

# CHAPTER 16 INTRODUCTION TO MAP READING

## Objectives

At the end of this chapter, students should be able to; i. Describe what a map is ii. Differentiate between map and plan iii. Discuss the importance of maps iv. Describe what is map scale v. Mention some conventional symbols and marginal information on topographical maps.

### 16.1 Maps

A map is a geographic representation of all or parts of the earth drawn to scale usually on a flat medium. A map can also be described as an image of our environment showing spatial distribution of geographic elements such as climate, relief, soil, vegetation, economic activities, population distribution *etc.* Map is a fundamental tool of geographers, however many people in other fields of learning use map for several purposes. Maps are produced by cartographers. Cartography refers to the science and art of map making. The ways maps are made have changed over years. The earliest maps that have withstood the test of time were made on clay tablets. Maps were also produced on leather, stone and wood. However, the most common medium for producing maps is paper. Today maps are produced on computers, using software and Geographical Information Systems.

### Types of Map

Two broad types of maps can be identified namely; 1. **Mental Maps**

Mental maps are images of our environment that exist in our minds. These maps are what allow us to remember the routes that we take to schools, market places, church, mosque, hospital *etc.* They are based on individual perception of the world.

### 2. Cartographic Maps

These are external or physical representation of the geographical environment. It is a simplified representation and reduction of the environment. It includes physical maps such as globes, physical models, line drawing or sketches, photograph and imagery of the earth taken from airplanes, spacecraft and satellites.

Based on particular application areas, we may have the following types of maps; 1. **Aeronautical map - Map used by pilots** 2. **Base map - Map upon which other maps are built.**

3. **Cadastral map - Map that shows properties, particularly landed properties and building.**
4. **Climatic map synoptic - Map used to show climatic types variations in climatic elements such as temperature, rainfall, humidity, *etc.***
5. **Economic or Resource Map:** An economic or resource map shows the specific type of economic activity or natural resources present in an area through the use of different symbols or colours depending on what is being shown on the map. *E.g. Distribution of crops, minerals, manufacturing activities, etc.*
6. **Historical maps - Maps that show historical variations in people history, culture and landscape.**
7. **Nautical map - It indicates routes and show nautical distance. Map used by sailors for sea navigation,**
8. **Political Map:** A political map shows local government, state and national boundaries.
9. **Road map - Map that shows road network of areas.**

- 10. Thematic Maps:** Thematic maps are maps that focus on a particular theme or special topics. An example of a thematic map would be one showing the population change of Nigeria from 1996 to 2012.
- 11. Topographical map -** Map that shows natural (topography, hills, rivers, etc) and manmade features (settlement, hospital, school, etc) of a particular area.
- 12. Vegetation map -** This shows vegetation types and variations.

Based on scale we may have;

- 1. Small scale maps -** These are maps that cover large areas and show few details. Examples of such map are atlas and globe.

- 2. Medium scale maps -** They are maps between the small and large scale maps. Usually topographical maps are drawn on medium scale.
- 3. Large scale maps-** These are maps that cover small areas, but show detail features of an area. They include cadastral maps or plans.

### **Uses of Maps**

- The uses of map are many;
1. Map shows the location of features and places on the earth surface.
  2. Maps are very useful for urban planning.
  3. Maps are used to show properties.
  4. Map serves as a medium for storing information.
  5. Maps are useful for advertisement of goods and services.
  6. Maps are security documents
  7. Maps make possible the rapid inventory of resources in our environment.
  8. Maps are good research instrument.
  9. Map is a good instrument of political propaganda, useful to convince voters on political issues.
  10. Map gives visual impression of our immediate environment.

### **16.2 Differences between map and plan**

There are differences between map and plan. Indeed plans are maps; however they differ from maps generally because they cover very small areas.

- A plan is a true scale representation while a map is drawn such that some features on it cannot be drawn to scale.
- On a map many features are represented using symbols and generalization; however features are shown as they were on the ground on a plan. Plans tend to be for a single or few applications while maps cover a large varying uses in areas of oil exploration, military operations, recreation, geological survey, navigation e.t.c.
- All features on a plan are drawn to scale while not all features on a map are drawn to scale.
- Plan covers small mps, cover large areas e.g. countries, world, etc.
- A plan may be for a specific (plan of a classroom) or few applications while maps can be used for several purposes.

### **16.3 Map Scales**

The scale of a map shows the relationship between distance or size on the map and the corresponding distance or size on the ground. It is important information usually provided around the margins of maps. It determines the amount information that can be shown on any map. Therefore, map scale should be studied carefully before any interpretation is made.

## **Types of Scales**

**There are three methods of indicating scale on maps, namely; a) Representative fraction (R. F)**

Representative fraction expresses the proportion of map distance to ground distance in fraction or ratio form.

Examples of representative fraction are; 1) or 1:25,000

2) or 1:50,000

3) or 1:100,000

The numerator whose value is always 1 equal to distance on the map, while the denominator represents distance on the ground. The denominator indicates how many times the numerator must be multiplied to know the actual distance on the ground. For example, The R.F scale of 1:50,000 indicates that 1cm on the map is equivalent to 50,000 cm on the ground. In other words 1cm on the map is equivalent to half kilometre on the ground. Note that the numerator and denominator should be of the same unit.

### **Advantages of Representative Fraction**

1. It can be applied to any unit of measurement.
2. Very easy to understand and use.
3. It is very useful in solving scale problems.
4. It is useful in the construction of linear scale.

### **Disadvantages of Representative Fraction**

1. It does not change in value whenever the map is reduced or enlarged photographically.
2. It is mathematically cumbersome.

### **b) Statement Scale**

The statement scale expresses the ratio of map distance or size on the map to distance or size on the ground in words. For example, 1 centimetre on the map represents 1 kilometre on the ground. Thus; 1:50,000 would mean 1 centimetre to half of a kilometre. 1:25,000 would mean 1cm to a quarter of a kilometre on the ground and 1:100,000 would mean 1centimetre to 1 kilometre on the ground.

### **Advantages of Statement Scale**

1. Easy to read and understand.
2. Easy to express in any language
3. It does not involve mathematical calculation.

### **Disadvantages of Statement Scale**

1. There is a problem of mixture of distance unit (centimetre and kilometre), which can be confusing.
2. When a map is reduced photographically, statement scale does not change.

## **Linear Scale**

Linear scale is usually shown on a map in form of line or bar sub-divided so that measurement taken on the map can be read off straight from it. It is also called bar scale. The scale is made up of two sections and it is read from left to the right beginning at zero point as shown in figure 1.1. The subdivision to the right of zero enables you to determine distances in whole unit and it is called *the primaries*. The division to the left of zero makes the reading of the fractional parts of the whole unit possible and it is called *the secondaries*.

*Figure 16.1: Linear Scale subdivisions*

To use the linear scale, first measure the required distance on the map with either a piece of strong inelastic string or twine, an edge of plain white paper or pair of divider. Place the material you use to measure on the map on the scale, make sure that the starting point of your measurement is on zero and the other lies over the primaries as demonstrated in figure 1.1b. If your measurement comes between two primaries, you will need to use the secondary scale to read off the tenth of kilometre as the case might be. In figure 1.1 the measurement reads 2.6 Kilometres.

### Advantages of Linear Scale

1. It does not involve mathematical calculations which is necessary when using the representative fraction.
2. It changes when a map is reduced or enlarged photographically.
3. It is convenient and easy to use.
4. It is always correct.
5. Both kilometre and miles can be shown conveniently on linear scale.

### Disadvantages of Linear Scale

1. It is difficult to construct.
2. Interpreting measurement from primaries and secondaries may be confusing if care is not taken.

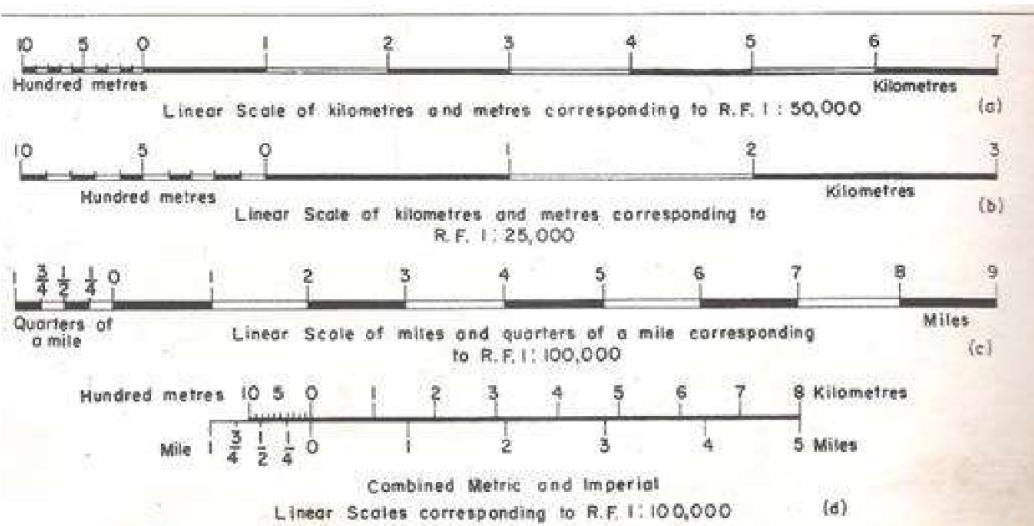


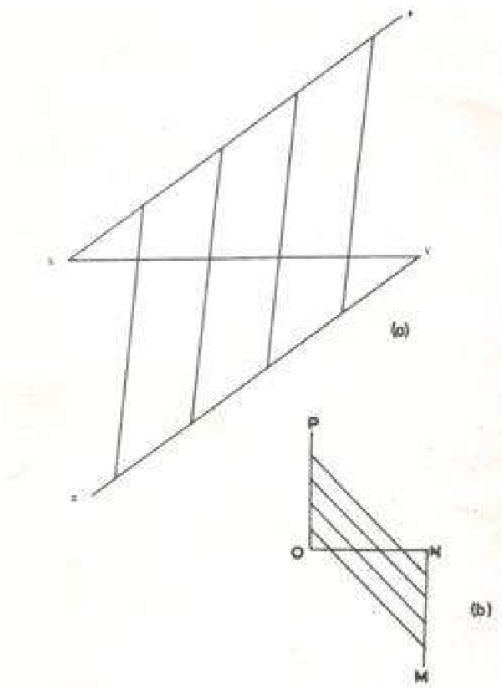
Figure 16.2: Linear Scales

### 16.4 How to construct a linear scale

To construct a linear scale for a given scale of 1: 50,000, the following steps should be taken; 1. Manipulate the scale to convert it to a statement scale. For a scale of 1: 50,000 given, it will be 1cm to km, or 2cm to 1 km 2. Since 2cm represent 1km, each primary unit of your scale will be 2 cm.

3. Determine the number of primaries you want to have. For example, if the number of your primaries will be five, then the length of your scale will be 10cm i.e  $2\text{cm} \times 5$
4. Draw line XY equal to 10cm.
5. Construct line XP and YZ such that angle PXY is equivalent to angle XYZ. Preferably the angle can be  $60^0$  or  $90^0$ . See figure 16.3 a &b.
6. With a pair of dividers make four marks of equal intervals (2cm) on both line XP and YZ.
7. Connect the marks on line XP with the marks on line YZ and you would have divided line XY into five equal places.

8. Select the first subdivision along the line XY to create your secondaries and divide into 10 equal parts following the same procedures as highlighted above.
9. Erase all construction lines, leaving only line XY with subdivisions on it and label beginning with 0 after the first subdivision number from 0 to 1 to left and 0 to 4 to your right.



*Figure 16.3: Constructing a linear scale*

### 16.5 Conversion of Scale

It is possible to convert from one type of scale to another. In other words a statement scale can be converted to Representative Fraction and vice versa. For example a scale in R.F, 1:100,000 is the same as 1cm to 1 Kilometre. Similarly an R.F of 1:500,000 can be read as 1centimetre to 5 Kilometres. It is also possible to convert these scales to linear scales.

To convert R. F. to statement scale, the following examples are helpful: 1. 1:50,000

To calculate the number of centimeters to the kilometers in example 1.

Divide 100,000 by the denominator of the given scale. Note that 100,000cm is equal to 1km.

$$\therefore \frac{100,000}{50,000} = 2$$

$\therefore 2\text{cm} = 1\text{km}$  2. Convert the statement scale 2.5km to 1km to representative fraction Multiply the value of kilometers by 100,000

$$\therefore 2.5 \times 100,000 = 250,000$$

$$\therefore 2.5\text{km to } 1\text{cm} = 1:250,000$$

See more examples in figure16.4

STATEMENT SCALE	REPRESENTATIVE FRACTION (R.F)	LINEAR SCALE						
1. 1 cm to 1m	$\frac{1}{100}$ or 1:100	0	1	2	3	4	5	Metres
2. 1cm to 20m	$\frac{1}{200}$ or 1:200	0	20	40	60	80	100	Metres
3. 1cm to 1km	$\frac{1}{100000}$ or 1:100000	0	1	2	3	4	5	6 Km
4. 2cm to 1km	$\frac{1}{50000}$ or 1:50,000	0	1	2	3	4	5	Km
5. 3cm to 25km		0	25	50	75			Km

Figure 16.4: Scale conversion.

## 16.6 Conventional Symbols and Marginal Information

Conventional symbols are used to depict objects on map. Symbols generally used for preparation of topographical map are shown in figure 16.5.

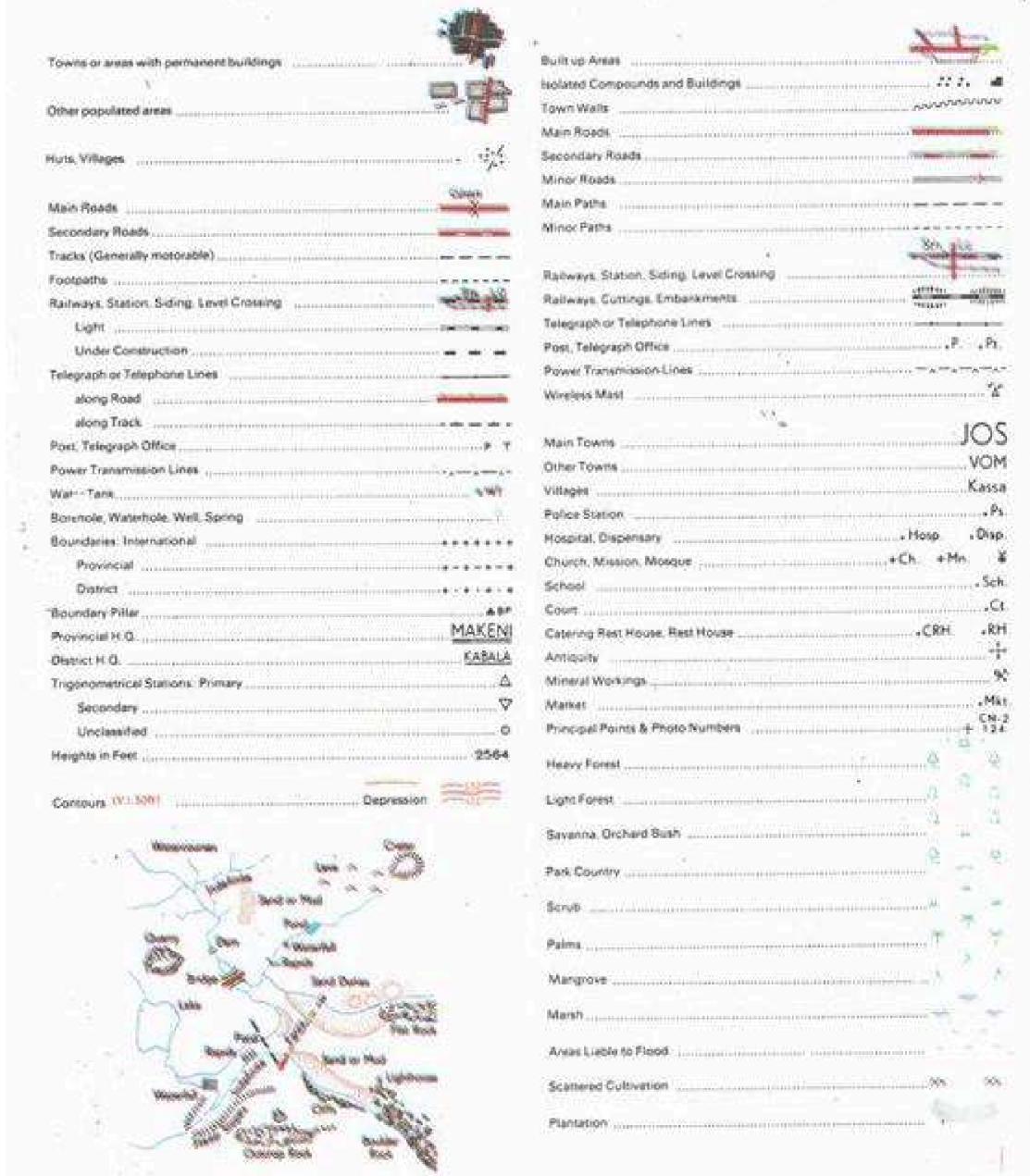
## Conventional signs on survey maps

## Sierra Leone

1:50 000

Nigeria

1:50 000



*Figure 16.5 Conventional Symbols on maps.*

The marginal information constitute those information found along the margin of a map and are useful information telling readers how to explain and accurately interpret the map. They include; 1. Date of publication  
2. Boundary diagram.

- 3. Reliability
  - 4. Sheet history
  - 5. Legend
  - 6. Title
  - 7. Sheet Name .
  - 8. Sheet Number .
  - 9. Series Name .
  - 10. Scale .
  - 11. Series Number .
  - 12. Edition Number .
  - 13. Index to Boundaries .
  - 14. Adjoining Sheets Diagram .

15. Elevation Guide .
16. Declination Diagram .
17. Contour Interval Note .
18. Spheroid Note .
19. Grid Note .
20. Projection Note .
21. Vertical Datum Note .
22. Horizontal Datum Note .
23. Control Note .
24. Preparation Note .
25. Printing Note .
26. Grid Reference Box .

## **Summary**

In this chapter, the following have been discussed; · Map is a geographic representation of all or parts of the earth drawn to scale usually on a flat medium.

- We have two broad types of map namely mental map and cartographical map · Map shows the location of features and places on the earth surface.
- Map and plan differs. Although plans are maps; however they differ from maps generally because they cover only very small areas.
- We have three types of map scale, namely Representative Fraction, Statement Scale and Linear Scale.
- Conventional symbols and marginal information help us to adequately interpret and explain maps.

## **Revision Questions**

### **Objective Questions**

1. The straight distance between two points on a map is 10centimetres, and the corresponding distance on the ground is 2 kilometres. What is the scale of the map in Representative Fraction?
  - A. 1:2,000,000.
  - B. 1:20, 000
  - C. 1: 200,000
  - D. 1:2,000
2. What is the actual length on the ground of a road measured as 8.4 centimetres on the map with a scale of 1:25,000
  - A. 2 Kilometres B. 2.4 Kilometres C. 2.1 Kilometres D. 8.4 Kilometres
  3. The subdivision to the right of zero on a linear scale that enables you to determine distances in whole unit is called
    - A. The primaries.
    - B. The secondaries
    - C. The first subdivision
    - D. The tertiary
  4. Another name for linear scale is;
    - A. Bar Scale
    - B. Convertible scale
    - C. Statement scale
    - D. Linear rule
  5. Map that shows natural and manmade features of a particular area.
    - A. Topographical map
    - B. Climatic map
    - C. Base map
    - D. Aeronautical map
  6. Nautical map are used by;
    - A. Sailors
    - B. Pilots
    - C. Geologists
    - D. Architects
  7. Which of the map scale type changes when a map is reduce or enlarged photographically?
    - A. Statement scale.

B. Representative Fraction C. Linear Scale D. None of the above.

8. Example of small scale map is;

*A. Plan B. Topographical map C. Atlas D. Cadastral map.*

- 9. One important advantages of Representative Fraction is that; A. It can be applied to any unit of measurement.**
- B. It changes when the map is reduced photographically C. Both kilometre and miles can be shown conveniently on it.**
- D. Easy to express in any language 10. The followings are marginal information except;**

*A. Date of publication B. Sheet history C. Reliability D. Expiry date*

*Answers*

1. C 2. C 3. A 4. A 5. A 6. A 7. C 8. C 9. A 10. D

### **Essay Questions**

1. Define map and states its importance.
2. List the various types of map we have.
3. Enumerate five usefulness of linear scale
4. Differentiate between conventional symbols and marginal information
5. Construct a linear scale of kilometres and tenth of kilometres for the following R.F Scale; i.  
1:25,000  
ii. 1:50,000  
iii. 1:100,000