CHAPTER 2
MAPS AND MAPPING

**What's coming up**

This chapter allows students to develop the skills and tools needed to use and understand maps. Students will:

- study various types of maps
- learn why BOLTSS (border, orientation, legend, title, scale and source) is an important cartographical acronym
- acquire skills such as area and grid referencing
- discuss latitude and longitude
- learn how to read a topographic map
- become familiar with spatial technologies.

**Pre-quiz**

Students create a list of different maps they have seen or used. The types of maps that students may have encountered include those found online, on television, and in atlases, magazines, brochures, travel guides and advertisements. Students then respond to the following:

1. Describe how you have used one of these maps. Student’s individual response.
2. Create a list of some characteristics that all good maps have. Consistent symbols, colours/shading and BOLTSS.
3. In your own words, explain ‘scale’ and why it is so important in Geography. Scale denotes the proportional relationship between the representation of an object or place and its actual size. For example, an accurate scale on a map helps to represent the distance between two points on a map relative to their actual distance on the earth’s surface. An accurate scale is important because it allows you to calculate the distances that a map represents on the earth’s surface.
4. Recall some symbols that you have seen or used on a map, such as railway lines, roads, windmills, rivers or dams. See Figure 2.1 for some examples.

**Using the image**

The chapter opening image shows a 3D image created by Zebedee, which is a handheld 3D mapping laser. To create a 3D map, a lightweight scanner is used to map places that are difficult to access, such as underground, indoor and outdoor areas. Zebedee is a creation of the CSIRO. Students need to focus on the map and answer the following questions:

1. How does this type of map differ from a traditional paper map?
2. What are the benefits of this type of map?
3. List the different ways you could use a 3D map.

These questions can be discussed when students learn about the different types of maps.

**Glossary**

- aspect: the direction that a slope faces
- cartographer: a person who draws maps
- circle of latitude: a parallel to the Equator
- circle of longitude: a meridian of longitude
- divide: a line that separates two areas
- elevation: the height of a point above sea level
- latitude: the position of a feature or place on the earth’s surface
- location: the position of a feature or place on the earth’s surface
- longitude: the position of a feature or place on the earth’s surface
- map scale: the ratio between the distance on a map and the actual distance on the earth’s surface
- map table: a map designed to illustrate a particular theme, for example, soil type or the condition of infrastructure
- map use: the study of maps and their principal features in terms and longitude, grid references and area references.
- orientation: the position of a feature or place on the earth’s surface
- parallel of latitude: imaginary line drawn around the earth from north to south
- parallel of longitude: imaginary line drawn around the earth from west to east, parallel to the Equator
- reading a topographic map: a process of interpreting the shapes of the land, including height and steepness
- river: a natural watercourse flowing through a valley
- road: a route that is used by land vehicles
- relief: the difference in height between two points on a map
- scale: the relationship between the distance on a map and the actual distance on the earth’s surface
- spot height: the exact altitude or height above sea level
- symbol: a representation of an object, area or action
- symbolising: the process of representing objects, areas or actions
- terrain: the landscape or physical environment
- topographic map: a map designed to illustrate a particular theme, for example, soil type or the condition of infrastructure
- vegetation: the plants and other living things of an area

**Getting started**

**EAL/D support**

Vocabulary assistance

To help students become familiar with the glossary listed on this page, have them work in pairs to set up and play a game of 'memory'. In pairs, students write all of the glossary terms onto separate pieces of card, then do the same for each definition. Once this is complete, students randomly place all cards face down on a desk. Students take turns revealing two cards at a time. If they turn over a word and its matching definition, they keep the two cards. If not, they turn the cards back over for the next person’s turn. The winner is the person who has collected the most cards at the end of the game.

**Vocabulary assistance**

Pearson Reader and eBook

Documents

Teaching program: Chapter 2

Interactive activities

Mapping

Types of maps

Grid and area references

Topographic maps

Types of maps

Templates

Graphic organisers

Blank outline maps

Web destinations

**Pearson geography 7 RESOURCES**
Geographical inquiry and skills

Geoskills

Treasure island

ML: visual–spatial, verbal–linguistic, logical–mathematical, interpersonal

This activity is designed to reinforce some of the geographical skills covered in Units 2.1 and 2.2.

Students create a map of an island and write a set of instructions that, when used in conjunction with the map, show the location of buried treasure.

1. Using an A3 sheet of paper (landscape), students draw up a 20 × 30 centimetre table.
2. Have students draw a 2-centimetre grid over the entire 20 × 30 centimetre table.
3. Students work out an appropriate scale. Refer to them all the features they need to include on their map and what an appropriate scale may be, such as 2 centimetres equaling 20 kilometres.
4. Students include the following features on their map, using the appropriate map symbols:
   - village
   - roads
   - railway line
   - airport
   - hotel
   - sea
   - river
   - forest
   - school
   - police station
   - fire station
   - beach
5. Students should complete a rough draft before producing the final document. Remind students to apply the elements of the BOLTS acronym (border, orientation, legend, title, scale and source) to their final draft.
6. To accompany their map, students write a set of instructions to find the buried treasure on their island. The instructions must include at least ten clues that lead to the buried treasure. The clues should be based on a combination of distance, direction and grid referencing information.
7. When they have completed the treasure hunt instructions, students swap their maps with a partner. Can students find the buried treasure on their partner’s map?

Geographical knowledge and understanding

Evaluate understanding

Venn diagrams

ML: visual–spatial, verbal–linguistic, interpersonal

Venn diagrams are a great way to allow students to compare and contrast information in a visual format. Where the two circles in the diagram overlap, students note the similarities. In the outer sections of the circles, students list the unique characteristics of each topic or element.

Provide students with a blank outline of a Venn diagram. Students list the similarities and differences between area referencing and grid referencing. When they have completed this task, students share their results in groups or with a partner in order to compare their work and add more detail to their own Venn diagrams.

Activity answers

Knowledge and understanding

1. Northerns are horizontal and eastings are vertical.

Geographical skills

2. a i Shipwreck
   b i 002562
   c i Mangroves and swamp
   d i 20 metres
   e i 65 metres
   f i North-east

Geographical concepts

It’s important for EAL/D students to grasp the geographical concept of space and the idea of area references. One way to revise this topic is to set up and play a version of the children’s board game ‘battleships’. Use the following instructions to help students play the game in class.

1. Divide the class into pairs. Have students draw up a 10 × 10 grid on two different pieces of paper.
2. Students label the axes on each grid and draw six battleships on the first grid. They should draw one battleship that covers three spaces, one that covers two spaces and three that cover one space. They can place their battleships either horizontally or vertically anywhere on their grid. However, each grid cell can only be used for one boat (boats cannot overlap each other).
3. Tell students that their second grid is a blank map of their opponent’s battleship area. Students can then take it in turns to guess the grid references of their opponent’s ships. If there is a ship located in the grid reference guessed, their opponent must say ‘hit’. If there is no ship in the reference, the opponent says ‘miss’. Students record their hits and misses on the blank grid reference. Students get one guess for each turn.
4. Once a student has correctly guessed the grid references for each part of a ship, the other player must say ‘sink’. The first student to sink all of their opponent’s ships wins the game.
Geographical inquiry and skills
Geographical inquiry activity

**Practice on a real map**

MI: visual–spatial, interpersonal

This activity should be based around a topographic map. Provide students with questions that they can use to compose a paragraph discussing the topographic features of the map. Sample questions include:

- What is the location of this region?
- What is the primary use for land in this area?
- What map evidence supports this?
- Where are the steep slopes located in this region?
- Are the steep slopes found in forested areas?

Note the elements on the map that prove/disprove this argument.

Describe the location of the flat land in the region.

- What is the name of the river on the map?
- In what direction does the river flow?
- Approximately how far does the river flow?

As an extension, students could prepare another activity, modelled as above, but based on a different topographic map. Each student swaps their map and questions with another student and then provides the answers after the other student has attempted their activity.

Geographical knowledge and understanding

**Extension task**

Using spatial reasoning

MI: visual–spatial, logical–mathematical, interpersonal

This activity requires students to use counting and scale to find the density of a map feature over an area.

1. Students work in pairs. Provide one topographic map for each pair of students.
2. Provide a list of some easy-to-find features on the map, such as buildings, vegetation, roads, and irrigation channels. Try to choose both human and natural features.
3. Students then complete the density of these features over a given area. For example, students could calculate the density of:
   - dams over the entire map area
   - houses over a designated region of 10 square kilometres
   - vegetation in the south-east region of the map

Model this activity on an interactive whiteboard. Students then complete a similar activity in pairs (or individually if an assessment outcome is desired).

AC: general capabilities: numeracy

Group work

**Map making**

MI: visual–spatial, verbal–linguistic, musical–rhythmic, intrapersonal

Students either compose a song that explains why maps are important in everyday life or write a poem describing the wealth of knowledge contained in an atlas.

Skillsbuilder support

**Hints and suggestions**

It takes time and patience to teach students how to measure areas using scales. To start, mock up an A4-sized map similar to Figure 2.3a. Place a 1-kilometre grid over the features you have drawn so that students can easily add up the ticks in the squares and calculate the area of the feature. Do a couple of examples or ask students to draw a map of their own and swap with a partner. Each mock-up map must have a linear scale, where 1 centimetre represents 1 kilometre.

**Applying skills**

Provide a topographic map with a distinctive feature on it, such as a lake, forested region, large dam or area under irrigation. Students will find it more difficult simply because it will be more complicated than their own topographic map. Allow them more time to do the measurements on a real topographic map.

Activity answers

**Geographical skills**

1. A lake with wetlands
2. AR 2562
3. GR 226603
4. Shipwreck
5. Bridge
6. 5 km
7. North-east
8. North
9. South
10. 120 m
11. 30 m
12. Pine plantation
13. 10 buildings per km²

**EAL/D support**

**Oral rehearsal**

Have EAL/D students work in pairs to practise reading instructions and measuring distances on maps. Give each pair a map, a divider and some paper and have them follow the instructions in the Skillsbuilder activity on this page. Students can take it in turns to read the instructions out loud to their partner. They may need to use additional instructional expressions to assist their partner, such as:

- Firstly, secondly, thirdly ...
- The next step is ...
- After this ...
- Now ...
- The last step is ...

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Atlas maps

2.6

An atlas is a collection of maps. These maps show physical features, human features or a mixture of both. Atlases also contain world maps and regional maps showing particular themes, such as climate or wealth.

Types of maps

In an atlas there are usually maps of each continent, more detailed maps of regions, showing particular countries, and even more detailed maps of smaller areas, such as cities. Cities are usually shown on maps using dot symbols. Titles, different symbols are used to indicate cities of different sizes or a capital city.

There are also many special atlases available. These atlases contain maps linked to a particular place or to a theme such as population and food use. Maps can be viewed in print form and in electronic form. Advances in computer technology mean that electronic atlases are becoming increasingly sophisticated and interactive.

Physical and human features maps

The maps in an atlas are often labelled with human (cultural and political) features such as boundaries, countries and cities. Physical (natural) maps show features such as rivers, mountains, plains and lakes.

Thematic maps

Atlases contain maps that illustrate particular themes. These maps may show, for example, the annual rainfall, the distribution of ethnic groups or the distribution of vegetation. (Figure 2.15 is a thematic map showing Australia's average daily maximum temperatures.

ACTIVITIES

Evaluating the usefulness of maps

Copy and complete the following tables.

<table>
<thead>
<tr>
<th>Map type</th>
<th>Features shown</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical</td>
<td>Landforms, vegetation types, rivers, mountains, lakes</td>
<td>To study the landscape and environment of a particular country or area</td>
</tr>
<tr>
<td>Political</td>
<td>Borders, capital cities, towns, country names</td>
<td>For the purposes of global geopolitics</td>
</tr>
<tr>
<td>Thematic</td>
<td>Information relating to a theme, such as climate and vegetation growth</td>
<td>To study a single theme (such as climate) and assess how this affects vegetation growth</td>
</tr>
</tbody>
</table>

Geographical inquiry activity

Connections between maps

For this question, students refer to Figures 2.15 and 2.16.

1. Describe the temperature and rainfall in July in the following cities:
   a. Alice Springs
   b. Darwin
   c. Melbourne
   d. Hobart
   e. Perth.

Vocabulary assistance

Mean annual rainfall (millimetres)

<table>
<thead>
<tr>
<th>Region</th>
<th>Mean annual rainfall</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 250</td>
<td>250-500</td>
</tr>
<tr>
<td>500-1000</td>
<td>1000-1500</td>
</tr>
<tr>
<td>1500-2000</td>
<td>2000-3000</td>
</tr>
<tr>
<td>3000+</td>
<td>More than 3000</td>
</tr>
</tbody>
</table>

Mean daily maximum temperature

<table>
<thead>
<tr>
<th>Region</th>
<th>Mean daily maximum temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>18˚C and under</td>
<td>18-25˚C</td>
</tr>
<tr>
<td>25-30˚C</td>
<td>30-36˚C</td>
</tr>
<tr>
<td>36˚C and over</td>
<td>More than 36˚C</td>
</tr>
</tbody>
</table>

EAL/D support

Vocabulary assistance

Key words appear on the maps on these pages. EAL/D students may benefit from an explanation of certain terms for each figure.

Figure 2.15:
- Mean daily maximum temperature: The average top temperature each day (the average is the sum of temperatures which is then divided by how many temperatures are in the list).
- Isotherm: A line on a map connecting points that have the same temperature.
- Mixing winds: Direction: A wind that mixes two or more normal winds.

Figure 2.16:
- Mean annual rainfall (millimetres): The average number of millimetres of rain that falls each year.
- Approximate scale: A guess/estimate of the scale, although it may not be completely accurate.
- Tropic of Capricorn: One of the three most important lines of latitude that circle the earth (the other two are the Equator and the Tropic of Cancer).
### 2.7 Latitude and longitude

#### Helpful hint

**Latitude**
- Visual/spatial, verbal/linguistic
- Latitude relates to the imaginary lines that run in an east-west direction around the earth. The most important of these lines is the Equator (0°), which divides the world into the Northern and Southern hemispheres.

**Longitude**
- Visual/spatial, verbal/linguistic
- Longitude relates to the imaginary lines that run in a north-south direction around the earth. The most important of these lines is the Prime Meridian (0°), which passes through Greenwich Observatory in London, United Kingdom, and divides the world into the Eastern and Western hemispheres.

The International Date Line (IDL) is on the opposite side of the world, at 180°.

### EAL/D support

**Vocabulary assistance**

The following quick tricks may help EAL/D students remember the difference between lines of latitude and longitude:

1. **Latitude** is like a belt (horizontal).
2. **Longitude** is like a pair of suspenders (vertical).
3. When you say ‘latitude’ out loud, your mouth stretches side to side (horizontal).
4. When you say ‘longitude’ your mouth stretches up and down (vertical).
5. Latitude rhymes with ‘terminal’ because the horizontal lines are flat. Longitude lines are long.
6. Students can visually represent latitude and longitude lines by drawing the lines and directions on a paper plate (used to represent earth).

**Activity answers**

**Knowledge and understanding**

1. **The term ‘parallel of latitude’ relates to the imaginary lines that run in an east-west direction around the earth.** The term ‘meridian of longitude’ refers to the lines that run in a north-south direction.
2. **Parallels of latitude** run north-south and converge at the North and South poles. **Meridians of longitude** run east-west and do not converge at any point. In contrast, the Equator and the International Date Line (IDL) are on the opposite side of the world, at 180°.

**Geographical skills**

- **Teach students how to enter the coordinates listed in the student book into an online GIS tool, such as Google Maps.** An example of how to successfully enter coordinates is shown in the table below.

#### Skills builder support

**Hints and suggestions**

- **Teaching and learning about latitude and longitude** can be a fun exercise for students who are beginning to understand this important geographical skill. **This provides students with a model to reference as you describe how the world is divided into the Northern and Southern hemispheres by the Equator and the Eastern and Western hemispheres by the Prime Meridian and theIDL.** Demonstrate how latitude and longitude work together to pinpoint a specific location.

- **Use an alphabetical clue to help students remember that the latitude coordinate is read before the longitude coordinate.** For example, has a latitude of 34°40’N and a longitude of 132°00’W.

- **Turn to a map of the region or continent, and locate the latitude and longitude you have been given.** Use an alphabetical clue to help students remember that the latitude coordinate is read before the longitude coordinate. For example, has a latitude of 34°40’N and a longitude of 132°00’W.

- **Direct students to a world map or atlas, which includes lines of latitude and longitude.** **These allow you to pinpoint places on the earth’s surface.** Together, lines of latitude and longitude form a grid.

#### EAL/D support

**Vocabulary assistance**

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