READING TROPICAL MAPS

SEVENTH EDITION

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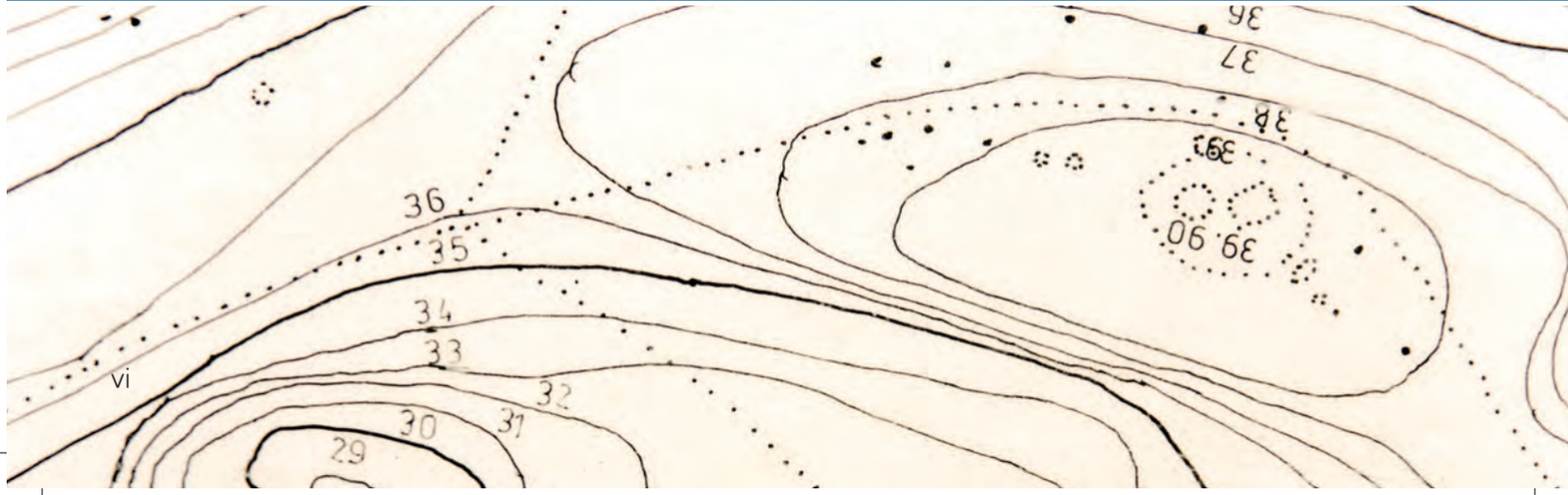
CONTENTS



Chapter

1 Essential Skills

Introduction to Topographical Maps

Maps

Maps are graphical representations of the Earth's surface that are drawn on a flat surface. There are many types of maps and each shows some specific information. Some maps deal with the physical environment, some with the human environment, and some with both environments. The following are some of the information shown by maps which appear in an atlas.

Physical Environments on Maps

- Land masses and oceans — their locations, shapes and sizes
- Relief features — mountains, plateaux, valleys, plains and coasts
- Drainage systems — seas, oceans, lakes and wetlands
- Elements of climate — temperature, rainfall, air pressure and wind patterns
- Vegetation types and biomes — rainforests, grasslands and deserts

Figure 1.1 is a map giving information about the physical environment.

Figure 1.1 Map of vegetation patterns and drainage systems in Singapore

Human Environments on Maps

- Agricultural features — crops and animals
- Industrial features — mining and manufacturing
- Settlement features — cities and towns
- Communication features — roads, railways, ports
- Living conditions — wealth, urbanisation and food supply

Figure 1.2 is a map giving information about the human environment.

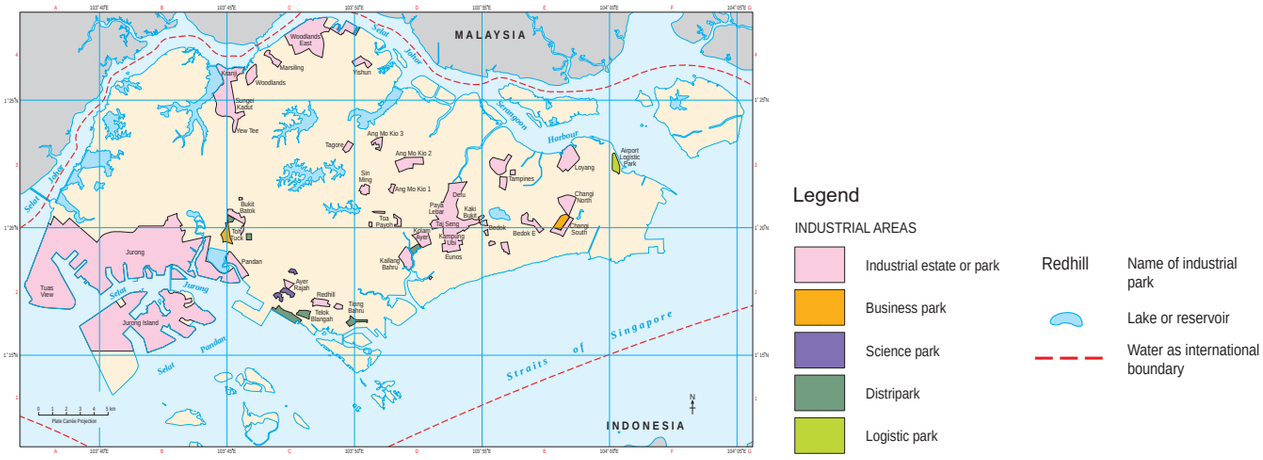


Figure 1.2 Map of industrial patterns in Singapore

Some maps such as those in an atlas show very large areas of the Earth's surface, such as a continent. These maps can only show very large features. In other words, these maps represent a large area and show a small amount of detail. These maps are called **small scale maps**. For instance, a map of scale 1 : 1 000 000 (or one centimetre to ten kilometres) is a small scale map. Other maps such as **topographical maps**, show a small area of the Earth's surface such as a few hundred square kilometres. They show a large amount of detail and are called **large scale maps**. For instance, a map of scale 1 : 50 000 (or one centimetre to five hundred metres) is a large scale map.

Topographical Maps

Most of the maps in this book are topographical maps. Topographical maps show the physical and human features that occur on a part of the Earth's surface. The physical features shown include relief, drainage and natural vegetation. The human features shown include agricultural, industrial, settlement and communication features.

When you read a topographical map, you gain an idea of what an area looks like if you were to see it looking straight down from an aeroplane, helicopter or hot air balloon. Topographical maps include a great deal of information about the parts of the Earth's surface they represent. As geographers, you will learn to interpret and use this information.

Figure 1.3 A topographical map and its legend

The vertical grid lines are called **eastings** because they are numbered from west to east as shown in Figure 1.4 (a). The horizontal grid lines are called **northings** because they are numbered from south to north as shown in Figure 1.4 (a).

Together, eastings and northings form squares called **grids** or **grid squares** as shown in Figure 1.4 (a).

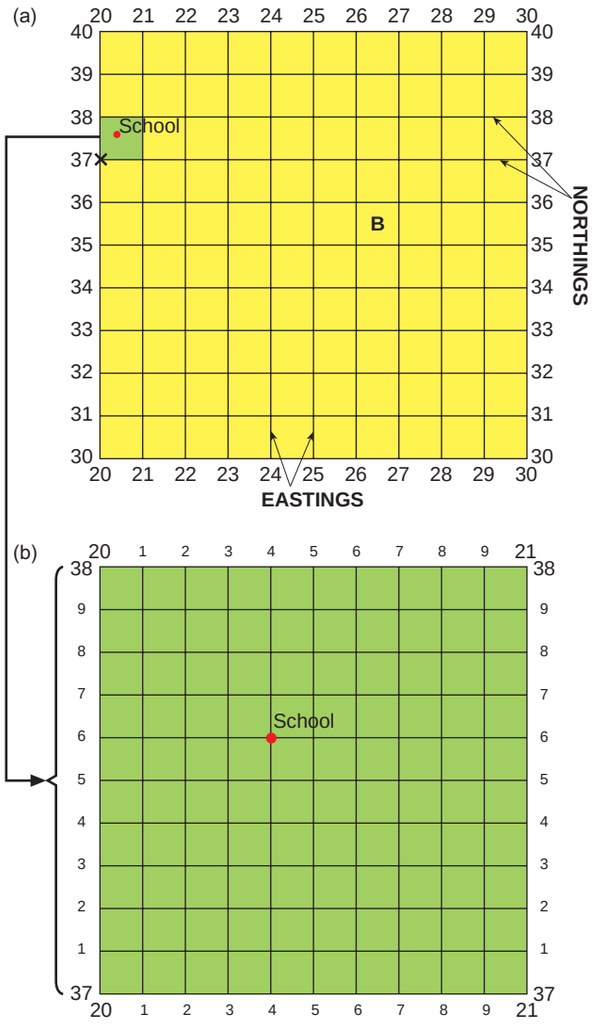


Figure 1.4 (a) A grid; (b) Enlarged grid square containing the school

Grid References

We can identify the location of any feature on a topographical map using grid references. The **grid reference** of a feature is obtained by giving the value of the point of intersection of its easting and northing.

There are two ways of reading grid references. You can either read the four-figure grid reference or the six-figure grid reference. The **four-figure grid reference** is used to indicate the grid square in which a feature is found. Features such as a mountain range, the coastline and a town area can be best identified by giving a four-figure grid reference. The **six-figure grid reference** is used to indicate the specific position of a feature within a grid square. Features such as a building, road junction or mountain peak are best identified with a six-figure grid reference since there is a specific location for them.

How to Read Four-figure Grid References

Look at Figure 1.4 (a). One of the grid squares is coloured green and it shows the location of a school.

To obtain the four-figure grid reference of the square in which the school is located, the following steps should be taken.

Step 1: Find the south-west corner of the grid square where the school is located. On Figure 1.4 (a), this is marked 'X'. This is the point where the easting and northing of the grid square intersect.

Step 2: Take the value of the easting of the grid square at 'X', i.e. easting 20.

Step 3: Take the value of the northing of the grid square at 'X', i.e. northing 37.

Step 4: Give the easting before the northing. The four-figure grid reference of the school is 2037.

Example 1

What is the four-figure grid reference of B in Figure 1.4 (a)?

Step 1: Find the south-west corner of the grid square in which B is located.

Step 2: Take the value of the easting, i.e. 26.

Step 3: Take the value of the northing, i.e. 35.

Step 4: Give the easting before the northing. The four-figure grid reference of B is 2635.

How to Read Six-figure Grid References

To give a six-figure grid reference of the school in Figure 1.4 (a), follow these steps.

Step 1: Divide the sides of the grid square in which the school is found into 10 equal parts. This is shown in Figure 1.4 (b) which is an enlargement of the green square in Figure 1.4 (a).

Step 2: Take the easting of the centre of the school. The centre is four-tenths (4) of the distance from easting 20. Therefore the easting of the school is 204.

Step 3: Take the northing of the centre of the school. The centre is six-tenths (6) of the distance from northing 37. Therefore the northing of the school is 376.

Step 4: Give the easting before the northing. The six-figure grid reference of the school is 204376.

Example 2

What is the six-figure grid reference of the road junction at A in Figure 1.5?

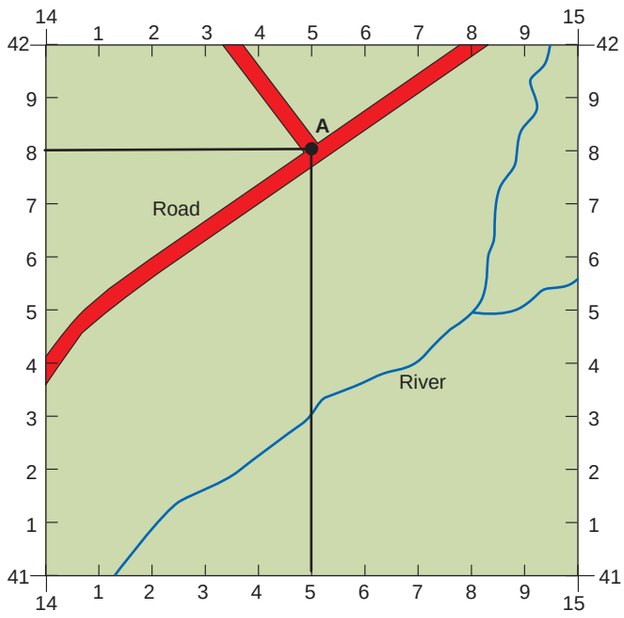


Figure 1.5 Reading a six-figure grid reference

Step 1: Divide the sides of the grid square 1441 into 10 equal parts.

Step 2: Take the easting of the centre of the road junction at A. The easting is five-tenths of the distance from easting 14, i.e. 145.

Step 3: Take the northing of the centre of the road junction at A. The northing is eight-tenths of the distance from easting 41, i.e. 418.

Step 4: Give the easting before the northing. The six-figure grid reference of the road junction at A is 145418.

The following is an example of reading four-figure and six-figure grid references.

Example 3

Refer to Map 1, Pont Colville.

What are the four-figure and six-figure grid references of the mill near Beau Climat?

The four-figure grid reference of the mill is obtained as follows:

Step 1: Find the south-west corner of the grid square where the mill is located.

Step 2: Take the value of the easting, i.e. 03.

Step 3: Take the value of the northing, i.e. 76.

Step 4: Give the easting before the northing. The four-figure grid reference of the mill is 0376.

The six-figure grid reference of the mill is obtained as follows:

Step 1: Divide the sides of the grid square in which the mill is found into 10 equal parts.

Step 2: Take the easting of the centre of the mill. The easting is seven-tenths of the distance from easting 03, i.e. 037.

Step 3: Take the northing of the centre of the mill. The northing is nine-tenths of the distance from northing 76, i.e. 769.

Step 4: Give the easting before the northing. The six-figure grid reference of the mill is 037769.

Remember

Always give the easting value before the northing value when stating grid references.

Handy Hint

To give a six-figure grid reference, only imagine the additional grid lines. Drawing the lines on a map is time consuming and may hide key map information.

Quick Check Multiple Choice Questions

1. Which of the following in Figure 1.6 has an easting of 26?
   A. B
   B. D
   C. L
   D. M

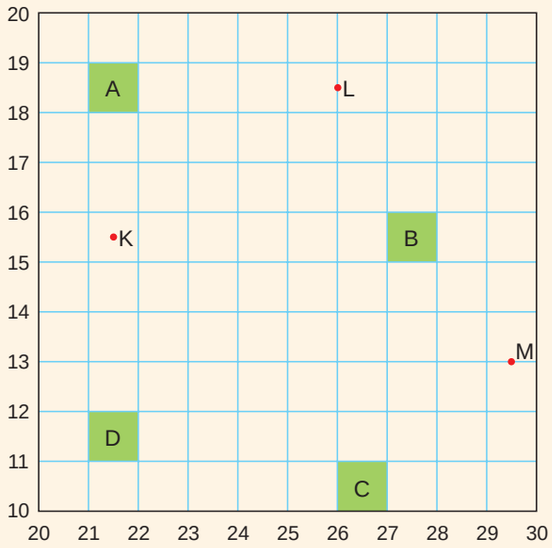


Figure 1.6 A map grid

Refer to Map 2, Port Morant, for Questions 2 to 5.

2. What is the four-figure grid reference for Leith Hall near the south-west corner of the map?
   A. 2036
   B. 3620
   C. 1936
   D. 3619

3. Which of the following places has a four-figure grid reference of 1941?
   A. Airy Mount
   B. Industry Hill
   C. Johns Town
   D. Airy Castle

4. Through which of the grid squares is the Duppy River, in the south-west corner of the map, flowing?
   A. 1937
   B. 1835
   C. 1836
   D. 1736

5. What feature is found at grid reference 219358?
   A. Pera Point
   B. Fort Lindsay
   C. coral reef
   D. road

Quick Check Activity

Refer to Figure 1.6.

1. (a) What are the easting and northing values of grid square D? What is its four-figure grid reference?
   (b) What are the four-figure grid references of the squares A, B and C?
   (c) Give the six-figure grid references for points K, L and M.

Refer to Figure 1.7.

2. (a) What is the four-figure grid reference of the grid square?
   (b) Give the six-figure grid references for points N, O, P, Q, R and S.

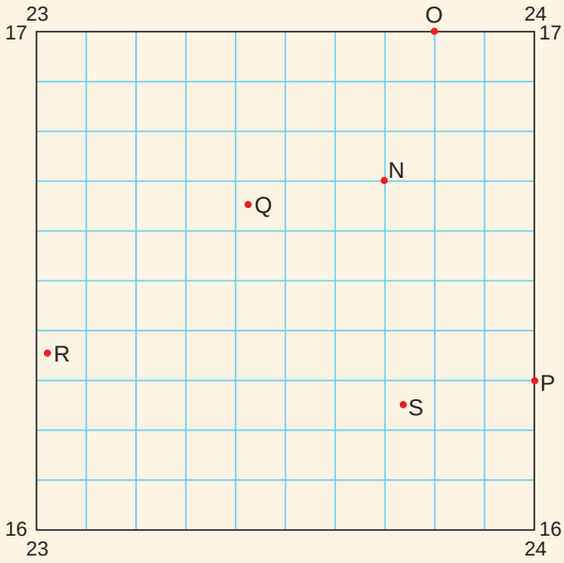


Figure 1.7 A grid square

Refer to Map 1, Pont Colville.

3. (a) Name the feature at grid reference 035811.
   (b) Name the grid square containing Pont Colville.
   (c) Describe how to give the four-figure grid reference for the Tea Factory situated in the southern part of the map.

Refer to Map 2, Port Morant.

4. (a) What is the six-figure grid reference of the wharf at Port Morant?
   (b) Name the feature whose grid reference is 183457.
   (c) Describe how to give the six-figure grid reference of the factory near Port Morant.

Map Scales and Distances

Map Scales

Every map shows a specific area of the Earth's surface. Topographical maps of land areas show physical features such as hills, lowlands, valleys and rivers as well as human features such as roads, railways, settlements and agricultural activities. As it is not possible to draw the actual sizes of these features on maps, they have to be reduced proportionately to fit onto maps. Hence, scales are used.

A scale is the ratio between a given map distance and the actual ground distance. For example, if a map has the scale of one centimetre to one kilometre, then a distance of one centimetre on the map represents a distance of one kilometre on the ground.

The scale chosen for a map varies according to the size of the area and the amount of surface details to be shown.

- A map showing the plan of a building may use 1 centimetre to represent 1 metre.
- A map showing a town plan may use 1 centimetre to represent 50 metres.
- A map showing several towns linked by major roads may use 1 centimetre to represent 1 kilometre.
- A map showing a large area of a country may use 1 centimetre to represent 10 kilometres.

Chapter 2

Photographs and Satellite Images

Types of Photographs and Satellite Images

Photographs and satellite images are important tools for the study of Geography. They can be used by themselves or with other tools such as topographical maps. They can provide vital information about the appearance and arrangement of human activities and physical features of a place at a particular time that may not be available on a map, such as the location of people or the flooding of a river. By analysing parts of a topographical map together with photographs that were produced at different times, it is possible to work out changes that have occurred. In addition, photographs and satellite images record information.

There are three main types of photographs, each showing different kinds of information. The points of origin of the three types of photographs as well as that of satellite images are shown in Figure 2.1.

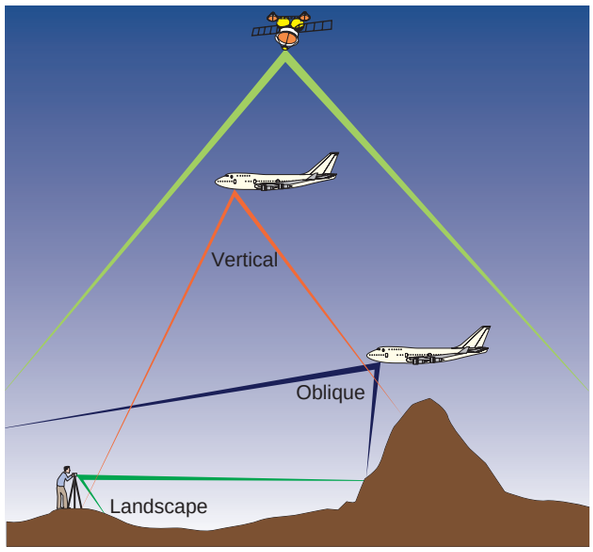


Figure 2.1 The points of origin of different types of photographs and satellite images

Landscape Photographs

Landscape photographs are taken from the ground towards the horizon such as in Figure 2.2. Features in the foreground will appear larger and in more detail than those in the background. Large objects such as buildings or trees in the foreground can block out features in the middle ground or background.

Figure 2.2 A landscape photograph of Mount Mayon, an active volcano in the Philippines

Aerial Photographs

Aerial photographs are taken from the air looking towards the Earth's surface. There are two types of aerial photographs: oblique and vertical.

Oblique Photographs and Vertical Photographs

Oblique photographs are taken when the camera is pointed at an angle to the ground. The photograph may be taken from the top of a hill, from a tall building or from a low-flying aircraft. Figure 2.3 is an example. Oblique photographs are similar to landscape photographs with background features appearing smaller than those closer to the camera lens. Because of their oblique angle, the horizon may not be visible in some oblique photographs.

Figure 2.3 An oblique photograph of part of a coastal city

Vertical photographs are taken from above the ground with the camera lens pointed directly onto the area being photographed. Figure 2.4 is an example. Vertical photographs do not show the height of features but show them as a plan, similar to a map. Unlike the landscape and aerial oblique photographs, the area represented on a vertical photograph will be at the same scale across the whole area of the photograph.

Figure 2.4 A vertical photograph of a river estuary and coastal spit, northern Australia

Satellite Images

Satellite images are images recorded from satellites located hundreds or thousands of kilometres above the Earth (Figure 2.5). They can cover substantial areas of the Earth as well as focus on much smaller local areas such as a neighbourhood. The colours on a satellite image are produced by a computer to emphasise features such as vegetation, cities or water depth.

Handy Hint

The colours used on satellite images are generally green for vegetation, blue or black for water, and brown for non-vegetated area.

Figure 2.5 A satellite image of Mount Mayon, a volcano in the Philippines

How to Read Photographs

Photographs consist of three horizontal parts.

1. Foreground — the part of photographs nearest to the observer
2. Middle ground — the central part of photographs between the foreground and the background
3. Background — the part of photographs farthest away from the observer

These three parts are shown in Figure 2.6. In this photograph, the foreground is occupied by the truck, the middle ground is occupied by the hill and the background by the mountain.

Photographs can also be further subdivided vertically into left, centre and right (Figure 2.6).

Figure 2.6 Parts of a photograph

How to Describe Photographs and Satellite Images

1. Read any captions or associated text given with photographs or satellite images.
2. Identify the characteristics of the main features in photographs or satellite images, in particular:
   - evidence of location and time at which the photograph was taken,
   - clues for scale such as the height of people, and
   - features that seem out of place and might need further research.
3. Describe the overall effect or patterns seen on the photographs or satellite images. This could include comments such as 'This is a volcanic landscape' or 'This attractive coastal location...'
4. Describe the main features including their positions, sizes and relationships to other features within the photographs or satellite images.
5. Describe any limitations to further description of the photographs or satellite images, such as the lack of an appropriate scale.

Remember

The horizontal scale is the same across the whole area of the photograph for vertical photographs and satellite images but not for landscape and oblique photographs.

Example 1

Describe the main characteristics of the landscape in the satellite image shown in Figure 2.5.

Step by step

(1) This image is dominated by the Mayon volcano, the crater of which is located in the north-west. (2) From this crater there are radial lines reaching towards the lowland and the coast. These lines could be past flows of lava and lahars (mud flows). (3) In the centre of the image is a dark, elongated area suggesting the remains of a more recent eruption.

(4) On the lowlands and close to the coast, a large settlement is evident together with numerous roads which skirt the lower flanks of the mountain. (5) On the southern slopes vegetation ceases to be present about halfway up the main body of the volcano. (6) In the south west corner and along the southern edge of the image, there appears to be rugged landscape which is heavily vegetated.

(1) Introductory statement and topic sentence — main feature and its location identified

(2) Elaboration — a suggestion to explain how the feature is formed

(3) Elaboration — another feature identified and its likely cause suggested

(4) Topic sentence — another feature identified and explained

(5) Elaboration — relationship of two features described

(6) Concluding statement — summary given

How to Sketch and Annotate from Photographs and Satellite Images

The main aim in making sketches from photographs or satellite images is to show their key features. Sketches should not replicate everything that are in the photographs or images. The annotations can highlight the main features, the relationship between features or how some features are changing.

Follow these steps to produce an annotated sketch of the landscape photograph shown in Figure 2.7 (a).

1. Draw a frame on plain paper in the same proportion as the photograph.
2. Divide the landscape photograph into three areas:
   - Foreground
   - Middle ground
   - Background

   Lightly pencil these divisions onto your sketch. See Figure 2.7 (b).
3. Look carefully at the features in each division and draw a pencil outline of these on the plain paper.
4. Shade in any feature you want to highlight, such as the trees or river bank. See Figure 2.7 (c).
5. Add in further detail to the main features but remember that it is a sketch and not an exact replica of the photograph.
6. Label all the main features.
7. Give your sketch a title and a source.

(a)

Figure 2.7 (a) A landscape photograph