part 1

geography

The geography toolkit

Geography is the study of the world around us. Studying geography helps us understand how the Earth works. This includes natural processes (such as volcanoes, floods and the weather) as well as human activities (such as mining, tourism and building cities).

Geographers use a range of key concepts and key skills to study the world. Each of these concepts and skills is a tool that you can use to better understand your world. As you master each of these concepts and skills you will gradually fill your toolkit with a range of useful geographical tools.

Geographers are curious. They look at the Earth's **features** and always want to know more about them. For example, when they look at the Bungle Bungle Range (Purnululu National Park) located in the East Kimberley region, Western Australia, shown in Source 1, they wonder about many aspects of this natural feature. They want to know about:

- its size
- its location
- the types of rock in the area
- the types of plants and animals in the area
- its significance to Indigenous Australians
- the way it is used by people
- the way it is changing.

This curiosity and wonder gives geographers a special view of the world. You can share that view. Welcome to the wonderful world of geography!

chapter 1

Source 1 The Bungle Bungle rang in Purnululu National Park

1A
What are geographical concepts?

1B
What are the geographical skills?

1C
What is fieldwork?

1.1 Geographical concepts

Geographers use seven concepts to help investigate and understand the world. The seven key concepts in geography are:

- **place**
- **sustainability**
- **space**
- **scale**
- **environment**
- **change.**
- **interconnection**

Place

Places are parts of the Earth's surface that are identified and given meaning by people. A place can be as small as your bedroom or as large as the entire planet!

Places can be natural (that is, shaped by the environment and largely unchanged by humans) or built (that is, constructed by humans).

The life of every person and animal on Earth is influenced by place. Places determine our relationships with one another. Our closest relationships are likely to be with people in the same place. The environmental and social qualities of a place all influence the way we live. Climate, landscapes, types of plants and resources, transport networks, entertainment venues and workplaces all have a major impact on place and the way we live.

For Indigenous Australians, place also has a deeper spiritual meaning. Their sense of identity comes from their relationship with place. Aboriginal people have lived in the Kakadu region of Northern Territory for over 50 000 years. The region contains approximately 5000 rock art sites, some of which are over 20 000 years old. They represent the longest historical records of any group in the world.

Geographers use the concept of place when conducting any geographical inquiry. For example, a geographer studying Perth (Source 1) would use the concept of place to help understand why people originally settled there, how the city was built and how it has changed over time.

They would also use place to investigate the important role the city plays in the lives of New Yorkers, Americans and people all over the world.

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Source 1 An aerial view of Perth – an example of a built environment.

Just as place influences people, people also influence place. The ways in which we live, and the actions we take, change the places in which we live. Geographers investigate the outcomes of these changes. For example, by investigating the way in which human actions have altered the Brazilian Rainforest, geographers can learn how to better manage and care for our natural resources.

Space

To most people space means the empty universe but to a geographer it has a different meaning. Geographers investigate the way that things are mapped and arranged on the Earth's surface. They look for patterns and try to explain them. The concept of space helps them to do this. It has three main elements:

- location – where things are located on the Earth's surface
- spatial distribution – the shapes and patterns in which things are arranged on the Earth's surface
- organisation – how and why things are arranged and managed on the Earth's surface by people.

Geographers investigate the way that people use and change the space in which they live. They recognise that different groups of people use space in different ways and that this changes over time.

The city of Shimabara in the south of Japan (Source GT.3) illustrates the concept of space well. The city has been built on a flat coastal area at the foot of an active volcano, Mount Unzen. Houses, schools and office buildings in Shimabara are linked by roads leading to nearby farms closer to Mount Unzen. The volcano clearly presents a danger to people living in the town. As Source GT.3 shows, the flow of superheated ash and rock from the volcano has buried part of the city as it makes its way to the sea. At first glance it may not be clear why anyone would risk living this close to a volcano, but the fertile volcanic soil in the area makes it ideal for growing crops.

The concepts of place and space can be difficult to separate, but it will help if you remember that places can be divided into spaces. For example, a place, such as your school, has different spaces for learning (such as classrooms), playing (such as playgrounds), eating (such as the cafeteria or canteen) and running the school (such as staffrooms).

Larger places (such as your suburb, town or city) are also organised into different spaces. There are spaces for housing, businesses, industry, entertainment and sport and recreation.

Our understanding of the location, patterns and planning of spaces helps geographers to make sense of our world.

Source GT.3 An aerial photograph showing the path of the hot ash and rock that flowed to the sea from Mount Unzen, an active volcano on the island of Kyushu in Japan. Part of the city of Shimabara (shown in the foreground) has been buried by the eruption.

Environment

The world in which we live is made up of many different environments. Some environments are natural (or physical) such as deserts, grasslands, mountains, coral reefs, forests, oceans and ice caps. In order for an environment to be considered natural, its soils, rocks, climate, plants and animals must remain largely untouched by humans. Today, there are very few truly natural environments left on Earth.

Other environments have been so altered by humans that very few natural features remain. These environments are known as built (or human) environments and include large cities, towns, suburbs and vast areas of farmland. Human environments not only affect the natural features (such as soil, plants and animals) they also affect the climate. A large city, such as New York, has its own microclimate. It will often be a few degrees hotter than the surrounding areas because concrete in the buildings traps the Sun's heat.

Most environments on Earth are now a combination of natural and human features. For example, Antarctica, the harshest environment on the planet, is considered a natural environment despite humans having altered some areas of it. These changes have included the building of a number of permanent research bases and the carrying out of various scientific studies both on land and sea. The McMurdo research base, for example, operated by the United States (Source GT.4), has three airfields, a harbour and more than 100 buildings. In addition to these built structures, other human influences have affected this environment. The warming of the planet has contributed to the increased melting of ice shelves and pollution of our oceans has had an impact on sea and land animals in Antarctica.

The study of different environments helps geographers to analyse the changes humans make to natural environments and better appreciate their impact so that they can be managed more wisely.

Interconnection

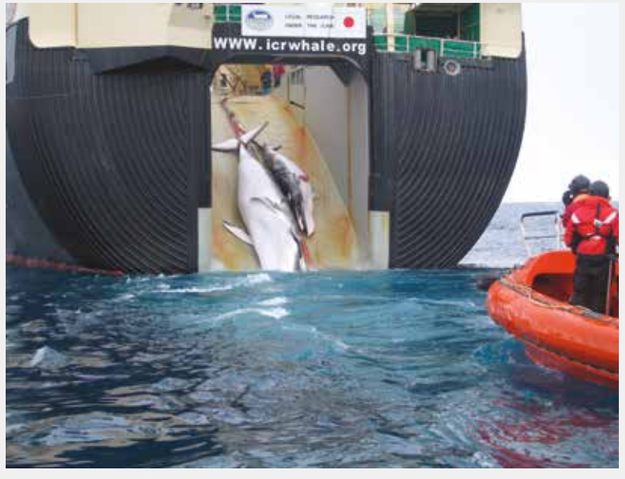
Geographers use the concept of interconnection to better understand the complex links between natural and human processes that shape our Earth. Places and people can be linked in many different ways that can be categorised as:

- natural processes, such as the water cycle and food chain
- human activities, such as the movement of people, the production and trade of goods and the flow of investment and money linked within and between different countries.

It helps to think of the Earth as a single living organism, much like your body. The Earth's living systems (such as climate, plants, animals, oceans, soils, atmosphere and energy) all function together and are interconnected. Even a slight rise in the Earth's temperature, for example, will effect the oceans (such as damaging coral reefs), the land (such as failure of crops and drought) and the polar ice caps (such as increasing sea levels and forcing millions of people to relocate). Source 4 shows a slum in Bangladesh, the most densely populated country in the world. Bangladesh is home to 150 million people. Its coastal zone has a very low elevation above sea level, making it one of the countries most vulnerable to climate change through rising sea levels.

Source 3 A scientist looking out over McMurdo Station at Observation Hill in Antarctica. The line between the natural and built environment is clearly illustrated in this photograph.

Source 4 Bangladesh is one of the countries most vulnerable to climate change because of a number of interconnected processes that are causing sea levels to rise. It is estimated that 15 million of the poorest people living in Bangladesh, like those living in this slum, will be affected by a 1-metre rise in sea levels.



Source GT.6 A Minke whale and her one-year-old calf are being dragged on board the Japanese factory ship *Nisshin Maru*. Anti-whaling activists argue that the number of whales hunted by the Japanese each year is unsustainable.

Sustainability

The concept of sustainability relates to the ongoing capacity of Earth to maintain all life. This means developing ways to ensure that all resources on Earth are used and managed responsibly so they are there for future generations.

Many of the world's resources (such as oil, coal and natural gas) are non-renewable. This means that if we continue to use them they will one day run out. Other resources (such as wind, forests, solar and water) are renewable. This means that they replace themselves naturally, or can be replaced to meet the needs of society. Sustainability encourages us to think about these different types of resources and take greater care of the Earth. Actions to improve sustainability can operate at a number of levels:

- Local – Recycling of paper by individuals, schools and households reduces the amount of trees that need to be cut down.
- National – In Australia the government has begun to encourage sustainable use of energy through the establishment of wind farms and hydroelectric power plants andthe use of solar panels.
- International – Efforts to protect endangered whale species around the world have attracted media attention and focused public opinion on maintaining breeding grounds free of large whaling vessels (Source 5).

Sustainability is an important concept for geographers. They use it to investigate how natural and human systems work, and understand how resources can be managed in such a way that they will be sustained into the future.

Change

The Earth is constantly changing. Some changes occur very rapidly and are easy to see, while others take place over millions of years and are almost undetectable to us. The concept of **change** is important in geography because it helps us to understand what is happening around us. Changes can be caused by natural processess, such as climate or natural disasters, or by human processes.

Changes take place on many different levels, from personal and local right through to national and global. Small local changes that happen quickly, such as a creek flooding, are often easy to observe and explain. Larger regional or national changes, such as an earthquake or tsunami, can happen quickly and their effects can be widespread and have devastating impacts on places and people (see Source 7). Changes that take place on a global scale can take much longer to occur. Global warming, for example, is a long-term change that happens slowly. Global warming has widespread effects that are not easily explained.

Geographers need to look at different types of changes, why they have occurred, over what time period they have occurred and what further changes may take place as a result. Sometimes changes can be positive, such as the conservation of plants and animals in national parks, while other changes can have negative consequences, such as the deforestation of native rainforests in Indonesia. Geographers play an important role in ensuring that change is managed in a sustainable way.

Source 6 The changes that took place in a Japanese coastal suburb of Rikuzentakata as a result of a tsunami in March 2011 were devastating and very rapid. The top image shows the area before the tsunami and the bottom image shows the same area after it had struck.

Scale

Scale is an additional concept used to guide geographical inquiries. Geographers study things that take place on many different spatial levels – meaning from small areas (such as a local park) to very large areas (such as the use of oil and coal all over the world). A geographic inquiry of the ways in which people use parks, for example, may be carried out at a range of scales (from smallest to largest):

- local – such as an inquiry into the daily visitors to a neighbourhood skate park, its whether facilities meet the needs of visitors
- regional – such as an inquiry into the types of visitors staying at campsites and tourist parks in Western Australia
- national – such as an inquiry into the yearly tourist numbers visiting national parks in Australia (such as Nambung National Park), including the impact these visitors have on our National Parks and the way in which these parks are managed.
- international – such as an inquiry into animal poaching in national parks and wild game reserves in different countries across Africa
- global – such as an inquiry into the use of all marine parks around the world how well they protect endangered species.

Source 6 Geographical inquiries can be carried out on a number of different spatial levels: **local** (e.g. at a nearby skate park); **regional** (e.g. at a campsite in the Grampians region of Victoria); **national** (e.g. at national parks across Australia); **international** (e.g. in different countries across Africa) and **global** (e.g. at marine parks all over the planet).

Check your learning 1.1

Remember and understand

1 Examine the photo of the Bungle Bungles (Source 1 on page XX). Is this a natural or built environment? Give reasons for your answer.

2 New York City (shown in Source 1 on page XX) is one of the world's largest cities. List five ways in which this built environment would affect how people live and work.

Apply and analyse

3 Here are some examples of changes that may be occurring on Earth at any given time:
- a new freeway is being built through the city
- the Earth's climate is warming
- an earthquake is destroying a town in Turkey

a Which of these changes are caused by human activities and which are caused by natural processes?

b Identify the scale at which each of the above changes takes place; that is local, regional, national, international or global.

4 List three ways in which your school or household is addressing the concept of sustainability. Which of these do you believe is most successful? Why?

5 Study Source 6 Identify the major changes to the Japanese coastal suburb as a result of the tsunami. How might an understanding of the concept of change be useful in guiding the rebuilding or relocation of the suburb?

6 Your class is undertaking research on the Great Barrier Reef. Develop one question for each of the seven geographical concepts discussed in the text.

Evaluate and create

7 Create a diagram, such as a flow chart, to show the interconnection between the natural and built environment at Antarctica's McMurdo Station (Source 3). Include information on such aspects as climate, landforms, wildlife and human settlement.

8 Choose one of the key concepts that has been discussed. Design a poster for your geography classroom to help you and your classmates remember this concept and use it in geography.

1.2 Geographical inquiry and skills

Geography has been described as the 'why of where'. Geographers examine the world and try to explain what they see. Like a detective at the scene of a crime they follow a line of inquiry. They are:

- Stage 1 – Questioning and research
- Stage 2 – Analysing
- Stage 3 – Evaluating
- Stage 4 – Communication and reflection

To follow a line of inquiry, geographers need a range of skills. As you develop each new skill you will have gained another important tool for explaining the natural processes and human activities that shape our amazing planet.

Each of the skills you will learn over the course of this year is explained in this section. It might help you to think of each of these skills as individual tools in your toolkit. For some geographical inquiries you may only need to use one tool; for others, you may need to use many.

Source GT.9 The skills needed by every geographer. Think of each of these skills as a tool in your geographer's toolkit.

1.3 Questioning and research

All good geographical inquiries begin by observing something in the natural or built world around you. If you look out the window of your classroom you will become aware of your surroundings. Is it a sunny day? Can you see any buildings or trees?

Even though you may look out this window on most days and take what you see for granted, these simple questions can easily become the basis of a number of different geographical inquiries. If the sun is shining, you might like to begin an inquiry into the hours of sunlight and the pattern of temperatures in your area. If you can see lots of trees or buildings, you might like to begin an inquiry into what type of environment you are in and the different forces that have shaped it. Once you have observed what is around you, the next stage is to develop some geographical questions to focus your inquiry.

Ask geographical questions

Geographers ask lots of questions. Geographical questions can be as simple as 'What is it?' and 'Where is it?' or more complex, such as 'What is the connection between these two things?' and 'How and why have things changed over time?'

As a geographer, no longer will you look at something in your world, such as Uluru, and only think of it as an interesting place to visit. Instead, you will begin to ask questions about how it was formed and came to look the way it does. You will also start to ask questions about the area in which it is located, its vegetation, how it is used and managed and its significance for Indigenous Australians.

When we ask questions of the world around us, sometimes we identify possible gaps in our knowledge. These gaps in our knowledge present an opportunity for geographical inquiry to gather new knowledge or challenge existing personal perspectives.

skilldrill

Developing geographical questions

Study Source 1 This visitor to Uluru is asking some important geographical questions. You can learn to do this too by starting your questions with the words 'what', 'where', 'how', 'why', 'what impact' or 'what should' when thinking about a particular feature or place.

Your questions should deal with ideas such as:

- Where is it?
- How many are there?
- How big is it?
- What pattern or shape is it?
- Why is it like this? Is it like this because something else is at this location?
- How does it interact with other things in this place?
- Who interacts with it?
- Is it changing? If so, why is it changing and what will it look like in the future?
- How should people best manage this change?

The very best questions open up an exciting area for you to explore. For example, the visitor might ask a simple question, such as 'How big is Uluru?' This is a question with a relatively simple answer. A better geographical question for the visitor to ask would be 'Why is Uluru so big?' This question opens up a whole new area for her to explore.

Apply the skill

1. Why would it be better to ask 'Why is Uluru so big?' than 'How big is Uluru?'
2. Where could you look to find answers to the question 'Why is Uluru so big?'
3. Examine the photograph of the Bungle Bungle Range at the beginning of this chapter. Work with a partner to develop geographic questions about this landscape.

Plan a simple geographical inquiry

Once you have asked a range of more general questions about a geographical feature or issue, it is time to select one question that will become the focus of your inquiry. When you have chosen this, it is useful to decide what data is needed to answer the question and how to collect the data.

Planning a geographical inquiry about Uluru

Having chosen to investigate the key inquiry question 'Is it a good thing that so many tourists visit Uluru?', you need to decide what data is needed to answer the question and how to collect the data.

Collect information and data

Good planning and preparation will ensure that your geographical inquiry will run smoothly, be relevant and give you the answers you are looking for:

- collect and record the information you think you will need to answer your key inquiry question
- evaluate this information and data to determine that it is accurate and relevant
- represent your findings in an interesting and appropriate way (such as tables, graphs, maps and sketches).

Geographers find answers to their questions in many places. They may collect information themselves by interviewing people, taking photographs, making sketches out in the field or conducting surveys and questionnaires. This kind of information will generally only be relevant to a particular inquiry and is called **primary data**.

Often a geographer collects information that supports his or her inquiry but has not been specifically collected or designed by the geographer for the inquiry. This type of information is called **secondary data**.

Source 4 Examples of primary and secondary data

Some examples of primary data	Some examples of secondary data
• Hand-drawn maps and field sketches • Photographs and images taken for the inquiry • Questionnaires and surveys designed and created for the inquiry • Graphs created from data (such as number of visitors, number of cars counted, and temperature and wind statistics) gathered by the geographer for the inquiry	• Information from textbooks, atlases, maps, graphs, reports and websites that were not created specifically for the inquiry • Data that was collected by a government department (such as census data), the media, companies and other organisations and was not collected specifically for the inquiry

Source 2 A guide for planning the direction of a geographical inquiry into Uluru

Key inquiry question	Data needed	Possible sources of data
Is it a good thing that so many tourists visit Uluru?	• Information on the importance and significance of Uluru to the Anangu, who are the Indigenous people in the area • Information on the management and maintenance of the park	• Conduct fieldwork into visitor numbers • Create surveys and questionnaires for visitors to complete • Contact Parks Australia and Uluru-Kata Tjuta National Park for information on how the park is managed • Download resources from the Parks Australia website; for example, podcasts, maps, visitor guides, geological reports, audio tours and images

Source 3 Kata Tjuta in the Northern Territory

Primary and secondary data provide either **quantitative data** or **qualitative data**. Quantitative data includes anything that can be recorded as numbers (for example, Uluru is 3.6 kilometres long and 1.9 kilometres wide and has a circumference of 9.4 kilometres). Qualitative data, on the other hand, includes anything that can be recorded in words (for example, Uluru, one of Australia's best-known natural landmarks, is very large).

Source 5 Examples of quantitative and qualitative data

Some examples of quantitative data	Some examples of qualitative data
• Climate and temperature statistics • Tourist numbers • Population figures (including birth and death rates) • Types and amounts of food grown • Plant and animal species and wildlife in certain areas • Forest clearance rates • Numbers of people killed in natural disasters • Numbers of volcanic eruptions and earthquakes	• Opinions • Points of view • Personal stories • Likes and dislikes • Feelings

Good geographical inquiries will always be based on a combination of primary and secondary data that is both quantitative and qualitative. Even though qualitative data is an important part of any geographical inquiry, quantitative data is considered to be more valuable because it is less open to personal interpretations and can be more accurately represented in graphs and charts. Before you move to the next stage of your inquiry, it is important to check that you have recorded all your data without errors and that it is balanced and fair. Your data should not reflect your personal opinions, emotions or attitudes; instead it should present the facts in a clear and concise way.

Recording information and data

There are many ways to record data and information as you collect it. Choosing the most appropriate method will often depend on the kind of data you are collecting.

If you are collecting qualitative data on the types of geographical features at your nearest beach, you might take photographs, make a list of the features or draw sketches of the beach. If, on the other hand, you are recording data on the number of people who use the beach, you might use a tally or table to keep track of people as they go by.

Mind maps and other graphic organisers can also be used to group ideas and identify relationships between features.

Ethical protocols

It is important to keep in mind ethical protocols when you are conducting your questioning and research. This means y you should try to do the right thing by anyone who you might involve in your inquiry. In order to do this you should keep in mind the following things:

- Remember to seek permission from someone before you use a photo of them in your inquiry.
- Always seek permission if you intend to visit Aboriginal cultural land.
- If you are using someone else's work in your inquiry, do not take credit for their work. Instead acknowledge correctly by using the format specified by your teacher.

Create maps and other graphic representations

Geographers can collate information they gather during their inquiries in a number of different ways. They often make maps, create graphs and tables or even draw diagrams to help them gather information or look for patterns in the data they have gathered. These tools also help people who were not involved in the inquiry (such as the general public, the government or people in the media) understand the work that has been done.

Creating maps

One of the most useful tools that geographers use to process information is a **map**. A map is a simplified plan of an area. Maps are drawn in the **plan view** (directly from above) because this ensures the scale will be the same across the entire area. If maps were drawn from an angle, some parts of the mapped area would look distorted and so it would not be an accurate representation of the area. When properly used, maps can reveal a great deal about our planet and the ways in which we use it.

<< N0101_07325>>

Source 6 An aerial photograph of Sydney Harbour and the city

SYDNEY: HARBOUR AND CBD

<< N0102_07325>>

Source 7 A map of Sydney Harbour and the city (as shown in Source 6)
Source: Oxford University Press

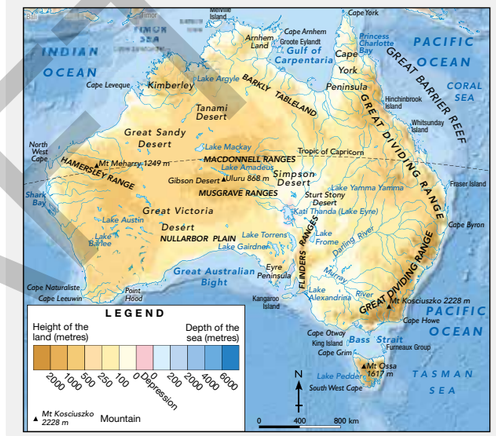
Simple maps

Geographers use different types of maps to show a whole range of different natural and built features – and the connections between them. This year you will be learning how to create a number of different types of maps and interpreting the information that they provide. These maps include:

Physical maps

Physical maps show the locations and names of natural features of the Earth. These may include deserts, mountains, rivers, plains, oceans, reefs, volcanoes and lakes.

PHYSICAL MAP OF AUSTRALIA SHOWING OCEANS AND MAJOR MOUNTAIN RANGES, RIVERS, LAKES AND DESERTS



Source 8 Source: Oxford University Press

Political maps

Political maps show the locations and names of built features of the Earth. These may include country borders, state and territory borders, cities and towns.

POLITICAL MAP OF AUSTRALIA SHOWING STATE AND TERRITORY BORDERS, CITIES AND TOWNS

Source 9 Source: Oxford University Press

Dot distribution maps

Dot distribution maps use dots (or shapes) to represent (and sometimes compare) a range of different features. The dots show the location of the chosen feature. The size and colour of the dots on the map can show different characteristics of that feature. For example, in GT.19, small towns are shown as small green dots and big cities are shown as big red squares. Other dot distribution maps show the location of a single feature, such as litter (see Source GT.51). Dot distribution maps help to show patterns and links between features – geographers refer to this as spatial distribution.

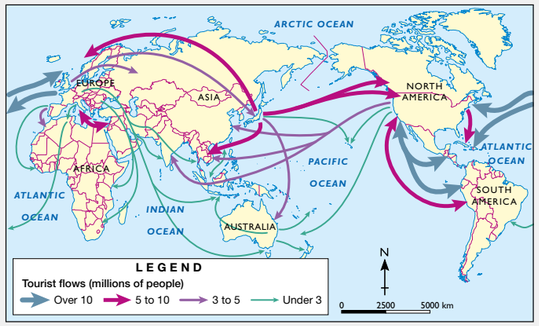
DOT DISTRIBUTION MAP OF AUSTRALIA SHOWING POPULATION

Source 10 Source: Oxford University Press

Flow maps

Flow maps show movement from one place to another. Arrows of different thicknesses or colours are used to show where different things (such as people or goods) are moving to and from, and compare the numbers involved in the movement.

FLOW MAP SHOWING THE FLOW OF TOURISTS WORLDWIDE

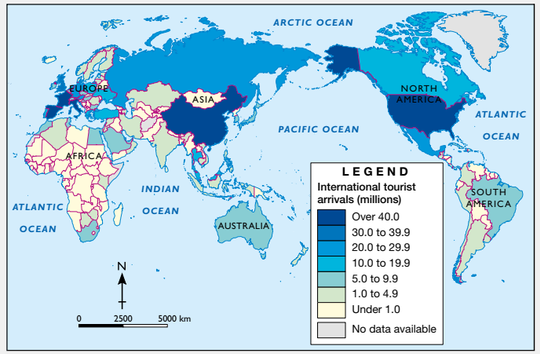


Source 11 Source: Oxford University Press

Choropleth maps

Choropleth maps use different shades of the same colour to give a quick impression of the pattern formed by the data being shown. Darker shades show the highest values or the greatest amounts, while lighter shades show the lowest values or the least amounts.

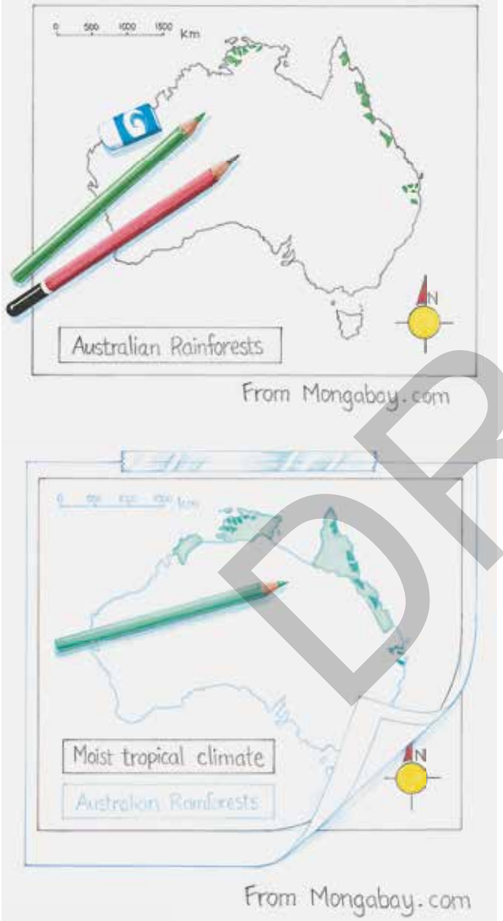
CHOROPLETH MAP SHOWING INTERNATIONAL TOURIST ARRIVALS WORLDWIDE



Source 12 Source: Oxford University Press

Overlay maps

Overlay maps show how features on the Earth's surface may be related to each other. To create an overlay map you first need to produce a base map showing one feature (such as the location of Australian rainforests) and then place a piece of tracing paper or plastic sheet over this base map showing the other feature you are investigating (such as areas with a moist tropical climate).



Source 13 An overlay map showing the location of Australian rainforests on a base map (top) and areas with a moist tropical climate on an overlay (bottom)

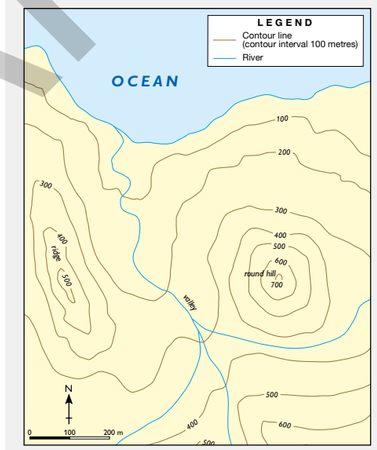
More complex maps

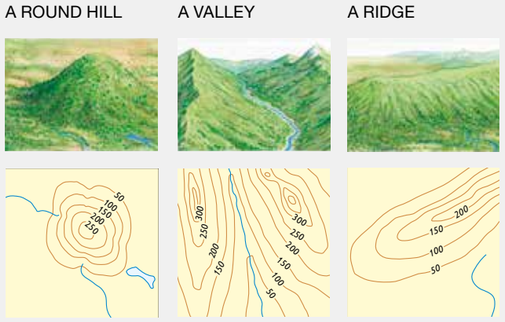
Over the course of the year you will also be working with a number of other, more complex maps. You won't necessarily be creating these maps yourself, but you will be learning how to make sense of the information they provide. These maps include:

Topographic maps

Topographic maps show the shape of the land (such as the shapes formed by valleys, hills and ridges) by using **contour lines**. Numbers on some of the contour lines show the height of the land above sea level. The closer together the contour lines are, the steeper the land. Symbols and colours are also used on topographic maps to show other natural features (such as forests, rivers and lakes) and built features (such as towns, roads and mines). The contour patterns of three common features are shown below the topographic map in Source 14.

TOPOGRAPHIC MAP SHOWING A ROUND HILL, A VALLEY AND A RIDGE





Source 14 Source: Oxford University Press

Weather maps

Weather maps show conditions in the atmosphere, such as air pressure, wind speed and wind direction. They also show the size and location of warm and cold fronts. Weather maps are also known as synoptic charts. They are most commonly seen on the nightly news.

Source 15 Weather maps feature in the nightly news on television

Thematic maps

Thematic maps show a particular theme or topic; for example, the distribution of resources (such as coal and gas), the different types of forests around the world, access to safe drinking water, or the types of crops and animals farmed in Australia.

THEMATIC MAP OF AUSTRALIA SHOWING TYPES OF ANIMALS AND CROPS GROWN

Source 16 Source: Oxford University Press

Geographic Information Systems (GIS)

Geographic Information Systems (GIS) are a way of creating, viewing, organising and analysing geographical information with the use of a software application. GIS is an exciting new development in the world of geography because it allows geographers to access and share an incredible amount of data and look at the world in new ways. GIS are made up of three elements:

- digital base maps
- data that is layered over the base map (such as a chart, overlay or table)
- a software application or platform that links these elements together and allows the user to interact with all of this information.

GIS combine satellite images, graphs and databases to allow you to identify patterns and trends so that you can gain a better understanding of the world around you. They allow you to turn different layers of data on and off in order to isolate exactly what you are looking for. You can even create and share your own maps, look at 3-D models of areas and record video simulations, known as flyovers.

GIS is already a part of many people's everyday life. Governments, companies and individuals all around the world use GIS. There are a number of GIS platforms available today, but one of the most commonly used and free GIS is Google Earth.

Essential features of maps

BOLTSS

Regardless of the type of maps you are creating or interpreting, all will share some common features. There are six features that ensure every map is drawn in a clear, concise and accurate way. To help you remember these features, remember you can use a mnemonic (memory aid) that consists of the first letter of each of the features. Together, these six letters make up the word **BOLTSS**:

Source 17 shows a map of Australia that is held together with BOLTSS.

B **Border** – an outline or box drawn around the map

O **Orientation** – an indication of direction, usually shown with a north arrow or compass rose
Legend – an explanation of the symbols, colours and

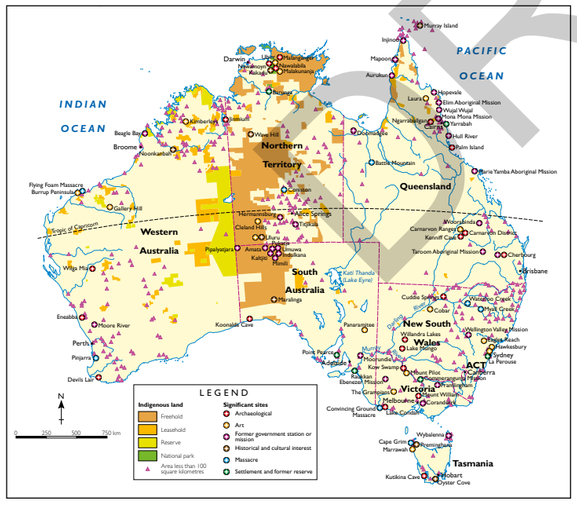
L patterns used on the map (also known as a key)
Title – a heading that describes the map and what it is

T showing
Scale – a way of indicating what distances on the map

S represent in the real world. Scale can be shown in three different ways: as a written scale, a line scale or a ratio. Source GT.29 shows the three ways scale can be represented on a map.

S **Source** – where the information used to create the map came from. If these details are not known, simply write 'Source: unknown'. If you have created the map from your own data, simply write 'Source: own map' or 'Source: [add your name]'.

AUSTRALIA: INDIGENOUS LAND AND SITES, 2006



Source 17 A map of Australia showing all the features of BOLTSS
Source: Oxford University Press

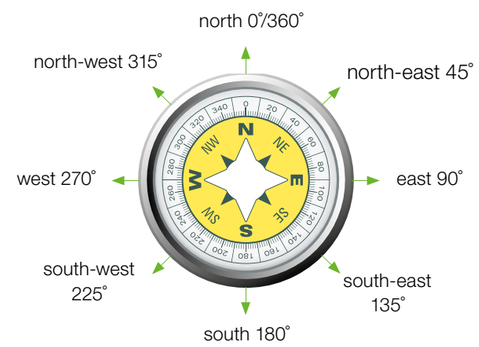
Direction

Direction must always be shown on maps because it enables the user to work out the location of features shown. Direction is shown on maps by the use of compass points. A **compass** is an instrument with a magnetised needle that will always point to the Earth's magnetic field near the north pole (known as **magnetic north**). The face of a compass shows a circle made up of 360 degrees (see Source 18).

The four main directions on a compass are north, south, east and west. These are known as **cardinal points**. Most maps are oriented to north. Once north has been established, you can find the other points of the compass.

Using compass points is an accurate way of giving directions because the compass always points to magnetic north no matter which direction you are facing.

Compass bearings provide an even more precise way to give directions. A bearing is an angle that is measured clockwise from magnetic north. The bearing of magnetic north can be either 0 degrees or 360 degrees, the bearing of south is 180 degrees, the bearing of east is 90 degrees and the bearing of west is 270 degrees. These bearings are also shown in GT.27.



Source 18 A compass face showing cardinal points and compass bearings

Scale

We use **scale** to shrink or increase real world features so they will fit into a space. Model cars are scaled down in size and proportion from real cars.

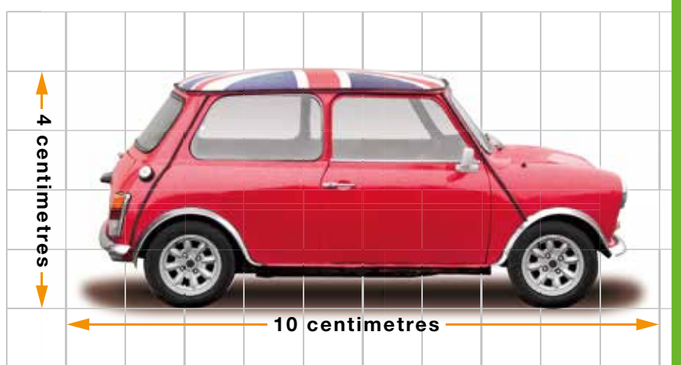
The model shown in GT.28 looks like the real car, only smaller. It is a 1:35 scale model. This means that 1 centimetre on the scale model is equal to 35 centimetres on the real car. If 1 centimetre represents 35 centimetres, then 10 centimetres (the total length of the model) represents a total length of 350 centimetres (or 3.5 metres) on the real car.

Scale on maps

Maps are scaled representations of real areas. These representations have been designed to fit on a piece of paper or on a computer screen. Maps look the same as the real areas they are representing, just reduced to a size you can work with. Scale on maps allows you to work out the distances in the real world.

Look at the map of Tasmania (Source 20). In the bottom left-hand corner it shows the three types of scale that can be used on maps and how they work:

- Written scale – A written scale tells you how much a distance on the map represents on the ground. The written scale on Source 20 is '1 centimetre on the map measures 30 kilometres on the ground'. Using this information we can easily work out that 5 centimetres on the map would be equal to 150 kilometres on the ground, and so on.
- Line scale – A line scale is a numbered line that acts like a ruler. You can use it to measure distances on the map. The Source20 line scale shows 1 centimetre is equal to 30 kilometres.
- Ratio scale – A ratio scale shows scale in numbers. The ratio scale for Source 20 is 1:3 000 000, so 1 unit (that is, 1 centimetre) on the map represents 3 000 000 centimetres on the ground. Of course, 3 000 000 centimetres is equal to 30 kilometres.



Source 19 This model car is thirty-five times smaller than the real car. This is expressed as 1:35.

skilldrill

Using line scale to measure distances

Scale is a handy tool to help you study the world around you from inside your classroom. Look at Source 2. You will notice that all the features on the map have been shrunk by the same amount so that they fit on the page.

You can use the line scale to measure the distance between two points 'as the crow flies' (that is, in a straight line) by following these steps:

Step 1 Place the straight edge of a sheet of paper over the points you wish to measure.

Step 2 Mark the starting and finishing points on the paper.

Step 3 Hold the edge of the paper against the line scale to work out the real distance between the two points.

Apply the skill

1 Use Sources 20 and 21 to answer the following questions:

a How far is it from the peak of Cradle Mountain to the centre of Hobart as the crow flies?

b How far is it from Devonport in the state's north to Queenstown in the west as the crow flies?

c How long is Lake Gordon from north to south?

d How wide is the state of Tasmania at its widest point?

TASMANIA

Source 20 Source: Oxford University Press

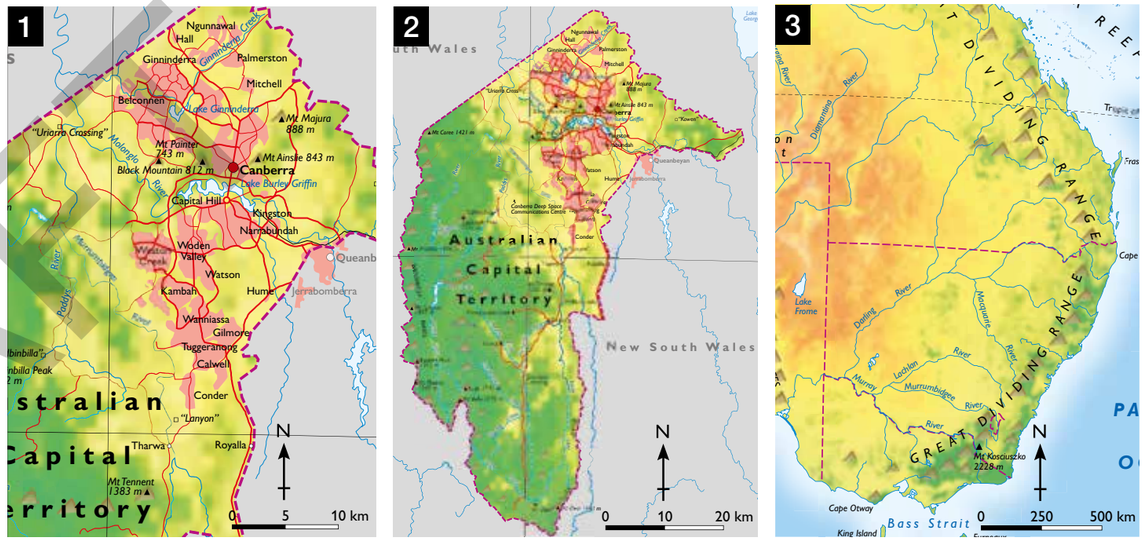
Source 21 Measuring straight distances on a map using a sheet of paper

Comparing map scales

Maps are often shown at different scales depending on the amount of detail they need to show. Source 23 shows three maps at different scales:

- Map 1 is a large-scale map. It shows a large amount of detail but only a small area. You can see the city area (in pink) and Lake Burley Griffin.
- Map 2 is a medium-scale map. It shows a medium amount of detail and a medium area. You can see the whole of the Australian Capital Territory (ACT).
- Map 3 is a small-scale map. It shows a small amount of detail but a large area. You can only just see the border of the ACT.

ACT AND EASTERN AUSTRALIA



Large-scale maps show detailed information about a small area.

Small-scale maps show general information about a large area.

Source 22 Source: Oxford University Press

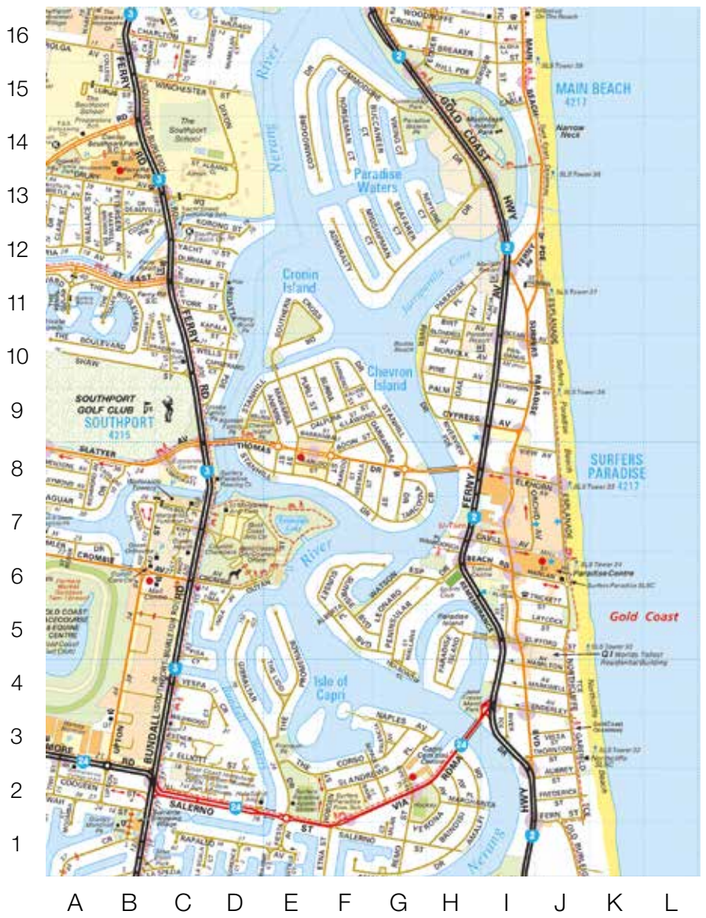
Remember:

- Large-scale maps show a **large** amount of detail, but a **small** area.
- Small-scale maps show a **small** amount of detail, but a **large** area.

Locating places on maps

Maps are used for many different purposes, but the most commonly used maps help us to find things we are looking for. These maps are often overlaid with a set of lines that form a grid. These gridlines divide the map into smaller areas and help us find places more easily. There are a number of ways in which you can locate things on maps and a number of methods you can use to help other people find these places. Some of these methods will give you a general idea of where something is, while others can help you pinpoint the exact location of something.

SURFERS PARADISE STREET MAP



Source 23 Source: *Brisway*

Grid and area referencing

Alphanumeric grid referencing

In maps that use alphanumeric grid referencing the spaces between gridlines are labelled with letters and numbers. The letters appear along the bottom (or top and bottom) of the map while the numbers appear down the left-hand side (or both sides) of the map. For example, in Source 23 the grid reference for the Paradise Centre is J6.

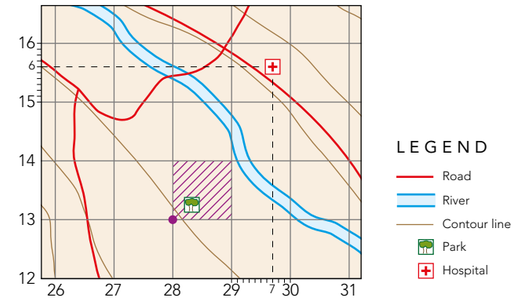
Area referencing (AR)

The area referencing (AR) method is used on topographic maps that have gridlines. Each line is given a two-digit number. The lines that run up and down the map are known as **eastings** (because the numbers increase as you move east). The lines that run across the map are known as **northings** (because the numbers increase as you move north). A four-figure area reference will pinpoint the bottom left-hand corner of the grid square in which you will find the feature. The eastings are given first then the northings. For example, in Source 24 the park is located in AR2813.

Six-figure grid referencing (GR)

Six-figure grid references (GR) help locate exact points on a topographic map. The area between each easting is divided into ten further parts (tenths), as is the area between each northing. This is just like adding a finer set of gridlines over the existing gridlines allowing you to be very specific about where things are within each grid square. As with area referencing, the eastings are given first then the northings. The difference is that one more figure is added to the easting and one more figure is added to the northing. This makes six figures in total. For example, in Source 24 the hospital is located at GR297156.

TOPOGRAPHIC MAP EXTRACT SHOWING AR AND GR



Source 24 Source: Oxford University Press

Latitude and longitude

Maps that show large areas of the Earth's surface (such as world maps) use a set of imaginary lines that form a grid. These gridlines, known as **latitude** and **longitude**, help us to locate places accurately.

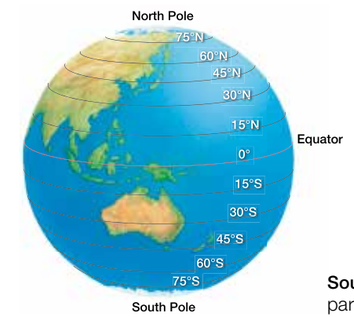
Lines that run from east to west are known as lines (or parallels) of latitude. Lines that run from north to south are known as lines (or meridians) of longitude. Each of the lines is separated by degrees rather than distance because the world is round, not flat.

The line of latitude midway between the north pole (90 degrees north) and south pole (90 degrees south) is known as the **Equator**, which is located at 0 degrees latitude. It divides the Earth into the northern hemisphere and southern hemisphere.

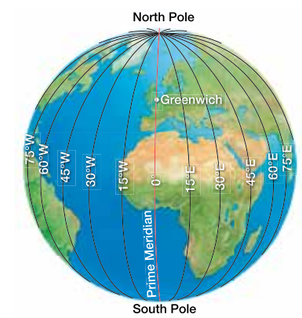
Lines of latitude are measured in degrees north and south of the Equator.

Lines of longitude are measured east and west of the Greenwich meridian (also known as the Prime Meridian), which is located at 0 degrees longitude.

Remember:
- Latitude – think 'lat is flat'.
- Longitude – think 'long is long'.



Source 25 Lines (or parallels) of latitude



Source 26 Lines (or meridians) of longitude

Check your learning 1.3

Remember and understand

1 What is the difference between primary and secondary sources?

2 On your way to school you notice that bulldozers are clearing an area of bushland.
   a How could this observation form the basis of a geographical inquiry?
   b Write five different types of questions to assist you in your geographical inquiry into the clearing of this bushland.

Apply and analyse

3 There is a proposal to build a new shopping centre.
   a Describe how a geographer would be able to find out what local people thought about the proposal.
   b What two additional issues may be linked to this geographical inquiry into the construction of a new shopping centre? One issue should relate to the natural environment and one should relate to the built environment.

Evaluate and create

4 Develop five questions that may assist a geographer in conducting an inquiry into the proposed development of a new shopping centre within their local area. Create a planning table similar to that used in the text for the inquiry into Uluru (Source 1).

1.4 Analysing

Interpreting information

Once you have collected and recorded your data, it is time to identify any trends, patterns or relationships in the information. You will have used questionnaires and surveys to gather visitor statistics, drawn sketches and diagrams, created graphs and tables and taken photographs (all of which are primary data). You will also have collected information from various other sources, such as textbooks, websites, GIS and atlases (all of which are secondary data). Now it is time to look at this information, identify any possible links and relationships and draw conclusions.

There are a number of methods that geographers use to help them during this stage of their inquiries. These include the:

- PQE method
- SHEEPT method.

Using the PQE method

PQE is a tool used by geographers to analyse the data they have gathered (such as maps, tables, graphs and diagrams) and reach conclusions. The letters PQE stand for pattern, quantify and exceptions.

Pattern (P)

In this step, you need to give a general overview of any patterns you may identify.

When looking at any form of data, look for things that stand out or form patterns. A pattern may be a group of similar features on a diagram, a concentration of a particular colour or feature on a map, or a particular shape that is created by data on a column graph. For example, when looking at a physical map of Australia (see Source GT.44) you might say, 'Most mountains run along the coast in the east.'

Quantify (Q)

In this step, you need to add specific and accurate information to define and explain the patterns.

Quantifying involves using statistics, amounts, sizes and locations to give specific details. For example, rather than just saying 'Most mountains run along the coast in the east,' you would need to quantify this statement. You might instead say 'A mountain range known as the Great Dividing Range extends more than 3500 kilometres along the eastern cost of Australia from Queensland to Victoria. It is the third longest mountain range in the world.'

Exceptions (E)

In this step, you need to identify anything that does not fit your patterns.

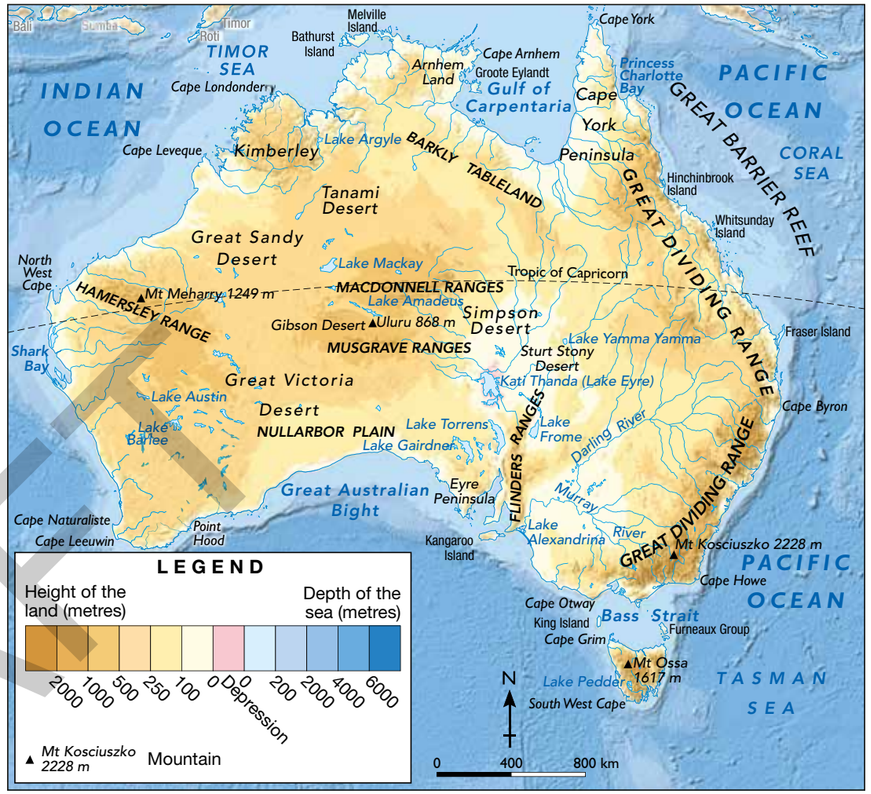
Often you may find that there are things in your data that do not fit into a pattern you have identified. These are called exceptions. They also need to be identified and quantified. For example, you might say 'There are a number of other mountain ranges that are not on the east coast. These include the Flinders Ranges in South Australia and the MacDonnell Ranges in the Northern Territory.'

Creating graphic representations

In addition to maps, geographers use a range of other visual representations to communicate information they have collected. These include:

- Tables – These allow geographers to present and compare data by organising it under different headings (see Source GT.36).
- Diagrams – These allow geographers to show the features or characteristics of some places or things much more effectively than describing them in words. Certain interesting or complex processes can also be more easily explained and demonstrated with the help of sketches, flow charts or illustrations (see Source GT.34 and Source GT.35).
- Graphs – These allow geographers to compare data and present it in an interesting and attractive way. There are a number of different types of graphs used by geographers for different purposes. The most common of these are explained on the following pages.

PHYSICAL MAP OF AUSTRALIA SHOWING OCEANS AND MAJOR MOUNTAIN RANGES, RIVERS, LAKES AND DESERTS



Source 27 Source: Oxford University Press

Source 28 A table showing the populations of Australian states and territories in 2011

State/Territory	Population	Percentage of Australia's population
New South Wales	7 317 500	32.3
Victoria	5 640 900	24.8
Queensland	4 599 400	20.3
Western Australia	2 366 900	10.4
South Australia	1 659 800	7.3
Tasmania	511 000	2.3
Australian Capital Territory	366 900	1.6
Northern Territory	231 200	1.0
Australia	22 693 600	100.0

Selecting information to analyse

When analysing information it is important that the sources you use are relevant. If your information and data does not meet these criteria, you run the risk of being misled and coming to the wrong conclusion. To get the best result from your geographical inquiry, your information and data adhere to the following guidelines:

- Accurate – there should be no mistakes in your data and your information should be based on observations, not guesses.
- Reliable – if you are using a secondary source, it should be from a source you can trust. For instance, the statistics on a government website will be more reliable than the statistics from an unverified blog.

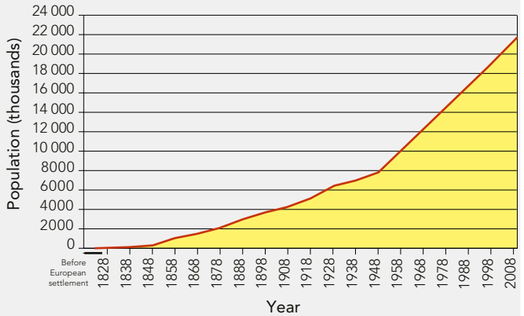
<< OVERMATTER >>

Simple graphs

Graphs are one of the most effective graphical representations when it comes to showing numerical (or quantitative) data. Some kinds of graphs are simple, while others are more complex. This year you will be learning how to create a number of different types of graphs and interpreting the information that they provide. Some of these graphs are described below.

Line graphs

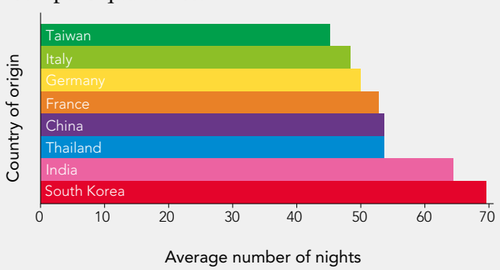
Line graphs show information as a series of points that are joined up to form a line. The line shows a trend or change over time. The horizontal axis (x) will usually show units of time and the vertical axis (y) will usually show amounts.



Source 3 A line graph showing the increase in Australia's population, 1828–2011

Bar graphs

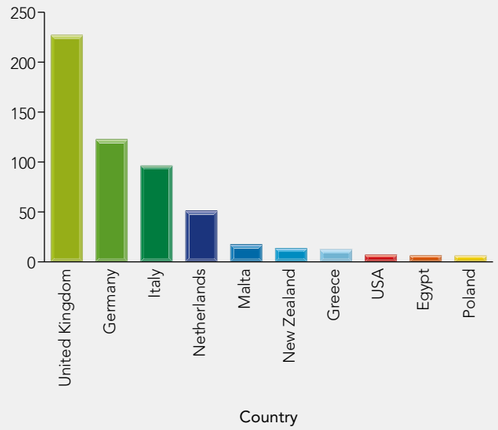
Bar graphs show information as a series of bars that run in a horizontal direction and are stacked one on top of the other. They are usually used to compare quantities.



Source 4 A bar graph showing average number of nights spent in Australia by tourists from different countries, 2009

Column graphs

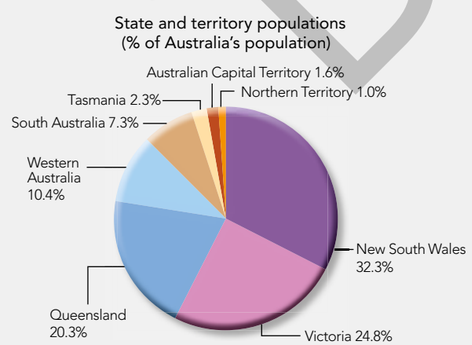
Column graphs are similar to bar graphs, but they show information as a series of vertical columns that are arranged side by side. They are also usually used to compare quantities.



Source 5 A column graph showing top ten countries of settler arrivals in Australia, 2010–11

Pie graphs

Pie graphs are shaped like a circle and are divided up so that the information being shown represents the slices of a pie. The circle of 360 degrees represents 100 per cent and each of the slices is a percentage of that. The slices of the pie are organised from largest to smallest in a clockwise direction starting from 12 o'clock.



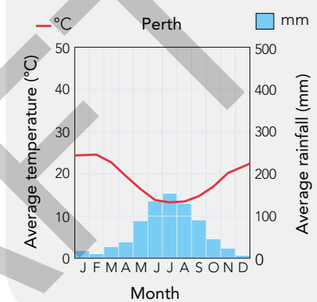
Source 6 A pie graph showing state and territory populations as a percentage of Australia's total population, 2011

More complex graphs

Over the course of the year you will also be working with a number of other, more complex graphs. You won't necessarily be creating these yourself, but you will be learning how to make sense of the information they provide. Some of these graphs are described below.

Climate graphs

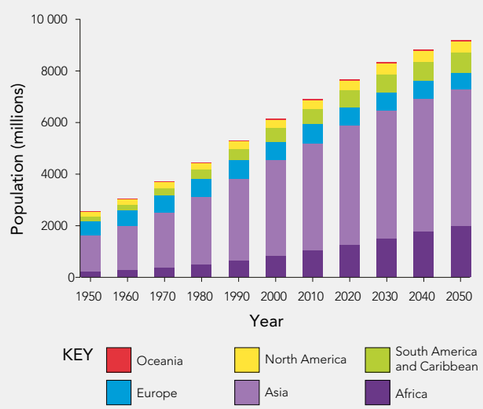
Climate graphs show the average monthly temperature and rainfall for a place over a year. Climate graphs combine line and column graphs. Temperature is recorded as a line graph and rainfall is recorded as a column graph.



Source 7 A climate graph showing the average monthly temperature and rainfall in Perth

Compound column graphs

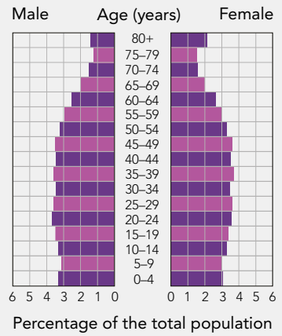
Compound column graphs are a more complex type of column graph in which each column is split into sections so results can be more easily compared.



Source 8 A compound column graph showing the increase in world population by region, 1950–2050

Population pyramids

Population pyramids are bar graphs that show the percentage of males and females in different age groups in a population. They help geographers identify trends in population growth in a country. Population pyramids are organised so that younger age groups are at the bottom and older age groups are at the top. Percentages of males are placed on the left-hand side and percentages of females are placed on the right-hand side.



Source 9 A population pyramid for Australia in 2009. From it you can see, for example, that there are more females than males over the age of 80

Check your learning 1.4

Remember and understand

1 What do the letters PQE stand for?
2 How can the PQE method assist us to identify trends, patterns and relationships in geographical data and draw conclusions?
3 Why is it important for information and data to be from accurate, reliable or current sources?

Apply and analyse

4 Look at Source 1. Use the PQE method to think about Australia's lakes.
   a Can you identify a pattern?
   b Can you quantify this pattern?
   c Are there any exceptions to this pattern?

Evaluate and create

5 Look at Source 2 and construct a bar graph or column graph to represent this data graphically. Analyse trends in this data using your graphic representation.

1.5 Evaluating

Drawing conclusions

The next stage of a geographical inquiry is to evaluate what you have learned in order to draw a conclusion.

There are a number of methods to evaluate your evidence. For instance you might like to compare the advantages and disadvantages of your data and analysis to conclude if any further action is required. It is also a good idea to use your analysis of relationships between data to decide how important those relationships are.

You might also like to use a method such as the SHEEPT method to evaluate the many factors influencing your data.

Using the SHEEPT method

SHEEPT is a tool used by geographers to help them consider the many factors that may contribute to the patterns identified in their data. When you are examining issues related to your inquiry, it is useful to think about them in terms of these six factors and rank them in order of importance. This will help you reach your conclusions. The letters SHEEPT stand for:

- social (S) – factors relating to culture and people
- historical (H) – factors relating to past events
- environmental (E) – factors relating to the natural environment (including climate, landforms and vegetation)
- economic (E) – factors relating to the earning or spending of money (including income earned from industry and tourism and the cost of building a dam or highway)
- political (P) – factors relating to governments (including laws, regulations and policies)
- technological (T) – factors relating to the availability and use of different types of technology (including the development of greener technologies, alternative energy sources and GIS).

Planning for action

After coming to a conclusion, you may discover that action is needed in order to respond to the issue you have been investigating. There are a number of different ways that geographers can take action to make a change. These include:

- creating a fact sheet or multimedia presentation about the issue to inform your class, school or community
- using social media to raise awareness and gather support
- emailing your local government representative or Member of Parliament about the issue
- inviting an expert speaker to present at your school assembly
- planning a campaign to raise money for the issue.

Our geographical inquiry into Uluru based around the key inquiry question 'Is it a good thing that so many tourists visit Uluru?' may lead us to actively campaign for tourism at Uluru to be managed in a more sustainable way so that this important landmark can be enjoyed by future generations. In particular, one of the negative effects discovered in the inquiry was litter, and a good example of a campaign to combat this is shown in Source 1.

Source 1 A geographical inquiry found that cigarette butts were a leading cause of litter at Uluru. One of the responses was the introduction of personal ashtrays. These ashtrays are available from the Cultural Centre and carry the logo 'Don't let the ranger see your butt'. Park authorities reduced the number of butts littering the area and believe this has also reduced the risk of bushfires.

Check your learning 1.5

Remember and understand

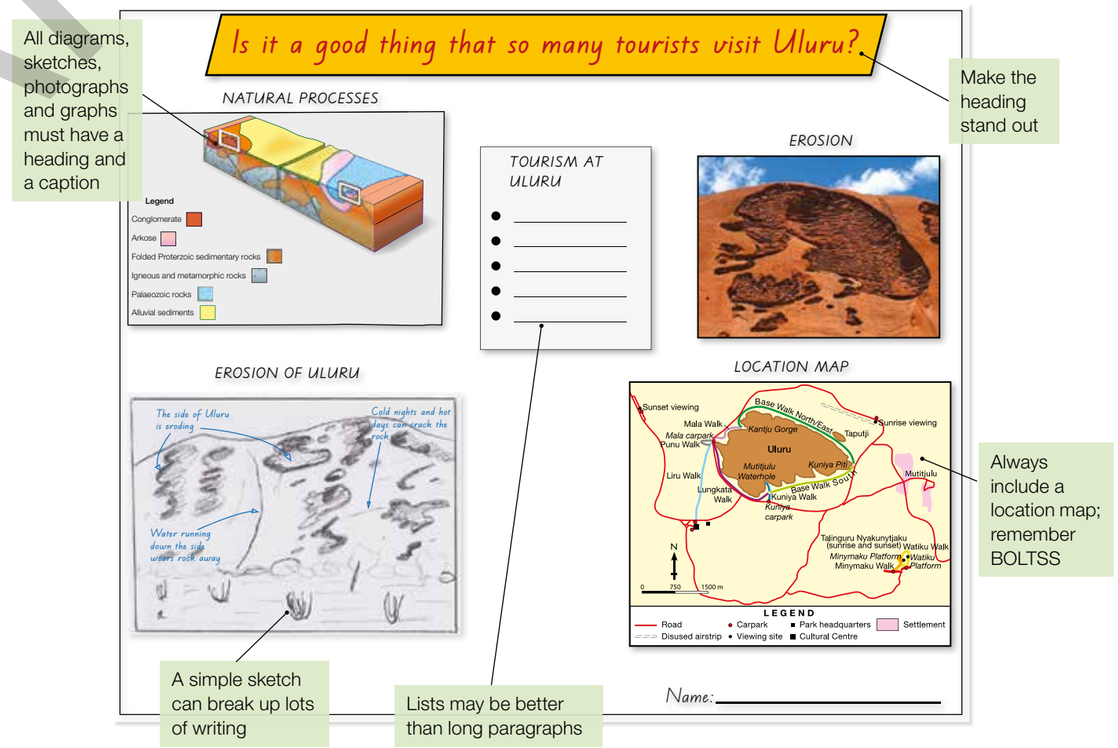
1 What do the letters in SHEEPT stand for?
2 How can SHEEPT methods assist us to draw conclusions?

<< OVERMATTER >>

1.6 Communicationg and reflecting

Geographers use a wide range of methods to inform other people about what they have found over the course of a geographical inquiry. After carefully considering their audience and the purpose of the inquiry they may choose to communicate their conclusions in a number of different ways. Some of the methods that geographers use to communicate their findings include:

- written methods, such as essays or reports
- oral forms, such as oral reports, presentations, discussions and debates
- graphic forms, such as maps, graphs, and diagrams
- visual forms, such as **annotated visual displays (AVDs)**, photographs, sketches, satellite images and posters
- digital forms, such as Wikis, Geographic Information Systems (GIS), databases, 3-D models and simulations, and multimedia presentations.



Source GT.45 An annotated visual display (AVD)

Reflect on what you have learned

The final stage of a geographical inquiry is to reflect on what you have learned and decide whether any action needs to be taken. Reflecting involves not only looking at what you have learned but also how it has been learned. It involves asking critical questions about the way in which your geographical inquiry was conducted and your role in it. One of the best ways to reflect on your progress is to complete a self-evaluation checklist rating your performance at each stage and adding comments.

Use correct geographical terminology

Just like scientists, geographers share a common language. They use geographical terminology to clarify what they are talking about and to share their findings. Source GT.46 lists and defines some commonly used geographical terms; additional geographical terms can also be found in the glossary at the end of this book.

Source GT.46 Some useful geographical terms

Term	Definition
BOLTSS	The six essential features that should be included on every map: border, orientation, legend, title, scale and source
direction	A way of orienting a map, usually shown by the use of compass points, such as north
distance	The amount of space between two objects or places, generally measured by using the scale on a map
distribution	The way in which things are arranged on the Earth's surface; the pattern formed by the way objects or places are distributed across a space
exception	A feature that falls outside a usual pattern or does not follow an observed pattern
geographical inquiry	The stages that geographers follow to guide their investigations
key inquiry question	A question that helps geographers to plan and focus their geographical inquiries
primary data	Data collected for a geographical inquiry by a person conducting an inquiry, such as survey data, hand-drawn maps or photographs
region	An area of the Earth's surface with a feature that makes it different from surrounding areas
scale	A line that indicates the distances on a map as represented in the real world
secondary data	Data collected for a geographical inquiry from another source, such as textbooks, atlases and government websites
spatial pattern	The distribution of features on the Earth's surface that may form particular patterns, such as linear (in lines), clustered or radial (like spokes on a wheel)
trend	A general direction in which something is developing or changing (e.g. the trend in population in Australia is positive because the population is growing)

skilldrill

Creating an annotated visual display (AVD)

One of the most popular ways of presenting and communicating the findings of a geographical inquiry is to construct an annotated visual display (AVD). An AVD combines written text with visual images (such as photographs) and other graphic representations (such as maps, graphs, tables, sketches and diagrams). To create a successful AVD there are a few steps to follow:

Step 1 *Gather your data*

Make sure that you have collected all the pieces of information and data that you have found and/or created throughout your inquiry. Print your photographs, tidy up your sketches and process any data that you have collected. Tables of raw data are usually much more effective when they are made into graphs (for example, bar graphs or pie graphs). Ensure that all your maps, including sketch maps, have BOLTSS. Each resource (such as a graph, map, sketch, photograph, cross-section or written explanation) must also have a title and, in the case of photographs, a caption.

Step 2 *Organise your results*

On a large sheet of poster paper, lay out all your information and data. All written descriptions and answers should be typed, or neatly printed, on separate sheets of white paper, not written directly onto the poster paper. This will allow you to arrange them on the poster paper in the most logical and relevant way before you glue them down. The key inquiry question that began your geographical inquiry may guide your final layout. In the following example, the focus question, 'Is it a good thing that so many tourists visit Uluru?', suggests that there will be three main parts to the AVD:

- information about Uluru and its physical features
- tourist statistics and other data that show the effects that visitors are having on Uluru and its surroundings
- an analysis of the data. A conclusion that answers the key inquiry question.

Step 3 *Present your results*

When you are happy with your layout, design a main heading and other smaller headings. Don't forget to write your name in small, neat letters next to the heading or at the bottom of the AVD. Use glue to stick your resources onto your AVD. You may like to draw borders around some information.

Step 4 *Acknowledge your sources*

If you have used books or other resources (such as websites) these need to be acknowledged in a bibliography or list of references. This can be stuck on the back of your AVD.

Apply the skill

1 Imagine that your class is exploring the Great Barrier Reef as a geographic inquiry with a particular focus on the impact of tourism on this natural environment.
   - **a** Discuss with a partner some geographic questions about this place.
   - **b** Select one of these questions that could be used to complete an AVD.
   - **c** Gather some data in response to this question. There is no need to explore this topic in great depth, but just to practice your communication skills. Your data could be sourced from the Internet, books, magazines or from your own personal experience. You should try to find about three or four images and some writing, such as a newspaper article.
   - **d** Work with your partner to design your AVD on a piece of A3-sized paper.
   - **e** Complete your AVD by following steps 3 and 4 of the skill drill.
   - **f** Display your AVD on the classroom wall and compare it with those of your classmates.

Source 2 A self-evaluation checklist

The title of my geographical inquiry is:		
My geographical inquiry set out to investigate:		
GENERAL POINTS	**My rating**	**Comments**
I was able to complete all stages of my geographical inquiry	1 2 3 4 5	
I was able to answer all my key inquiry questions	1 2 3 4 5	
I was able to plan my inquiry effectively	1 2 3 4 5	
My maps, graphs, tables and diagrams were clear and accurate	1 2 3 4 5	
I was able to analyse my data and reach a conclusion	1 2 3 4 5	
I was able to communicate my findings in an interesting and appropriate way	1 2 3 4 5	
AREAS OF STRENGTH	**Comments**	
My areas of strength are:		
I'm getting much better at:		
AREAS NEEDING IMPROVEMENT	**Comments**	
The part I found most difficult was:		
I need the most help with:		
IMPORTANT ISSUES HIGHLIGHTED BY MY INQUIRY	**Comments**	
The most important thing I learned from my inquiry was:		
This issue is important to me because:		
This issue is important to my community/country/world because:		

Check your learning 1.6

Remember and understand

1 Name two ways in which you could 'reflect' on what you have learnt throughout a geographical inquiry.
2 Give two reasons why it is important to be able to self-evaluate your work.
3 What do the letters AVD stand for?
4 Make a list of the things you need to gather before creating an AVD.
5 Why is it important to spend time on the layout of the written and visual information that will be shown on your AVD?

Apply and analyse

6 Do you think an AVD is an effective way to communicate the findings of a geographical inquiry? Why or why not?
7 As part of a geographical inquiry looking at the key question 'Is it a good thing that so many tourists visit Uluru?' your teacher has asked you to take part in a class debate. List three points for the affirmative and three points for the negative. Which side would you rather be on? Why?
8 Which form (such as written, oral, graphic, visual or digital) do you think would be most appropriate for presenting the findings of a geographical inquiry into tourism at Uluru? Why?
9 Which do you think are the two most important questions to ask yourself in the self-evaluation checklist? Why?

Evaluate and create

10 The completed self-evaluation checklist can look very different depending on what you are investigating. Are there any areas that you think could be improved in GT.48? What questions could be changed or added so that you could improve on the reflection process?

11 Your geography class has been asked by the principal to complete a geographical inquiry into the issue of recycling at your school. The principal hopes that by raising awareness of recycling, the school community may be willing to change their behaviour and make the school more sustainable. Conduct a class discussion on the most effective way to conduct the inquiry. At the end of your discussion, make a decision about the best way in which your findings could be presented to the whole school in order to convince them to participate.

1.7 Fieldwork in geography

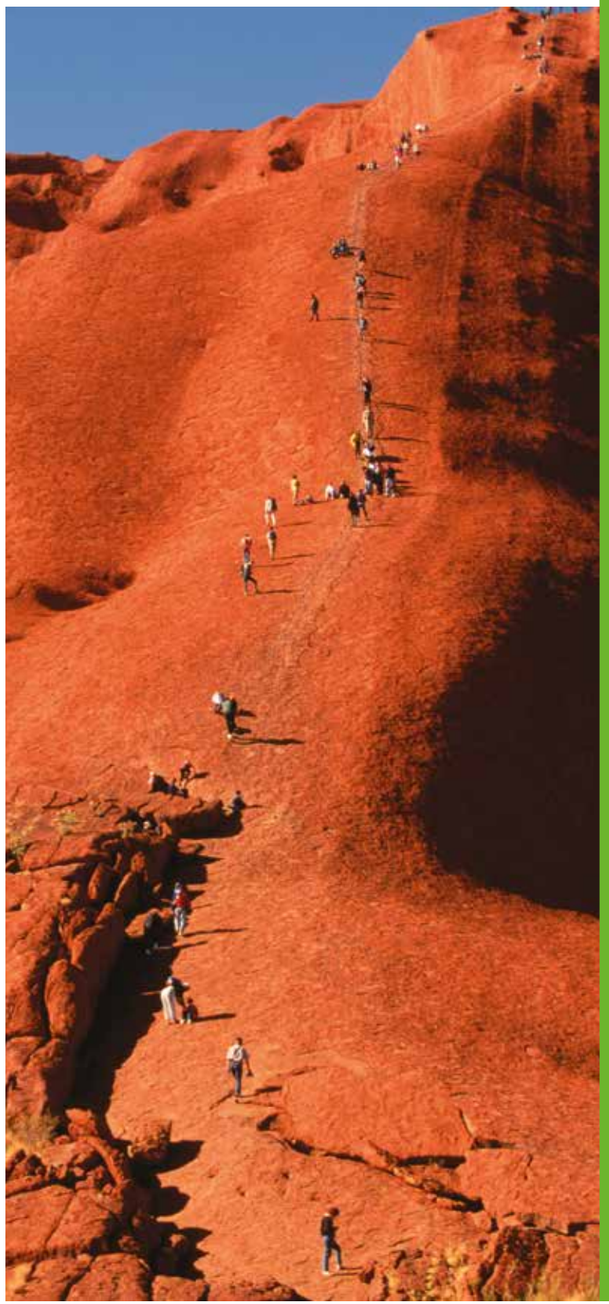
What is fieldwork?

Fieldwork is any geographical study that takes place outside the classroom or, as geographers say, 'in the field'. The 'field' is the source of geographical information (primary data). It can be conducted at a number of scales – in your school grounds, within your local community, in another state or even in another country. Fieldwork is an essential part of geography because the world outside the classroom is the geographer's 'laboratory'. Working in the field provides opportunities for first-hand investigation of both natural and built environments.

Fieldwork provides an opportunity to develop skills associated with observing, measuring and recording. Different forms of geographical data can be collected and then analysed to find relationships between the natural and human environments. The results of a fieldwork investigation are presented and communicated in a fieldwork report.

Fieldwork also involves identifying issues or problems and finding possible solutions. It is a way to engage with the real world and make a contribution to developing more sustainable and fair ways to manage the Earth's resources.

Fieldwork often looks at a key feature, issue or conflict. For example, many tourists visit Uluru each year with the intention of climbing 'The Rock.' In doing so, they ignore the wishes of the traditional owners of the land, the Anangu people (See Source GT.49). They also put themselves and others at risk. About thirty-five people have died while climbing Uluru and countless others have been injured or rescued. Geography students visiting Uluru may try to find out why people continue to climb it, and study the impacts of this activity on people and the natural environment.



Source 1 Every tourist that climbs Uluru must pass a sign asking them not to climb the rock out of respect for the traditional owners, the Anangu.

Different types of fieldwork

Most topics you learn about in class can also be studied during fieldwork. The types of fieldwork you conduct will differ according to your topic and the places you visit, but all these activities will help you to better understand your world. Source 2 provides examples of fieldwork locations and activities for a range of topics.

Source 2 Examples of fieldwork locations and activities for a range of topics

Topic	Possible location	Sample fieldwork activity
Water in the world	Local river or stream	Water sampling
Liveable cities	Edge of a large city	Observing and describing
Changing cities	Urban renewal project	Land use mapping
Coastal landscapes	Local beach	Sketching a cross-section
Landscape hazards	Local beach	Field sketching
Global links	Shopping centre	Using a questionnaire
Communities	Local area, including houses and shops	Street surveying
Food security	Farming area	Asking questions
Endangered environments and animals	Zoo	Comparing environments

Conducting successful fieldwork

Fieldwork is a type of geographical inquiry, so whenever you take part in fieldwork you will need to follow the stages that are outlined in this toolkit, namely:

1 Questioning and research
2 Analysing
3 Evaluating
4 Communicating and reflecting

The first stage is vital as this gives you a focus for your fieldwork. It also allows you to make a judgement about whether your fieldwork investigation has been successful.

Stage 1: Questtioning and research

Begin by looking at an issue or location and compile a set of related inquiry questions that you would like to answer. Plan what information you will need and how you will collect it.

Plan your fieldwork so that you can collect the evidence and data that you will need. For example, take photos, draw sketches, conduct tests, construct questionnaires and surveys. You will then need to use this data to create graphs and maps for analysis. You may also need to consider members of the public, including Indigenous people and their beliefs and feelings about places in the landscape. If your class is planning a field trip to a natural environment, such as a forest or beach, you will need to ensure you do not damage the environment by trampling on plants or animals or by dropping litter.

Stage 2: Analysing

Interpret and analyse the data you have collected and look for patterns or clues that will help you to answer your key inquiry question. There are a number of different tools and methods you can use to do this, including PQE.

Stage 3: Evaluating

Draw conclusions from the evidence you have collected by evaluating the information and data you have. You can then decide if any action needs to be taken. To do this you can use methods such as SHEEPT.

Stage 4: Communicating and reflecting

Communicate what you have found to an audience in the form of a report, a presentation or an annotated visual display (AVD).Think about your fieldwork findings and reflect on ways to improve your investigation process.

A fieldwork example: Gumtree College litter investigation

In the following example, a Year 7 geography class at Gumtree College (7G) decided to conduct fieldwork to explore a problem in their school – litter. As a class, they followed a process of inquiry to understand the issue and try to resolve it.

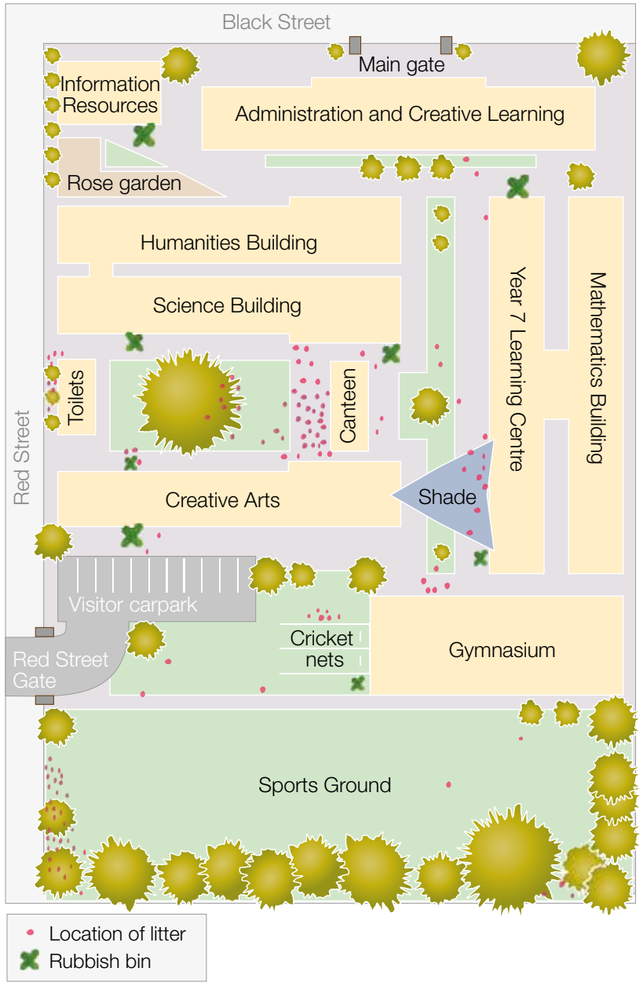
Stage 1: Questioning and research

During a brainstorm session, a range of investigation questions were raised by 7G. These included:

- What are the most popular foods sold in the school canteen?
- Does our school have the worst litter problem in the city?
- Does our school have enough bins in the yard?

During discussion it was decided that the first question wasn't really about litter. It was also decided that the second question was too broad and complex to answer in one fieldwork inquiry. The class agreed that the third question was the best one for the class to investigate.

The next stage was to plan what data had to be collected in order to answer the question and choose the methods used to collect this data. As geographers, 7G had to carefully consider other people and the environment when collecting data in the field. For example, they had to be careful not to disturb other classes while collecting their data.



Source 3 A sketch map of the schoolyard showing the locations of the bins and litter at Gumtree College

After some discussion, 7G decided to gather the information they needed to answer their inquiry question in three ways:

- A sketch map of the schoolyard showing the locations of the bins and the litter – To complete this map, a group of students would look for rubbish at the end of every lunchtime for five days and show their findings on a dot distribution map (see Source 3).
- A litter survey – This would involve another group of students looking closely at the rubbish and classifying each piece of rubbish using certain headings (see Source 5).
- A questionnaire of students in the schoolyard – Another group of students would ask other students about litter and how they disposed of it (see Source 4).

Source 4 A questionnaire of students in the canteen

Source 5 A litter survey

Stage 2: Analysing

After asking questions and collecting evidence through fieldwork, 7G needed to interpret and analyse this data so that they could come to some conclusions about what they had found. Their aim was to use the evidence to answer the key question. By looking closely at their map and applying the PQE method, 7G students identified that most of the litter in their schoolyard was located close to the canteen where there were no bins. It was found that in places where bins were provided they were generally used. The results of the student questionnaire were graphed (see Source GT.54); the results confirmed that 82 per cent of students used bins if they were nearby.

Stage 3: Evaluating

Based on the interpretation and analysis of their data, 7G concluded that there were not enough bins in the school yard. The next step for 7G was to evaluate their results and decide if action was needed. The students argues that three new bins had to be installed in the schoolyard - two near the canteen and one next to the sports ground.

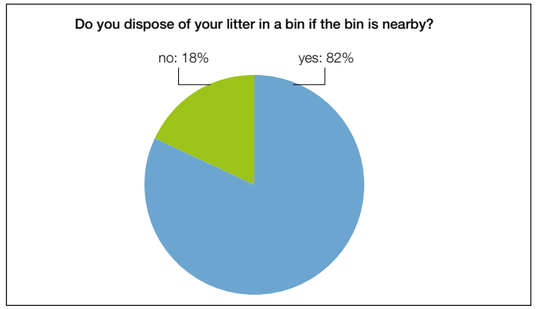
Stage 4: Communicating

Based on the data they had collected, 7G prepared an AVD about this issue and presented it to the school council. This information was passed on to the school principal.

The bins were installed within a week, but 7G also decided that students at Gumtree College needed to take more responsibility for their own litter and placed some posters in the canteen to remind students why littering was bad for the school.

In the final stage of their fieldwork, the 7G students had a class discussion to reflect on the ways in which they carried out their fieldwork. Most of the students felt that the process worked well, but a few thought that the key question about bins was a little too simple.

They decided to use the same method to explore a more complex problem in the local community.



Source 6 A pie graph showing the results of the student questionnaire

Check your learning 1.7

Remember and understand

1 What is meant by studying geography 'in the field'?

2 List two ways in which the results of a fieldwork investigation may be presented.

3 What is the main aim of all fieldwork investigations?

Apply and analyse

4 In what ways did 7G gather the information they needed
to answer their fieldwork question?

5 Which of these methods do you think would have given them the most valuable and reliable data? Why?

Evaluate and create

6 Look again at the geographical questions shown in Source 1 on page XX. Imagine that you are on a field trip to Uluru to study the impact of visitors on the natural and cultural environment.

a In small groups, decide on an issue related to Uluru that you would like to investigate.

b Generate a set of inquiry questions and decide on the one you would most like to explore in detail.

c Create a set of questions for a visitor questionnaire that you think will help you get the information you need to answer your key inquiry question.

d Share your key inquiry question with the class and read out the questions you decided to include in your visitor questionnaire. What do your classmates think of your ideas?