UNIT 1

Introducing maps

A map is a plan or drawing that shows where places and features—such as hills, roads, farms and towns—are found, and the distribution or spread of places and features.

Mostly, maps show us what is on the ground and where things are, as if looking down from above. Some maps, however—such as maps of the solar system or geological maps—show us what is above or below the earth's surface.

We use maps to find where we are, to navigate from place to place, to measure distance, and to find out information. Some maps show a small area of the earth's surface in a lot of detail, while others show the whole world. Many maps show only one feature, such as country boundaries or vegetation types, while others show a mix of natural and human features.

Source 1.1 Hagar the Horrible by Chris Browne.

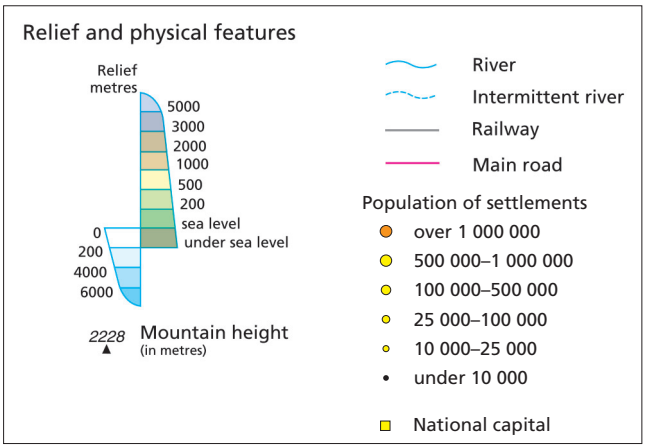
To be useful, a map must have:

- a title, which tells us the name of the region or place and what the map shows
- a map border to define and limit the area
- a **key** to show the **map symbols** used
- a north point or arrow to show **direction**
- a **scale** to show distance and the size of the area covered by the map.

SYMBOLS & MAP KEY

Map symbols are signs or colours used to show features on Earth's surface because there is never enough space on the map to show or name everything. Some symbols pinpoint a particular feature such as a house or mountain. Lines show railways and roads. Colours and shading show features that cover large areas, such as forests and urban areas.

The key or **legend** explains what the symbols show.



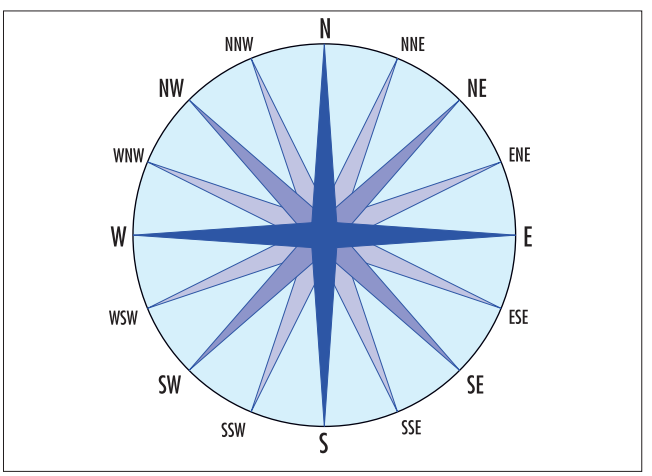
Source 1.2 Examples of symbols used on an atlas reference map.

DIRECTION

Direction helps us locate places. It shows where one place is from another, the way to travel, or where the sun will rise and set.

Direction is found by using the points of the **compass**. The four main points of a compass—north, south, east and west—are called **cardinal points**. The points in between—north-east, south-east, south-west and north-west—are **intermediate points**. They make finding direction more precise. Most maps have an arrow to show us where north is. If there is no north arrow, then north is at the top of the map.

Direction is also used to divide a map into **quadrants**, or quarters, named by the intermediate compass points north-east, south-east, south-west and north-west.



Source 1.3 Points of a compass.

MAPS & MORE MAPS

There are maps to show every type of information, from temperatures in North America to people without safe drinking water. Many are printed in an **atlas**—a book of maps and other types of visual information, such as photographs, satellite images and graphs.

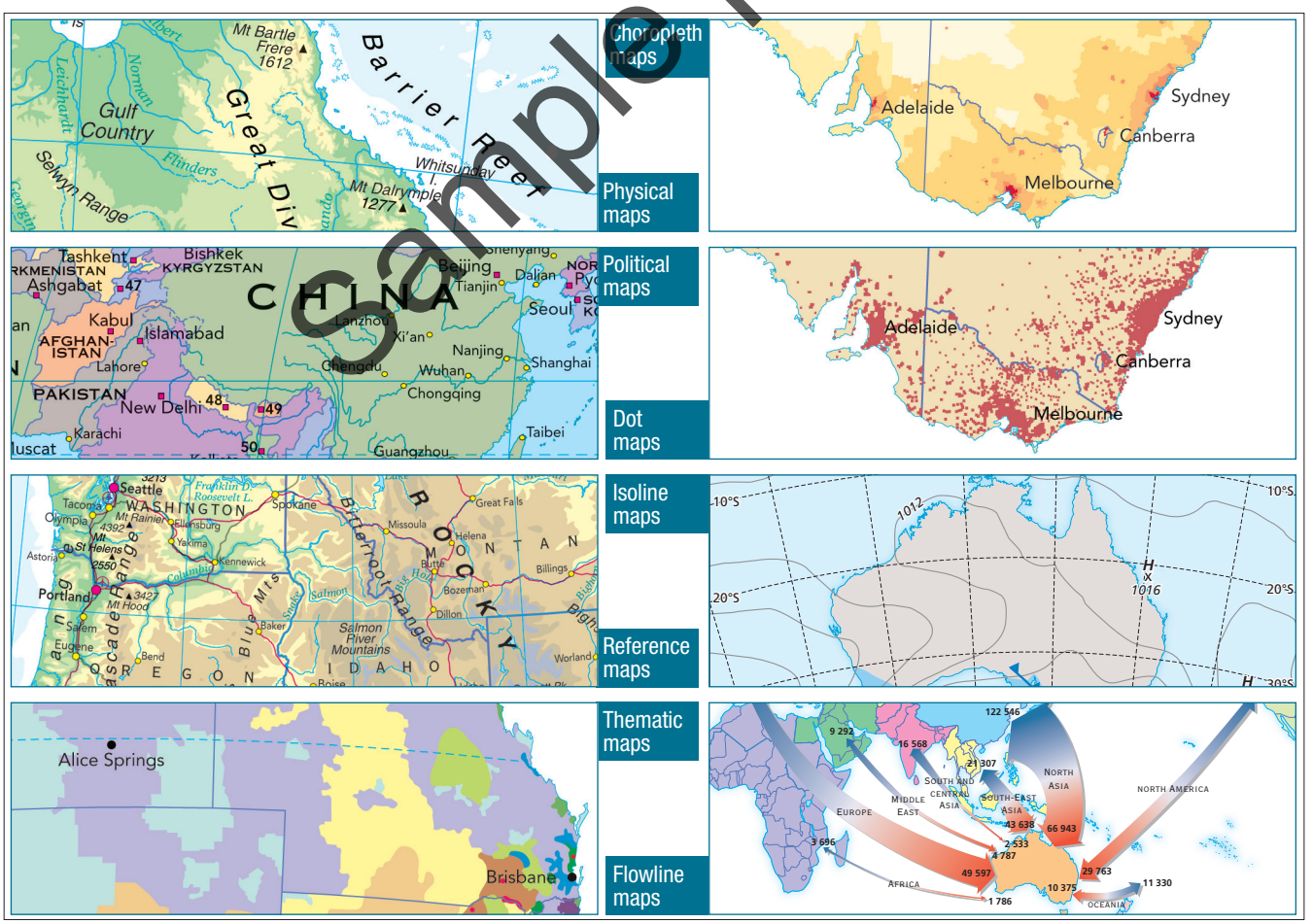
There are many different types of atlas. World reference atlases have maps of the world, continents, countries and regions. Some atlases focus on a theme, such as world climate, Australian birds, or the streets of a city.

Maps have millions of everyday uses. Possibly the most common map is the weather map—almost every newspaper and television news report has one. Then there are the maps we use to locate a street and to find our way around when we are on holidays away from home. People in jobs of all types use maps.

Many maps are now drawn in a digital format and stored in computer databases so they can be used with the global positioning system (GPS) and in digital geographic information systems (GIS).

TYPES OF ATLAS MAP

- **Physical maps** show oceans and islands, the shape and height of the land, and major landforms.
- **Political maps** show countries and states and their boundaries, their capitals and major cities.
- **Reference maps** combine the features of physical and political maps, and add roads, railways, and major towns.
- **Thematic maps** focus on a feature such as land use, using colours or symbols to show location or distribution.
- **Choropleth maps** use colours or shading to show distribution of a feature such as population.
- **Dot maps** use dots to show the distribution or density of a feature such as population.
- **Isoline maps** use thin lines joining places with the same value, to show air pressure or the height of the land.
- **Flowline maps** use arrows of varying width to show flows or movement of people, goods or information between places.



Source 1.4 Different types of atlas map.

UNIT 1 Activities

1A GETTING TO KNOW MAPS

1 What is a map?

2 Why are maps drawn as if looking down from directly above?

3 What do we use maps for?

4 Who uses maps? Draw lines to link people with the type of map they might use.

street directory	school student
main tourist sites	ship's captain
road map of Australia	gold prospector
general reference atlas	interstate truck driver
sea navigation chart	taxi driver
geology map	overseas visitor

5 Study Source 1.1. What is the story of Hagar's boat trip?

> **!** In the past, Pacific Islanders made maps by tying sticks together to show the usual pattern of ocean waves, and tied on sea shells to locate their tiny islands.

6 Why did Pacific Islanders need to make maps? How are they different from the maps we use?

7 List the five things a map needs to be useful.

1B MAP SYMBOLS

1 What are map symbols?

2 Why are they used on maps?

3 What is a legend or key?

4 Study Source 1.2:

a What do colours show on an atlas reference map?

b What symbols are used to show a:

i river?

ii railway?

iii main road?

iv mountain?

v settlement over 1 000 000?

5 Refer to the extract from the Kiama 1:100 000 topographic map on the inside back cover. Topographic maps are very detailed maps of a small area. Draw and describe the symbols used to show:

a a built-up area

b an unsealed vehicle track

c a horizontal control point

d a swamp

e a building

_____

6 What would a map look like if we used words rather than symbols to locate and describe features?

_____

_____

_____

_____

7 Using your own paper, draw a sketch map of your classroom, showing as much detail as possible. When you have completed your sketch map, answer the following:

a What does your map look like?

_____

b Did you use symbols—and, if so, why?

_____

c Compile a legend or key of the symbols you used or would use in the future.

1C DIRECTION

> ! If you were standing at the South Pole, the only direction you could walk is north.

1 Use your own words to define *direction*.

_____

_____

_____

2 What do we use to find direction?

_____

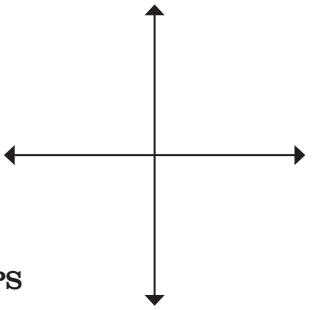
_____

3 Use the diagram to label:

a cardinal points

b intermediate points

c map quadrants.



1D MAPS & MORE MAPS

1 What is an atlas?

_____

_____

2 Why are there so many different types of map?

_____

_____

3 What do the following mean?

a GPS _____

b GIS _____

4 Why are more and more maps being drawn in a digital format? _____

_____

5 Complete the table below to summarise information about the main types of atlas map.

Type of map	Information shown	Method(s) used to show information

UNIT 2

Using atlas maps

When we use maps of large areas—such as a continent or the world—we need to know:

- how to locate places or features using the index and references around the map
- how different map projections are used to show places and features.

LOCATING PLACES OR FEATURES

Atlas maps have two systems to locate places:

- an **alphanumeric grid reference** on the margins of each page, using letters on the horizontal margin and numbers on the vertical margin, to locate an area of the map
- a worldwide grid of imaginary lines of **latitude** and **longitude** drawn on a map to provide a precise location.

LATITUDE

Lines of latitude are horizontal lines which run east–west around the world. They are known as **parallels of latitude** because they all run parallel to the **equator** in circles of decreasing size, from the equator to the poles. Latitude is measured in degrees (°).

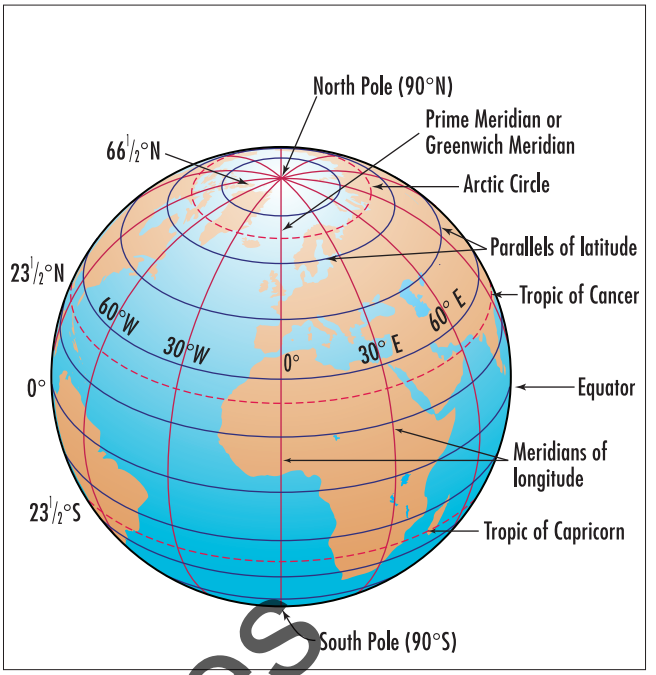
Latitude is fixed by 0° being located halfway between the poles. Because the lines of latitude are all parallel to each other, the distance between any two of them is the same. One degree of latitude is approximately 113 kilometres anywhere on Earth.

The most important parallel of latitude is the equator, or 0° latitude. It divides the globe into the northern hemisphere, to the north of the equator, and the southern hemisphere to the south. Parallels of latitude in the northern hemisphere are labelled N, while those in the southern hemisphere are labelled S. The North Pole is 90°N and the South Pole is 90°S.

All parallels of latitude are numbered between 0° and 90°, either north or south of the equator. The space between two parallels of latitude is divided into 60 minutes (').
The latitude of Melbourne is 37°49'S, often abbreviated to 37.49S.

LONGITUDE

Lines of longitude are vertical lines which run north–south from the North Pole to the South



Source 2.1 Latitude and longitude

Pole, in large circles which are all the same size. They are known as **meridians of longitude**. Longitude is also measured in degrees (°).

Longitude is determined by the time Earth takes to make one full revolution of 360°. Owing to the curvature of the earth's surface, one degree of longitude at the equator is approximately 110 kilometres, while at the poles it is almost nothing.

The most important meridian of longitude is the **prime meridian** (prime means first) or **Greenwich meridian**—0° longitude—which passes through London's Greenwich Observatory. Opposite the Greenwich meridian on the other side of the globe is longitude 180°—the **International Date Line**.

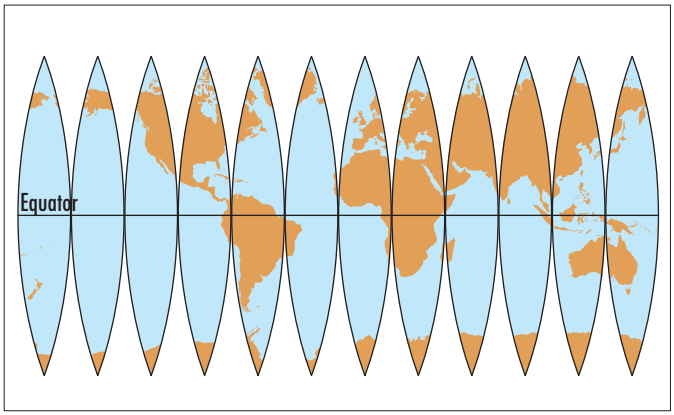
The Greenwich meridian and the International Date Line divide the globe into two hemispheres. West of the Greenwich meridian to the International Date Line is the western hemisphere. East of the Greenwich meridian to the International Date Line is the eastern hemisphere.

All meridians of longitude are numbered between 0° and 180°, and are labelled either E (east) or W (west) of the Greenwich meridian. The space between two meridians of longitude is divided into 60 minutes ('). The longitude of Melbourne is 144°58'E, often abbreviated to 144.58E.

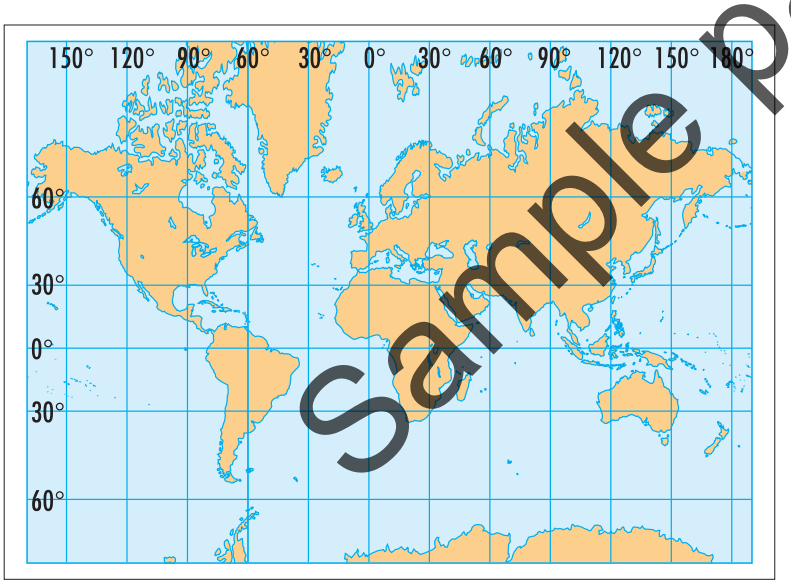
Latitude is always written first. The location of Kalgoorlie, for example, is 30.50S 121.30E.

MAP PROJECTIONS

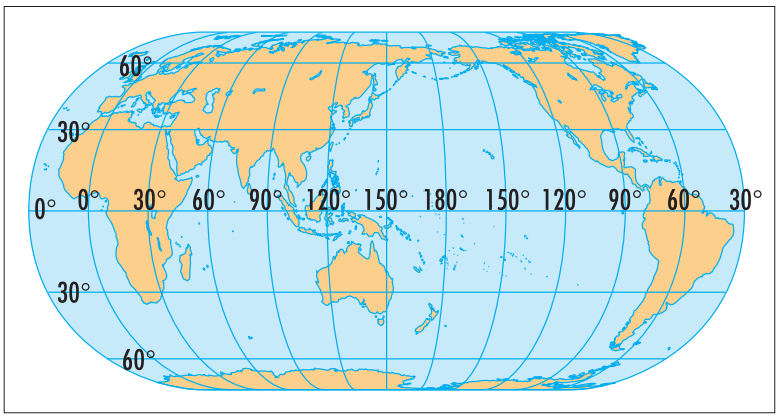
Because Earth is a sphere, the only totally accurate map of Earth is a globe. However, it becomes difficult when a number of globes of different sizes are needed to show continents and countries in great detail, or world patterns of population distribution or life expectancy, for example.



Source 2.2 Cutting to make a map projection.



Source 2.3 Mercator projection.



Source 2.4 Eckert IV projection.

Trying to make a flat map of the globe is like trying to flatten an orange or an old soccer ball. You can cut it, stretch or squash it, but whatever you do it ends up looking quite different.

Map makers—called **cartographers**—have no difficulty in making a map of a small area. However, showing the curved surface of a continent or the world on a flat piece of paper is quite a different matter.

Cartographers solve the problem by using a **map projection**, i.e. they project latitude and longitude from the globe onto a flat surface. The term 'map projection' comes from the practice of placing a light inside a transparent globe to project an image of the lines of latitude and longitude around the globe onto a piece of paper.

There are many different types of map projection. The type of projection used depends on what the map is to show, and how much of Earth's surface is to be shown.

There are four important elements that a map projection attempts to show correctly compared with a globe: shape, size or area, distance, and direction. No projection, however, can show all four correctly at the same time. All projections distort the Earth's curved surface in some way. Most manage to show correctly just one, or possibly two, of shape, size or area, distance and direction.

The Mercator projection, for example, shows direction correctly, but distorts distance, shape and area with increasing distance north and south of the equator. Note the apparent size of Greenland—which is in fact about one-eighth the area of South America—and how poles stretch to be the same length as the equator.

In contrast, the Eckert IV projection is an equal-area projection. It is used for thematic maps showing world distribution patterns because it shows all land areas at their true size relative to each other. We can compare the area and distribution of features; shape, distance and direction, however, are all distorted away from the equator and the central meridian.