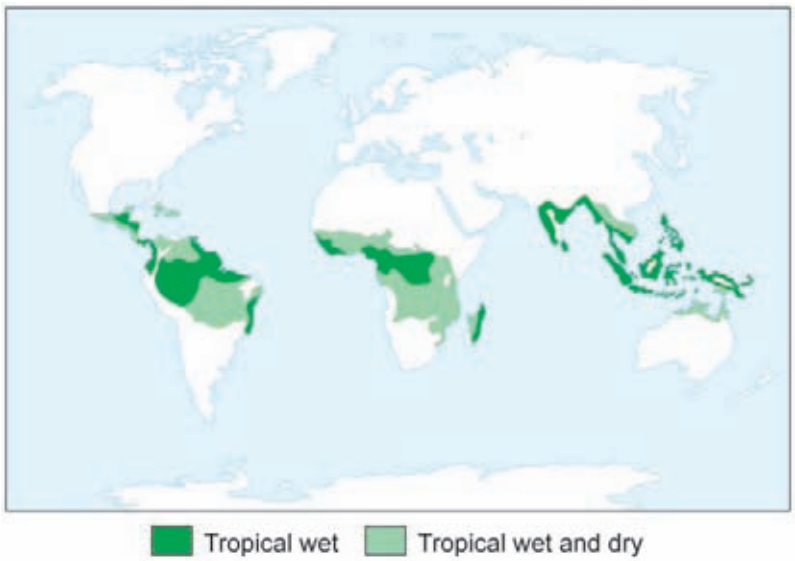
Different parts of the world have different climates. The world's climates are partly influenced by the five factors we studied in Unit 1. Over the next few pages we will examine the kinds of climates shown on the following map.



The world's main kinds of climate

As you study these climates, think about how they may be influenced by latitude, altitude, ocean currents, distance from the sea and mountains.

Tropical climate



Tropical climate areas

The high temperatures and heavy rainfall mean that thick rainforests grow in the tropical forest climate.

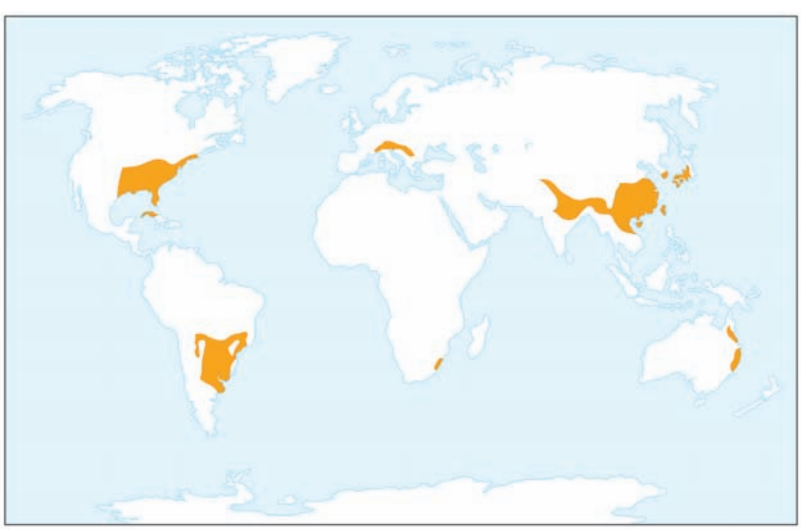
Tropical climates occur between the equator and 25° north and south, including the tropics of Cancer and Capricorn. We can divide tropical climates into the wet type and the drier type.

Wet tropical climates occur closer to the Equator where rainfall is high throughout the year. There is only one season. Temperature and rainfall are almost the same throughout the year. Most parts of this area receive over 2 000 mm of rain in one year. Remember the average rainfall for South Africa is only 489 mm a year.

Dry tropical climates occur closer to the tropics. The dry tropical climate has two seasons – a wet season and a dry season. Most of the rain falls in the wet summer season. Much of Madagascar has a dry tropical climate.

Sub-tropical climate

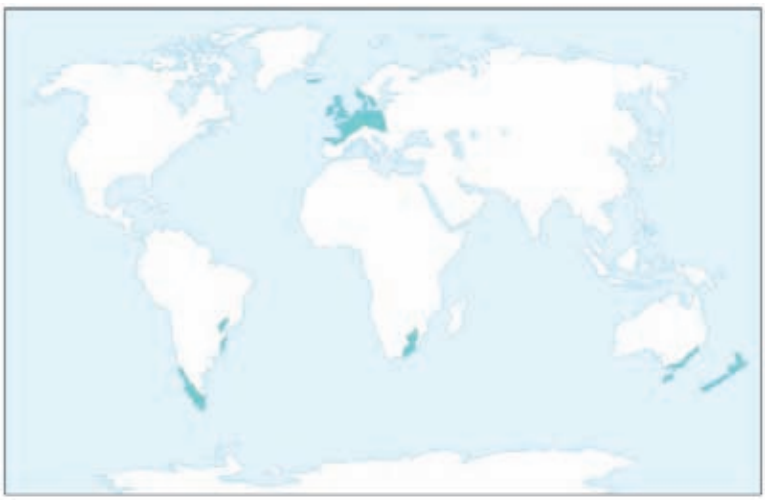
Sub-tropical climates occur between the 20° and 40° latitudes, often on the east coasts of continents. There are two clear seasons – summer and winter. Summer temperatures average above 20 °C. Winter temperatures are around 15 °C. Annual precipitation is about 1 200 mm.



Sub-tropical climate areas

Word bank

erratic	not regular
droughts	long periods of no rain

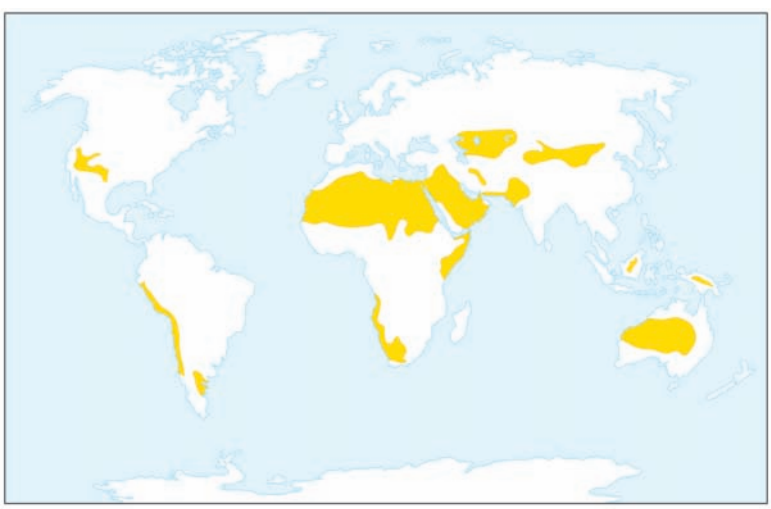


Temperate climate areas

Temperate

Temperate climate

Temperate climates occur between the 40° and 65° north and south latitudes. This is a rainy, cool climate typical of much of northern Europe. The average yearly temperature is 10 °C. Total annual rainfall is about 1 400 mm. There is often more rain in winter than summer.

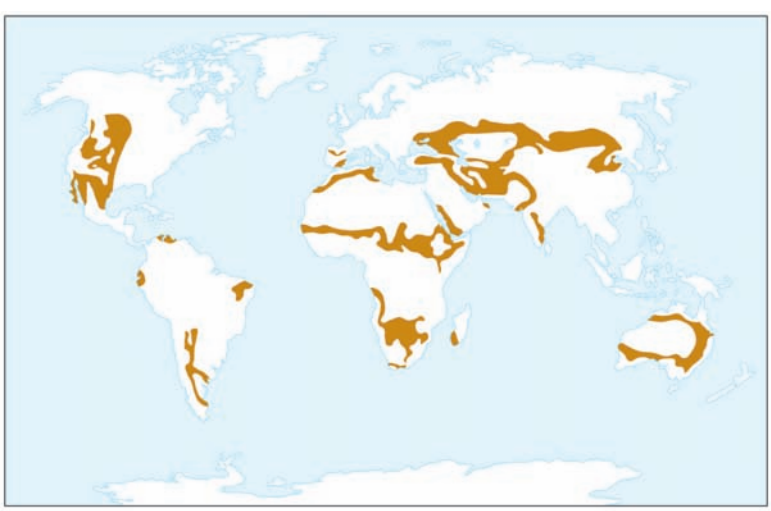


Desert climate areas

Desert

Desert climate

A desert is an area where there is very little rainfall, usually less than 250 mm each year. Deserts are not always hot places. Antarctica is a very dry cold area that can be classified as a desert. However, we usually use the word *desert* to mean a hot and dry area. The Sahara Desert is the world's largest hot desert. Temperatures can reach 50 °C during the day in hot deserts. Lack of vegetation and cloud cover means that the land cools down quickly at night. Night time temperatures can drop to 0 °C (freezing point).



Semi-desert climate areas

Semi-desert

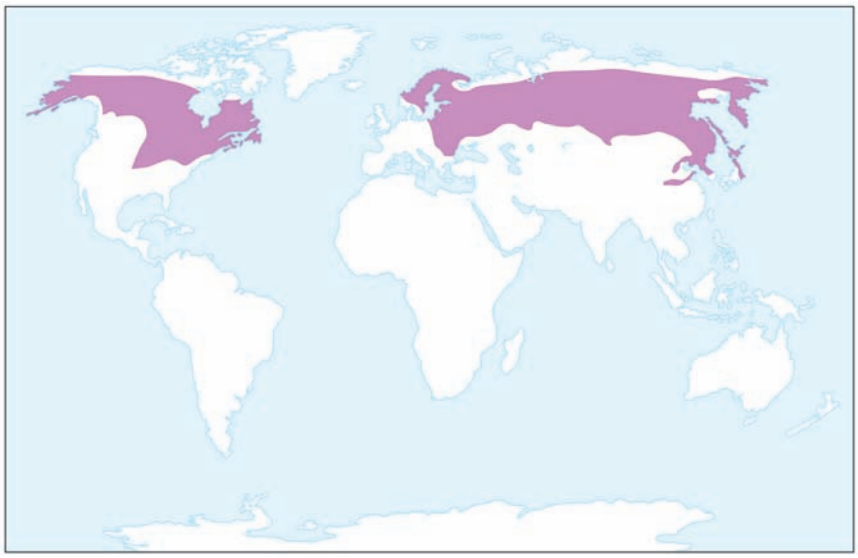
Semi-desert climate

The semi-desert areas are often on the edge of the hot deserts. Semi-desert areas receive less than 500 mm of rain a year and usually more than 250 mm.

They are risky areas for people to live in because the rainfall is very **erratic**. These areas often experience **droughts**. The Karoo is a semi-desert region in South Africa. Temperatures depend on latitude and altitude. But like desert climates, semi-desert areas often have high day time temperatures and cool or cold nights.

Continental climate

This region occurs between the 30° and 60° degree lines of latitude. The continental climate is only really in the northern hemisphere. There are no large landmasses in the same latitudes in the southern hemisphere. This climate has four distinct seasons. Parts of the region can be very wet. Rainfall varies between 500 mm a year to 1 250 mm a year. Summers are short with temperatures often above 20 °C, while winters are long with temperatures staying below freezing for three or four months.



Continental climate areas Continental

Polar climate

Regions close to the North and South Poles have a polar climate. In the warmest months temperatures may rise above freezing point, but rarely above 10 °C. There are two very distinct seasons. The seasons are determined by the amount of sunlight the area gets. For example, when the sun is over the Tropic of Capricorn, the area close to the South Pole receives almost 24 hours of sunlight at this time. In winter the sun is over the Tropic of Cancer so the South Pole faces away from the sun. This area then experiences almost 24 hours of darkness in winter.

Polar

The tilt of the earth means that polar climates have a light season and a dark season.

The long dark winters mean that temperatures drop to well below freezing point. The temperatures are so low that water does not have a chance to evaporate, which means there is very little precipitation. The average winter temperature for Antarctica is −40 °C.