

# The geographer's 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 cultural practices).

Geographers use a range of key concepts and 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 Uluru in Uluru-Kata Tjuta National Park, Northern Territory, shown in Source GT.1, they wonder about many aspects of this natural feature. They want to know about:

- its size
- its location
- what it is made of
- how it formed
- 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!



## GT.1

Concepts for geographical understanding





**Source GT.1** Uluru – an enormous sandstone rock formation in Uluru-Kata Tjuta National Park in the Northern Territory

## GT.2

Geographical inquiry and skills

## GT.3

Fieldwork in geography

# GT.1 Concepts for geographical understanding

Geographers use seven concepts to help investigate and understand the world. At times you will use several of these at once, while at other times you may focus on just one. As you learn to use each of the key ideas you will begin to think like a geographer. The seven key concepts in geography are:

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

## Place

Places are parts of the Earth's surface that are identified and given meaning by people. Your home and your school are important places for you because they are the places where you live and spend most of your time. A place can be as small as your bedroom or as large as the entire planet!

Places play an important role in the lives of every person on Earth. 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 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. This was one of the reasons Kakadu National Park was World Heritage listed. Aboriginal people refer to their place as 'Country' and believe that they have a responsibility to look after it.



**Source GT.2** An aerial view of Manhattan Island, New York City – an example of a built environment

Geographers use the concept of **place** when conducting any geographical inquiry. For example, a geographer visiting New York City in the United States (Source GT.2) 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.

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 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.

The concept of space can also be used to investigate some other important aspects of the world around us. 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. They also investigate the ways that improvements in transport and communication have made links between places quicker and easier and the ways that this is changing the world.

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 closer analysis of the area reveals that 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



**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.

can be divided into spaces. For example, a small place, such as your school, has different spaces. Each of these spaces has its own purpose. There are spaces for learning (such as classrooms and computer rooms), playing (such as playgrounds and play equipment), eating (such as the cafeteria or canteen) and running the school (such as staffrooms and administration buildings).

Larger places (such as your suburb, town or city) are also organised into different spaces. There are spaces for housing (such as homes for families), businesses (such as shops and offices), industry (such as factories and warehouses), entertainment (such as concert halls and theatres) and sport and recreation (such as stadiums, parks and gardens).

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

## 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 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. Skyscrapers also catch and funnel the wind, increasing its speed.

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 better understand and appreciate natural processes, such as how weather works, how mountains are formed and how rainforests and coral reefs grow. The concept helps geographers to analyse the changes humans make to natural environments and better appreciate their impact so that they can be managed more wisely.



**Source GT.4** 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 GT.5** 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.

## Interconnection

No place or thing on Earth exists in isolation. All environments on Earth and every living and non-living thing found within them are connected. These connections can be on a local level or a global level.

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 within and between different countries.

It helps to think of the Earth as a single living organism, much like your body. Your brain, heart, lungs, stomach, arms and legs all work together

as a single system to keep you alive and healthy. In much the same way, the Earth's living systems (such as the climate, plants, animals, oceans, soils, and the atmosphere) all function together and are interconnected. Even a slight rise in the Earth's temperature, for example, will have an effect on the oceans (such as damaging coral reefs and affecting the populations of fish and other sea creatures), 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 their homes). Source GT.5 shows a slum in Bangladesh, the most densely populated country in the world. Bangladesh is slightly larger than England in size, but is home to 150 million people; this is three times the population of England. 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 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 can be maintained for future generations.

Sustainable patterns of living meet the needs of the current generations without compromising the ability of future generations to meet their own needs. 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 more closely about these different types of resources – the ways in which they are formed and the speed at which they are being used. It also encourages us to look more closely at renewable options and take greater care of the Earth. Actions to improve sustainability can operate at a number of levels:

- **Local** – Recycling of paper and plastics by individuals, schools and households reduces the amount of trees that need to be cut down and oil that needs to be drilled to produce plastic bottles and bags.
- **National** – In Australia the government has begun to encourage sustainable use of energy through the establishment of wind farms and hydroelectric power plants and measures to promote the 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 GT.6).

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.



## Scale

The concept of **scale** is 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). They use the concept of scale to look for explanations and outcomes at these different levels. 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, the types of facilities there and whether these facilities meet the needs of visitors
- regional – such as an inquiry into the types of visitors staying at campsites and tourist parks in the Grampians region of Victoria
- national – such as an inquiry into the yearly tourist numbers visiting national parks in Australia (such as Kakadu National Park and Christmas Island National Park), including the impact these visitors have on our National Parks, the way in which these parks are managed, and on what levels Indigenous people are involved
- international – such as an inquiry into animal poaching in national parks and wild game reserves in different countries across Africa (such as South Africa, Kenya, Tanzania and Madagascar)
- global – such as an inquiry into the use of all marine parks around the world and their effectiveness in protecting different species of marine animals.



**Source GT.7** 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).



## 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 and see the world as a dynamic place. Over millions of years, the Earth has been shaped and changed by natural forces, such as climate, earthquakes, volcanoes, running water and storms to name just a few. In more recent times humans have shaped and changed the Earth to suit their own needs, but events such as volcanic eruptions and tsunamis are a reminder that powerful natural forces continue to alter the face of the Earth regardless of what humans do.

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 tree falling over on your street or 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 GT.8). 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.

Observing and understanding changes that are natural and/or are made by humans and have occurred over time is an important part of any geographical inquiry. 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 GT.8** 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.

## Check your learning GT.1

### Remember and understand

- 1 Examine the photo of Uluru (Source GT.1). Is this a natural or built environment? Give reasons for your answer.
- 2 New York City (shown in Source GT.2) is one of the world's largest cities. List five ways in which this built environment would affect how people live and work.
- 3 Look carefully at Source GT.3. Why have people settled in this location? Describe the pattern formed by the houses in the township.

### Apply and analyse

- 4 Here are some examples of changes that may be occurring on Earth at any given time:
  - a new supermarket is being built near your house
  - trees are being planted on your street
  - the polar ice caps are melting
  - a tornado is destroying a town in the USA
  - the Great Barrier Reef is being damaged by the Crown-of-thorns starfish.
- a Conduct some research online in order to rank these changes from the slowest to the most rapid.
- b Which of these changes are caused by human activities and which are caused by natural processes?
- c Identify the scale at which each of the above changes takes place; that is, local, regional, national, international or global.
- 5 Using Source GT.5, explain the chain of events that would lead to flooding in this slum area of Bangladesh. Describe how and why slum dwellers would be more affected by this event than the wealthy.
- 6 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?
- 7 Examine Source GT.6. Work with a partner to conduct research on the importance of the Southern Ocean Whale Sanctuary in conserving endangered whale species.
- 8 Study Source GT.8. 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?
- 9 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

- 10 Create a diagram, such as a flow chart, to show the interconnection between the natural and built environment at Antarctica's McMurdo Station (Source GT.4). Include information on such aspects as climate, landforms, wildlife and human settlement (especially waste management and change to the natural environment).
- 11 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.



# GT.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 ask questions, collect evidence, analyse the evidence to find an answer, communicate their findings, reflect on what they have found out and, finally, decide on a course of action.

To follow a line of inquiry geographers need a range of skills. By studying geography you will gradually master each of these skills. Some of them you will find easy to master; others may take a little longer. 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.

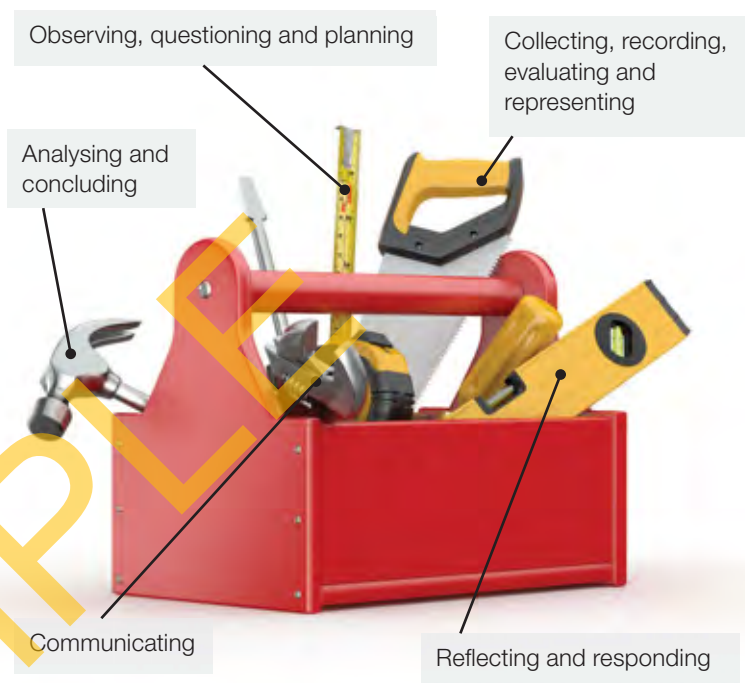
## Observing, questioning and planning

### Observe the world and its geographical characteristics

Developing an awareness and understanding of our world begins by observing the processes that are taking place in it. Geographers look at people, land, air, water, plants and animals and the connections between them to understand what is happening. They also seek to investigate where, why and how natural and built environments are formed and changed. These observations often include identifying any problems or issues that need to be investigated and resolved.

### Seeing the world through a geographer’s eyes

All good geographical inquiries begin by observing something in the natural or built world around you.



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

If you look out the window of your classroom you will become aware of your surroundings. Is it a sunny day? Is it windy? Can you see any buildings or trees? Are there any clouds?

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 it is windy, you might like to begin an inquiry into what direction the wind is coming from, how strong it is and why. 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.

## Develop geographical questions about the human and environmental processes shaping places

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.



**Source GT.10** Developing geographical questions is an important part of a geographical inquiry

### skilldrill

## Developing geographical questions

Study Source GT.10. 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?' rather 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 Uluru at the beginning of this chapter. Work with a partner to develop geographic questions about this landscape.



# Plan and implement 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.

**Source GT.11** 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?	<ul style="list-style-type: none"><li>Information on the importance and significance of Uluru to the Anangu, who are the Indigenous people in the area</li><li>Information on the management and maintenance of the park</li></ul>	<ul style="list-style-type: none"><li>Conduct fieldwork into visitor numbers</li><li>Create surveys and questionnaires for visitors to complete</li><li>Contact Parks Australia and Uluru-Kata Tjuta National Park for information on how the park is managed</li><li>Download resources from the Parks Australia website; for example, podcasts, maps, visitor guides, geological reports, audio tours and images</li></ul>

## Check your learning GT.2

Remember and understand

1 Good geographers are like detectives. Why is this?

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.

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.

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.

4 Develop five questions that may assist a geographer in conducting an inquiry into the proposed development of a new shopping centre within his or her local area. Create a planning table similar to that used in the text for the inquiry into Uluru (Source GT.11).

Evaluate and create

**Source GT.12** Kata Tjuta in the Northern Territory

# Collecting, recording, evaluating and representing

## Collect, record and evaluate primary and secondary 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 GT.13 Examples of primary and secondary data

Some examples of primary data	Some examples of secondary data
<ul style="list-style-type: none"><li>• Hand-drawn maps and field sketches</li><li>• Photographs and images taken for the inquiry</li><li>• Questionnaires and surveys designed and created for the inquiry</li><li>• Graphs created from data (such as number of visitors, number of cars counted, and temperature and wind statistics) taken by the geographer for the inquiry</li></ul>	<ul style="list-style-type: none"><li>• Information from textbooks, atlases, maps, graphs, reports and websites that were not created specifically for the inquiry</li><li>• 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</li></ul>

## Distinguish between quantitative and qualitative data

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 GT.14 Examples of quantitative and qualitative data

Some examples of quantitative data	Some examples of qualitative data
<ul style="list-style-type: none"><li>• Climate and temperature statistics</li><li>• Tourist numbers</li><li>• Population figures (including birth and death rates)</li><li>• Types and amounts of food grown</li><li>• Plant and animal species and wildlife in certain areas</li><li>• Forest clearance rates</li><li>• Numbers of people killed in natural disasters</li><li>• Numbers of volcanic eruptions and earthquakes</li></ul>	<ul style="list-style-type: none"><li>• Opinions</li><li>• Points of view</li><li>• Personal stories</li><li>• Likes and dislikes</li><li>• Feelings</li></ul>

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.



## Create maps and other graphic representations

Geographers often present the 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 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.



Source GT.15 An aerial photograph of Sydney Harbour and the city

#### SYDNEY: HARBOUR AND CBD



Source GT.16 A map of Sydney Harbour and the city (as shown in GT.15)

Source: Oxford Atlas

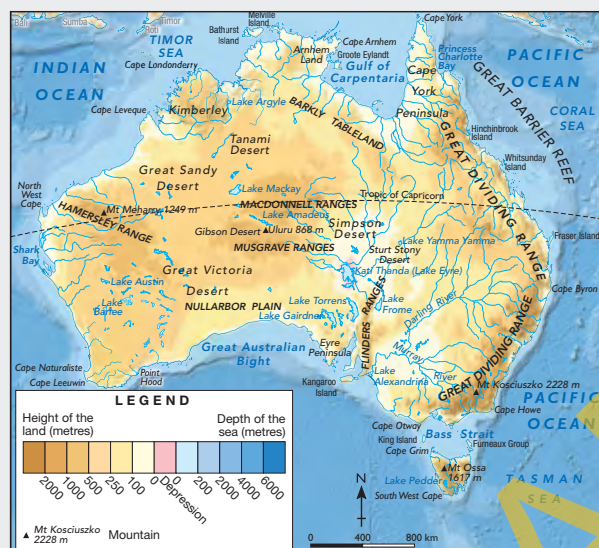
## Simple maps

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 GT.17

Source: Oxford Atlas

### 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 GT.18

Source: Oxford Atlas

### 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 shops or hospitals. 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 GT.19

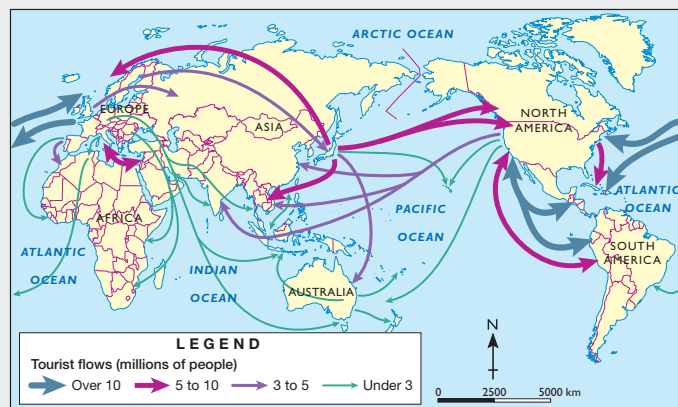
Source: Oxford University Press



## Flow maps

**Flow maps** show movement from one place to another. Arrows of different thicknesses and 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



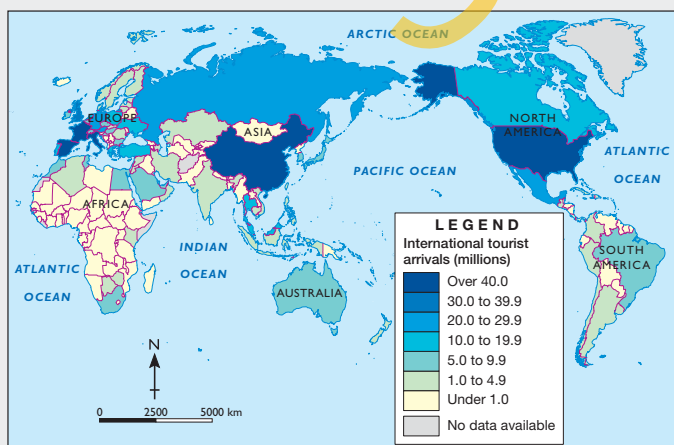
Source GT.20

Source: Oxford University Press

## Choropleth maps

**Choropleth maps** use different colours or 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

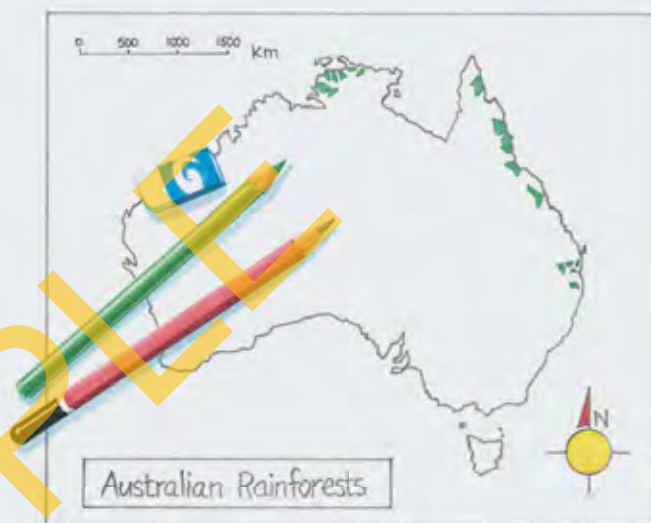


Source GT.21

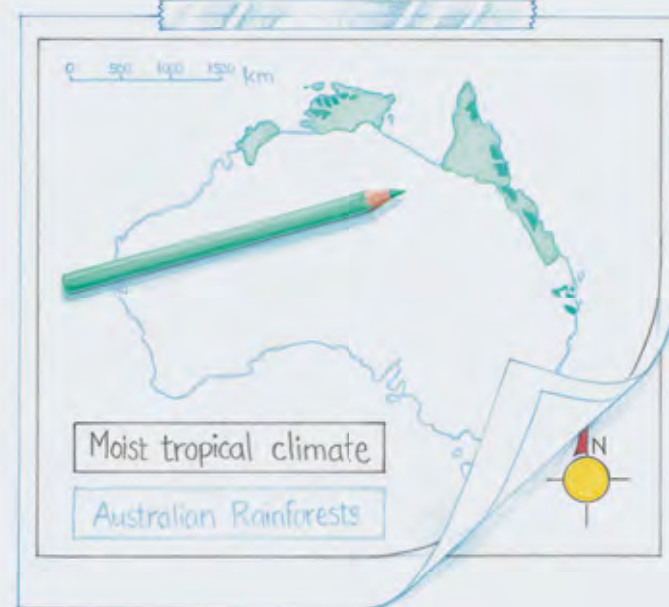
Source: Oxford Atlas

## 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 showing the other feature you are investigating (such as areas with a moist tropical climate).



From Mongabay.com



From Mongabay.com

**Source GT.22** 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

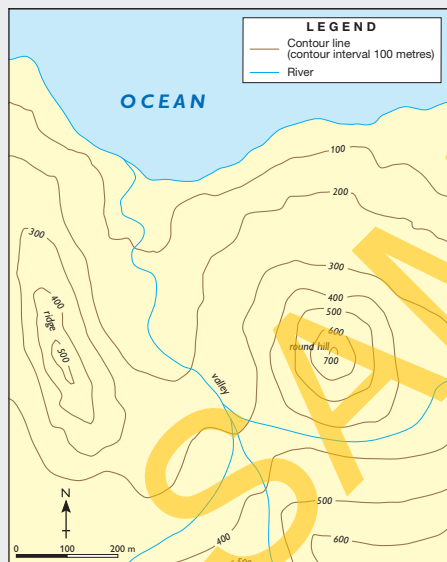
Over the course of the year you will also be working with a number of other, more complex maps. You won't necessarily be creating these maps yourself, but you will be learning how to make sense of the information they provide. These maps include:

### 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 GT.23.

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



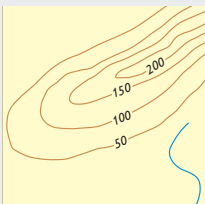
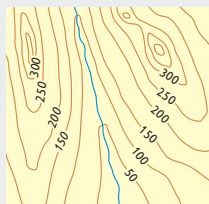
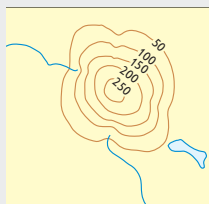
A ROUND HILL



A VALLEY



A RIDGE



Source GT.23

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 GT.24 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 GT.25

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

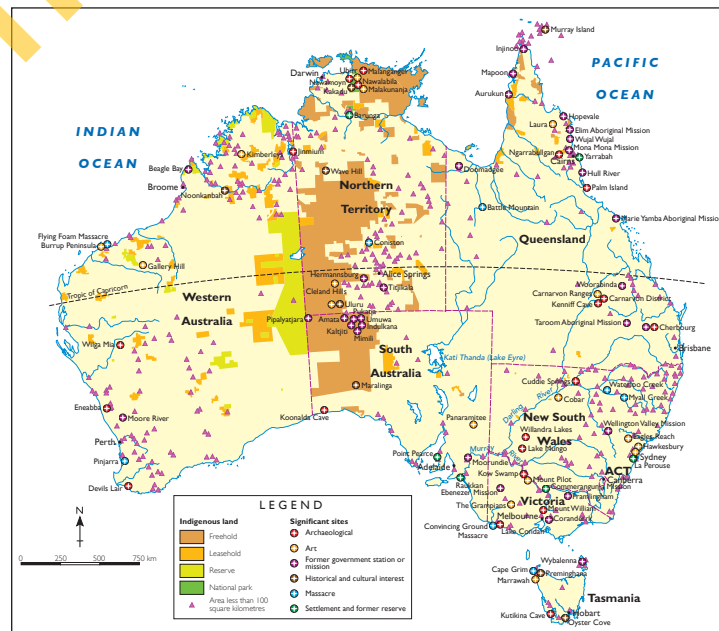
### BOLTSS

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**:

- 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
- L** **Legend** – an explanation of the symbols, colours and patterns used on the map (also known as a key)
- T** **Title** – a heading that describes the map and what it is showing
- S** **Scale** – a way of indicating what distances on the map 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]'.

Source GT.26 shows a map of Australia that is held together with BOLTSS.

AUSTRALIA: INDIGENOUS LAND AND SITES, 2006



Source: Oxford Atlas

Source GT.26 A map of Australia showing all the features of BOLTSS

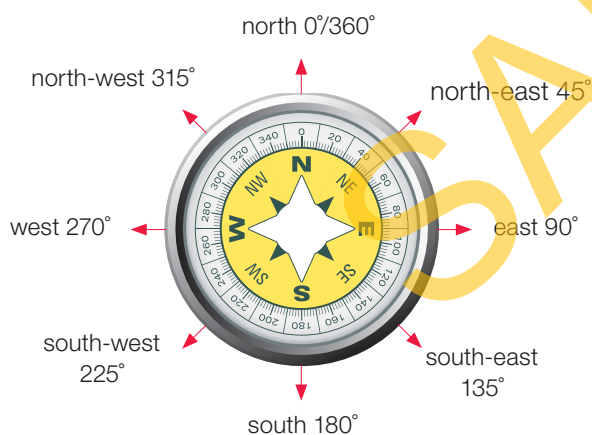
## Direction

**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 GT.27).

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 shown in GT.27.



**Source GT.27** 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.

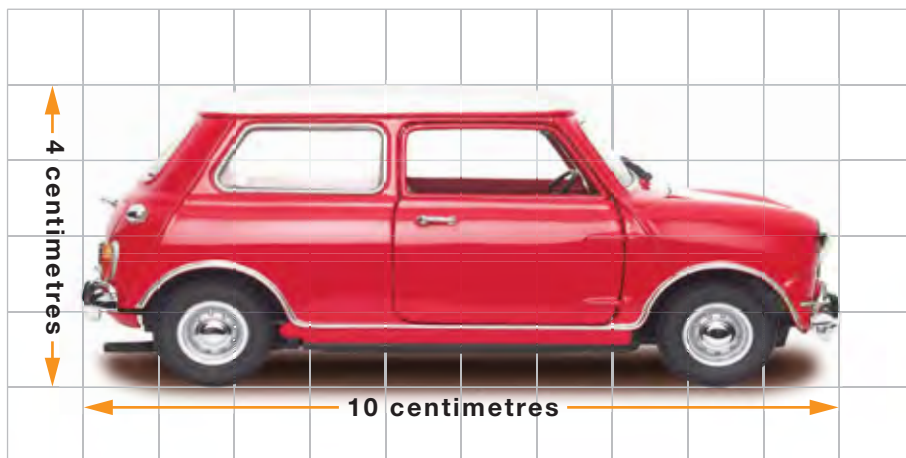
This means that 1 centimetre on the scale model is equal to 35 centimetres on the real car. If 1 centimetre represents 35 centimetres, then 10 centimetres (the total length of the model) represents a total length of 350 centimetres (or 3.5 metres) on the real car.

## 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 GT.29). 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 GT.29 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 Source GT.29 line scale shows 1 centimetre is equal to 30 kilometres.
- **Ratio scale** – A ratio scale shows scale in numbers. The ratio scale for Source GT.29 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 GT.28** This model car is 35 times smaller than the real car. This is expressed as 1:35.



## 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 GT.29. 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 GT.29 and GT.30 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?

**Source GT.30** Measuring straight distances on a map using a sheet of paper

TASMANIA



Source GT.29

Source: Oxford Atlas



## Comparing map scales

Maps are often shown at different scales depending on the amount of detail they need to show. Source GT.31 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 GT.31

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 GT.32

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 GT.32 the grid reference for the Paradise Centre is J6.

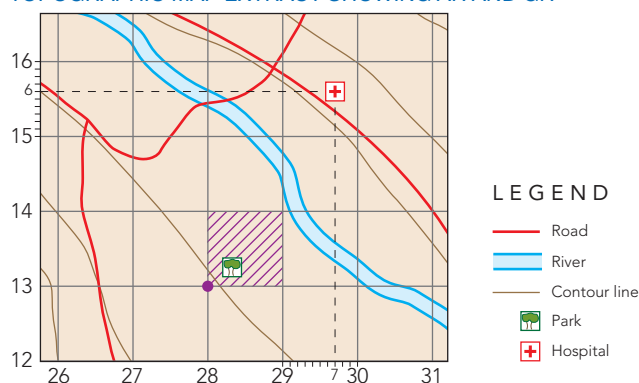
### Area referencing (AR)

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 GT.33 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 10 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 GT.33 the hospital is located at GR297156.

### TOPOGRAPHIC MAP EXTRACT SHOWING AR AND GR



Source GT.33

Source: Oxford Atlas Project 3

### Latitude and longitude

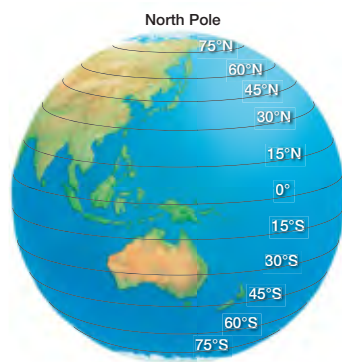
Maps that show large areas of the Earth's surface (such as world maps) use a set of imaginary lines that form a grid. These gridlines, known as **latitude** and **longitude**, help us to locate places accurately.

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.

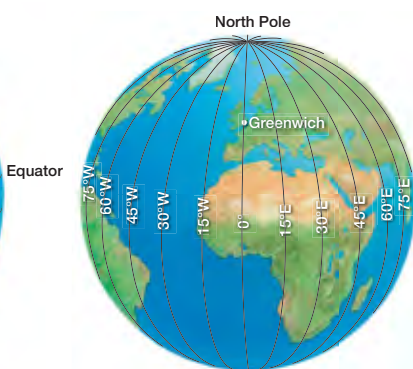
The line of latitude midway between the north pole (90 degrees north) and south pole (90 degrees south) is known as the **Equator**, which is located at 0 degrees latitude. It divides the Earth into the northern hemisphere and southern hemisphere.

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.



Source GT.34 Lines (or parallels) of latitude



Source GT.35 Lines (or meridians) of longitude

### Remember:

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

### 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.

Source GT.36 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

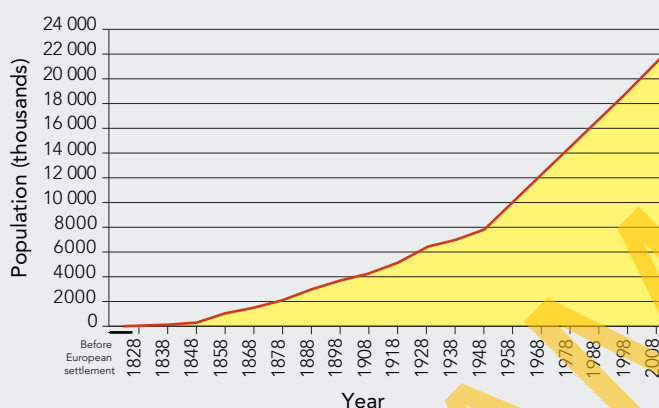


## Simple graphs

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

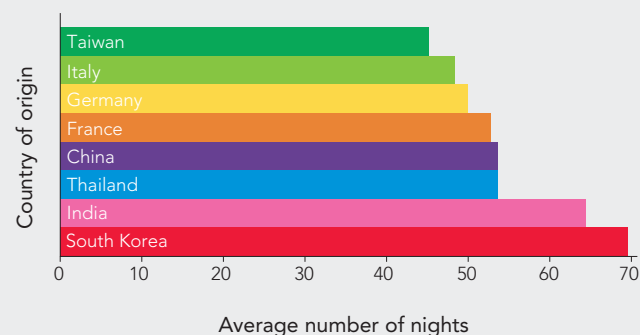
**Line graphs** show information as a series of points that are joined up to form a line. The line shows a trend or change over time. The horizontal axis (x) will usually show units of time and the vertical axis (y) will usually show amounts.



**Source GT.37** A line graph showing the increase in Australia's population, 1828–2011

### Bar graphs

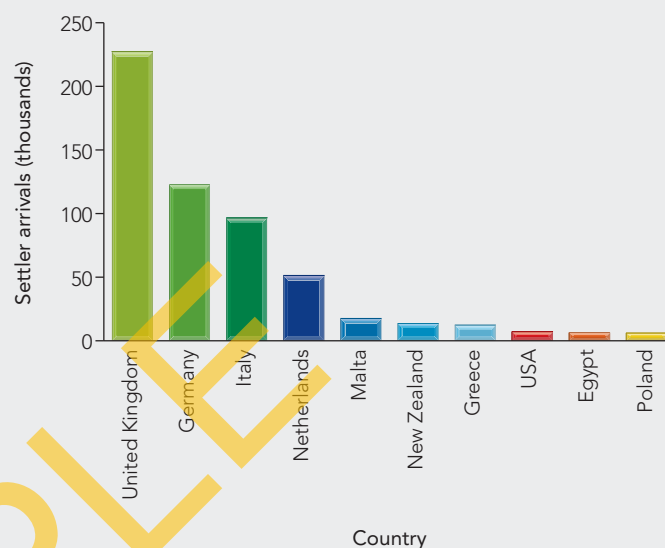
**Bar graphs** show information as a series of bars that run in a horizontal direction and are stacked one on top of the other. They are usually used to compare quantities.



**Source GT.38** A bar graph showing average number of nights spent in Australia by tourists from different countries, 2009

### Column graphs

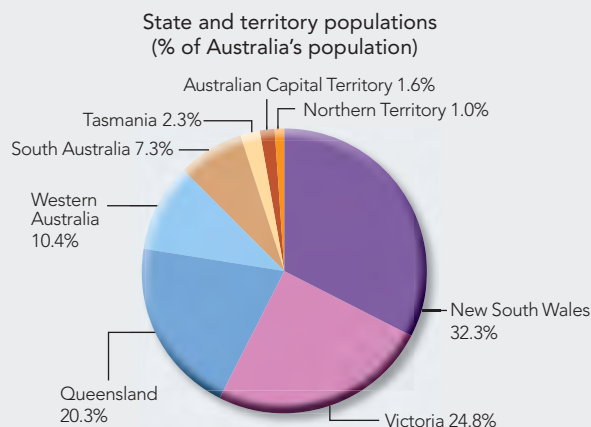
**Column graphs** are similar to bar graphs, but they show information as a series of vertical columns that are arranged side by side. They are also usually used to compare quantities.



**Source GT.39** A column graph showing top 10 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.



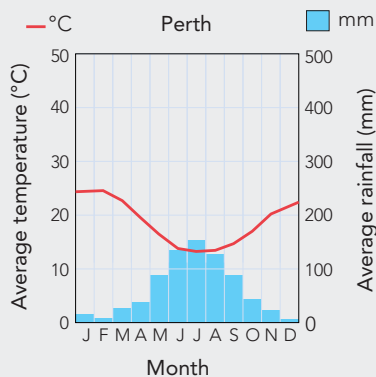
**Source GT.40** A pie graph showing state and territory populations as a percentage of Australia's total population, 2011

## 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

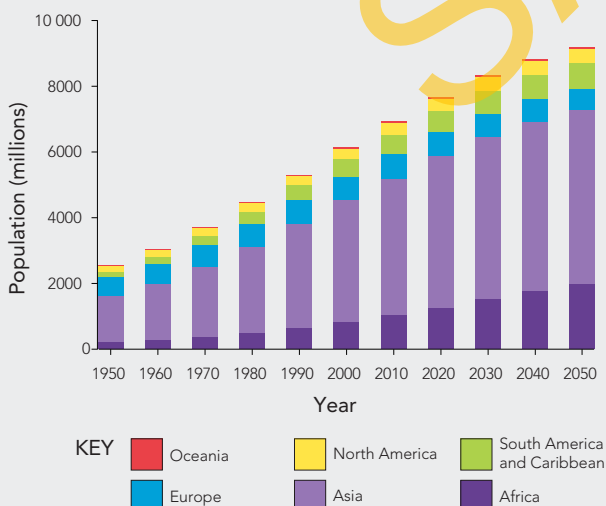
**Climate graphs** show the average monthly temperature and rainfall for a place over a year. Climate graphs combine line and column graphs. Temperature is recorded as a line graph and rainfall is recorded as a column graph.



**Source GT.41** A climate graph showing the average monthly temperature and rainfall in Perth

### Compound column graphs

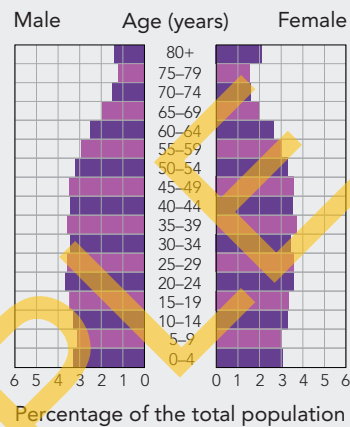
**Compound column graphs** are a more complex type of column graph in which each column is split into sections so results can be more easily compared.



**Source GT.42** 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 GT.43** 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 GT.3

### Remember and understand

- 1 Give two examples of primary data and two examples of secondary data. What is the main difference between these two types of data?
- 2 What is a map?
- 3 What does BOLTSS stand for?

### Apply and analyse

- 4 Look carefully at Source GT.29 and answer the following questions:
  - a What is the scale of the map? Give your answer in the form of a ratio.
  - b If you were flying from Marrawah to Port Arthur in which direction would you be travelling?

### Evaluate and create

- 5 On a piece of graph paper, draw a simple map of your bedroom. Be sure to include all the furniture (for example, your bed and desk) in the correct location and to the correct scale. Make sure it has BOLTSS.
- 6 Look at Source GT.37 and construct a bar or column graph to represent this data graphically.



## Interpreting, analysing and concluding

### Use methods to identify trends, patterns and relationships in geographical data and draw conclusions

Once you have collected, recorded, evaluated and represented 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 coast 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.'

#### 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 of 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).

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



Source GT.44

Source: Oxford Atlas

### Check your learning GT.4

#### Remember and understand

- 1 What do the letters PQE stand for?
- 2 What do the letters in SHEEPT stand for?
- 3 How can the PQE and SHEEPT methods assist us to identify trends, patterns and relationships in geographical data and draw conclusions?

#### Apply and analyse

- 4 Look at Source GT.44. 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 Conduct your own Internet research on the way in which Uluru is managed and use the SHEEPT method to think more closely about the factors that impact on Uluru.
  - a List at least one point for each of the SHEEPT factors.
  - b What conclusion(s) can you make about the way in which Uluru is managed?
- 6 Create a colourful and informative pictogram (by adding an image or picture to each of the letters in the word SHEEPT) to help you and your classmates remember what each of the letters in SHEEPT stands for.



## Communicating

### Present conclusions using a range of communication forms and digital technologies

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, graph 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.

## 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.

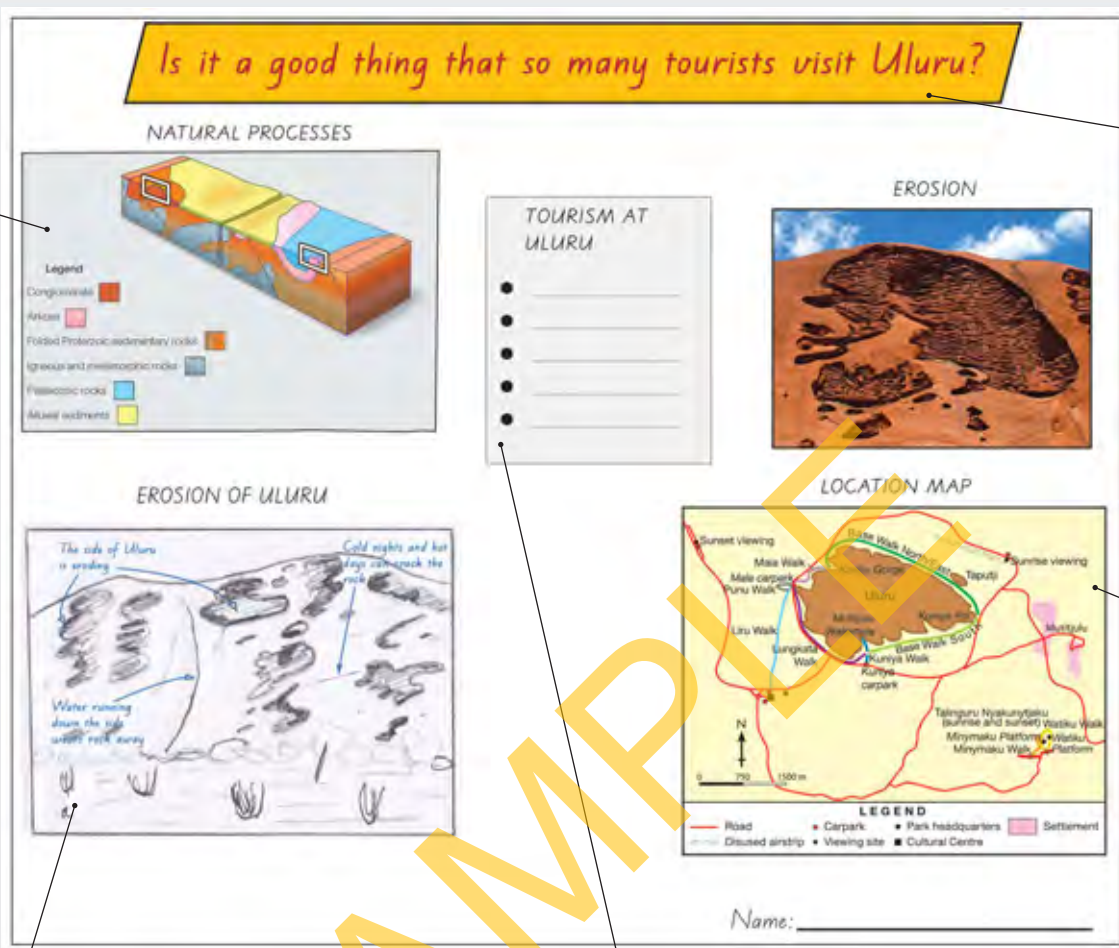
#### Step 3 *Present your results*

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.

All diagrams, sketches, photographs and graphs must have a heading and a caption



Make the heading stand out

Always include a location map; remember BOLTSS

A simple sketch can break up lots of writing

Lists may be better than long paragraphs

**Source GT.45** An annotated visual display (AVD)  
Natural processes illustration © Director of National Parks (Parks Australia) [www.parksaustralia.gov.au](http://www.parksaustralia.gov.au)

## 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.



# 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
<b>BOLTSS</b>	The six essential features that should be included on every map: border, orientation, legend, title, scale and source
<b>direction</b>	A way of orienting a map, usually shown by the use of compass points, such as north
<b>distance</b>	The amount of space between two objects or places, generally measured by using the scale on a map
<b>distribution</b>	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
<b>exception</b>	A feature that falls outside a usual pattern or does not follow an observed pattern
<b>geographical inquiry</b>	The stages that geographers follow to guide their investigations
<b>key inquiry question</b>	A question that helps geographers to plan and focus their geographical inquiries
<b>primary data</b>	Data collected for a geographical inquiry by a person conducting an inquiry, such as survey data, hand-drawn maps or photographs
<b>region</b>	An area of the Earth's surface with a feature that makes it different from surrounding areas
<b>scale</b>	A line that indicates the distances on a map as represented in the real world
<b>secondary data</b>	Data collected for a geographical inquiry from another source, such as textbooks, atlases and government websites
<b>spatial pattern</b>	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)
<b>trend</b>	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)

## Check your learning GT.5

### Remember and understand

- What do the letters AVD stand for?
- Make a list of the things you need to gather before creating an AVD.
- 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

- Do you think an AVD is an effective way to communicate the findings of a geographical inquiry? Why or why not?
- 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?

- 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?

### Evaluate and create

- 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.

# Reflecting and responding

## 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.



**Source GT.47** 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.

The title of my geographical inquiry is:		
My geographical inquiry set out to investigate:		
<b>GENERAL POINTS</b>	<b>My rating</b>	<b>Comments</b>
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	
<b>AREAS OF STRENGTH</b>	<b>Comments</b>	
My areas of strength are:		
I'm getting much better at:		
<b>AREAS NEEDING IMPROVEMENT</b>	<b>Comments</b>	
The part I found most difficult was:		
I need the most help with:		
<b>IMPORTANT ISSUES HIGHLIGHTED BY MY INQUIRY</b>	<b>Comments</b>	
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:		

**Source GT.48** A self-evaluation checklist

## Justify possible methods of response

After reflecting on what you have learnt, 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 GT.47.

## Check your learning GT.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.

### Apply and analyse

- 3 Which do you think are the two most important questions to ask yourself in the self-evaluation checklist? Why?

### Evaluate and create

- 4 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?



# GT.3 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.

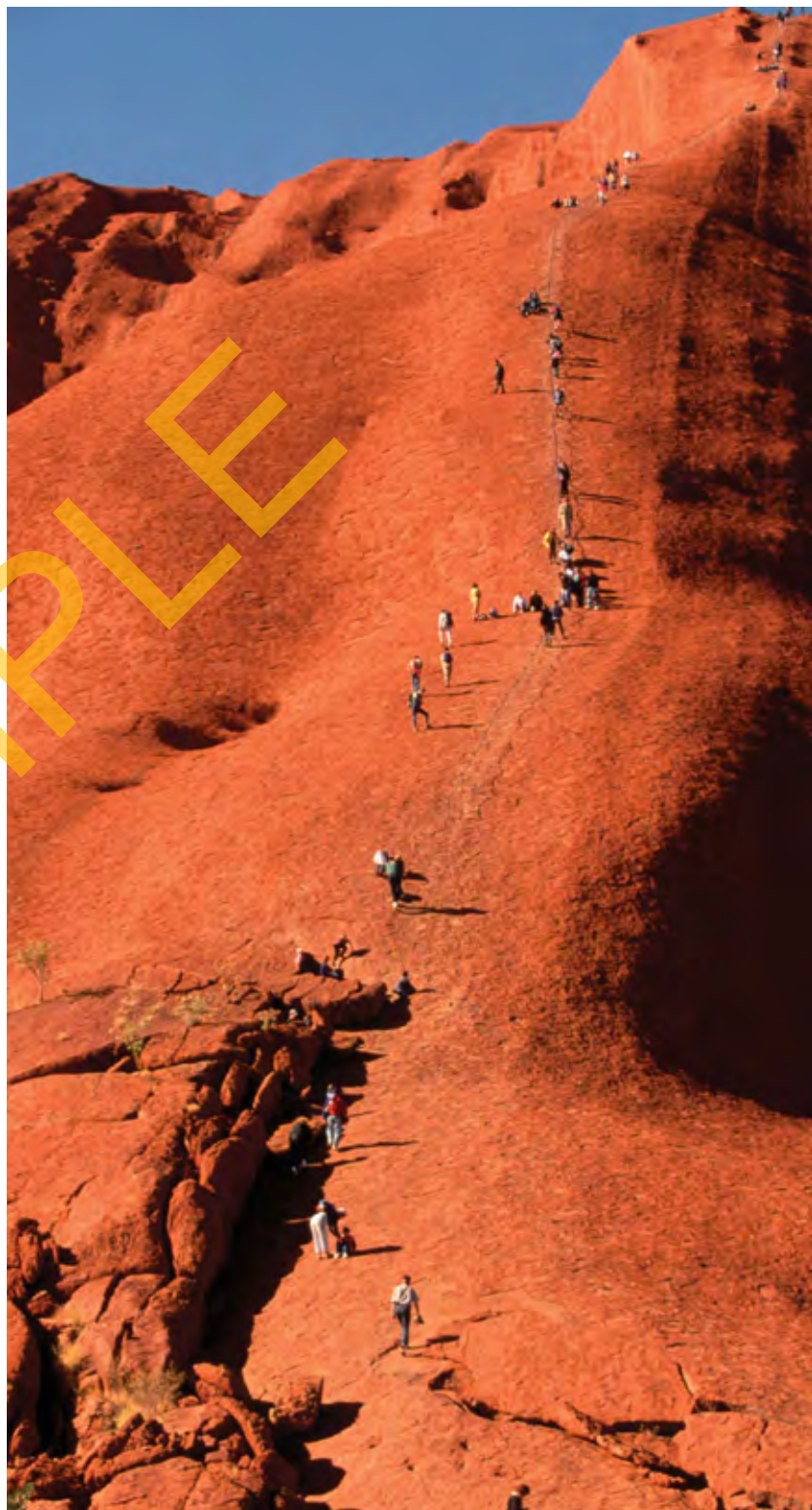
Fieldwork also provides an opportunity to develop skills associated with observing, measuring and recording. Different forms of geographical data can be collected and then analysed to find relationships between the natural and human (built) environments. The results of a fieldwork investigation are presented 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 35 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.

## 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 GT.50 provides examples of fieldwork locations and activities for a range of topics.



**Source GT.49** 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.

**Source GT.50** Examples of fieldwork locations, activities and key inquiry questions for a range of topics

Topic	Possible locations	Sample fieldwork activity	Possible key inquiry questions
Mountain landscapes and processes	A local mountain range, peak or rock formation	Taking geographical photographs	How are mountain landscapes used by people? Why are some mountains higher than others? How do mountain landscapes change over time?
Mountain hazards		Asking geographical questions	Why are some mountain landscapes hazardous? Why do some volcanoes erupt while others lay dormant? How many people are affected by mountain hazards?
Coastal landscapes and processes	A local beach, harbour or inlet	Field sketching	How are coastal landscapes used by people? How do waves change coastal landscapes? Why do some coastal areas erode more quickly than others? How will this coast change in the future? How have human activities interfered with natural coastal processes?
Coastal hazards		Sketching a cross-section	How has coastal erosion affected people living near the coast? Why are some coastal landscapes more dangerous than others? How many people are affected by coastal hazards?
Natural features of rivers	A local river, creek or stream	Observing and describing	Why do rivers bend? How do rivers change over time? How do rivers change other features of the natural environment?
Human interaction with rivers		Water sampling	How do human activities interfere with natural river processes? How do people respond to the risk of flooding? How have natural river processes affected built structures?

## 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 Observing, questioning and planning
- 2 Collecting, recording, evaluating and representing
- 3 Interpreting, analysing and concluding
- 4 Communicating
- 5 Reflecting and responding.

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

### Stage 1: Observing, questioning and planning

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.

### Stage 2: Collecting, recording, evaluating and representing

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 survey and gather data. You may 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 3: Interpreting, analysing and concluding

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 and SHEPT.



## Stage 4: Communicating

Communicate what you have found to an audience in the form of a report, a presentation or an annotated visual display (AVD).

## Stage 5: Reflecting and responding

Think about your fieldwork findings and reflect on ways to improve your investigation process. Finally, decide on a course of action, if this is appropriate.

## A fieldwork example: Westside Park investigation

In the following example, Year 8 geography class at Gumtree College (8B) decided to conduct fieldwork on how a park in their local area (Westside Park) was being used. Their aim was to make suggestions about how the park could be improved for the local community and environment.

### Stage 1: Observing, questioning and planning

To begin with, the class discussed some of the issues and problems they might be able to investigate. During a brainstorming session a range of possible inquiry questions were raised by 8B. These included:

- Who is Westside Park used by?
- What activities is Westside Park used for?
- How does the local community feel about Westside Park?
- Is Westside Park safe for all park users?
- What environmental impacts are people having on Westside Park?

As a group, 8B decided that these questions were all suitable for a geographical inquiry because they would allow students to explore a topic in depth by gathering data, drawing conclusions and developing possible responses. After further discussion, the class decided to focus on the last question about environmental impacts.

Most students in the class thought that this issue was important because a number of articles and letters published in the local newspaper over the last year had expressed concerns about the levels of litter and tagging (spray painting of letters and symbols) in the park.

Next, students in 8B planned the types of information and data they would need to investigate this issue. They decided that they should visit Westside Park a few times

to gather data about who was using it and how it was being used. They decided they would visit once during a busy period and once during a quiet period. Visiting the park during a busy period would allow them to record how many people were using the park, what they were using it for and what impacts these users were having on the environment. Visiting the park during a quiet period would allow them to take photographs, measurements and sketches without disturbing park users.

### Stage 2: Collecting, recording, evaluating and representing

To investigate the ways in which the local park was affecting the environment, students in 8B set out to collect and record a range of geographical data:

- Before their first visit, they designed a questionnaire for users of the park to fill in. This asked park users to list how and when they use the park.
- During their first visit, students created data tables and recorded the numbers of people using the park. They also divided these users into a number of categories; for example, parents with children, dog walkers, skateboarders and picnickers.
- The students measured the boundary of the park and its key features with measuring wheels and tape measures and created a simple sketch map of the park.
- They took a number of photographs documenting a range of environmental issues in the park, such as tagging, litter in garden beds, dog poo, trampled grassed areas and damaged vegetation due to use of cars and motorbikes in the park.



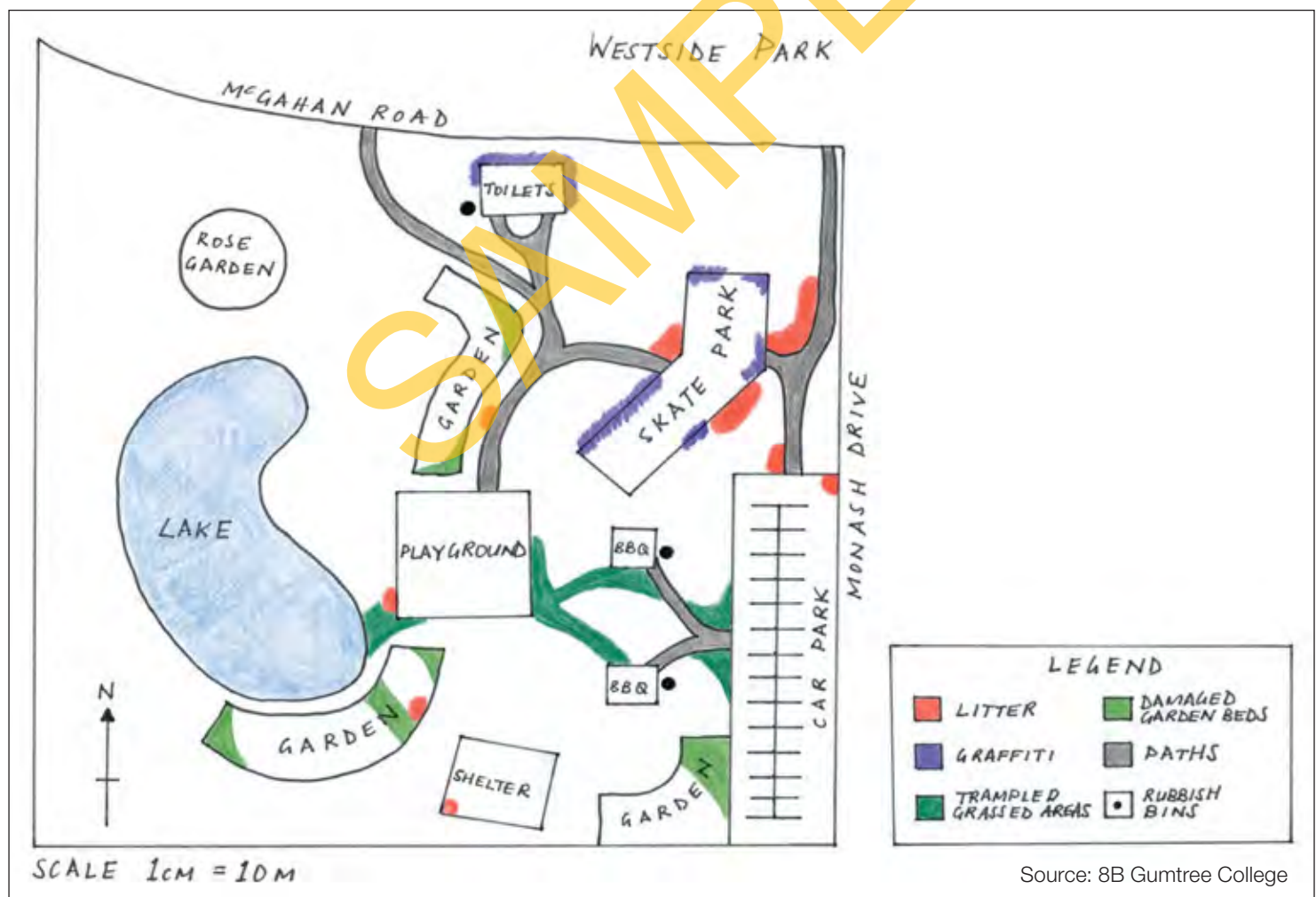
**Source GT.51** Students from Gumtree College measuring and recording features to be mapped at Westside Park

After collecting and recording this data, they returned to school and used it to create some graphical representations:

- They used the measurements they had recorded to create a second, more detailed sketch map of the park – this time to scale.
- Using the records and photographs they had taken, they marked the locations of the three most serious environmental impacts on the map.
- They collated the information from the questionnaires and created a pie graph showing the number of people using the park during busy and quiet periods. They also created a bar graph showing the different activities that people used the park for.



Source GT.53 Students measuring an area of trampled grass to be added to their sketch map



Source: 8B Gumtree College

Source GT.52 A sketch map of the local park identifying the locations of a range of environmental issues



### Stage 3: Interpreting, analysing and concluding

Once they had converted their primary data into a range of graphs and maps, the students analysed it much more easily and looked for patterns and trends that would help them answer their key inquiry question: How do people using the local park affect the environment?

Students identified that the two main groups of park users were parents with children and skateboarders. The three main environmental problems were litter, tagging and the trampling of grass and gardens in the park.

Based on these findings, the students of 8B concluded:

- About 80 per cent of the litter was located at or near the skate park. Data gathered showed a lack of rubbish bins close to the skate park. Students concluded that lack had led to the build-up of litter and that the skate park users were most probably responsible. The grass was trampled primarily near the car park and paths leading to the playground. These areas were mainly used by families. They concluded that families with prams and small children trample grass while moving between the car park and the playground.
- There were six observed pieces of tagging – five on the walls of the skate park and one on the toilet block. They concluded that the skate park area was a key target for taggers, but could not draw conclusions about who actually did the tagging.

### Stage 4: Communicating

Students prepared a group field report based on their findings. It included their maps, photographs and observations. Each student also made recommendations about ways in which the park could be used more sustainably to resolve these environmental issues. The report was sent to the local newspaper and a number of the findings were published. The students also sent their report to members of the local council.

### Stage 5: Reflecting and responding

Following the submission of their field report and recommendations for change, students reflected on their findings and the methods they used to reach their conclusions. They decided that the key inquiry question they had chosen was a good one because it allowed students to work as a team but in different areas of the park and on things that interested them most. Many of the students commented that fieldwork helped them better understand this local issue more than if they read about it in the newspaper.

A few months after 8B had completed their geographical inquiry, the local council installed bins near the skate park and put up signs around it asking park users not to litter. They also commissioned an artist to create a graffiti-style mural, to discourage taggers.

#### Check your learning GT. 7

##### Remember and understand

- 1 Why is fieldwork an essential part of geography?
- 2 Why are rivers and coasts popular for fieldwork?
- 3 What activities did the Gumtree College students complete in order to collect information?

##### Apply and analyse

- 4 What are some inquiry questions that could be explored with a field trip to a large amusement park?
- 5 Do you prefer working in a classroom or working in the field? Discuss your response with the class.

##### Evaluate and create

- 6 Select one of the key inquiry questions listed in Source GT.50. Using the Gumtree College example as a guide, explain the steps you would undertake to explore this question using fieldwork.