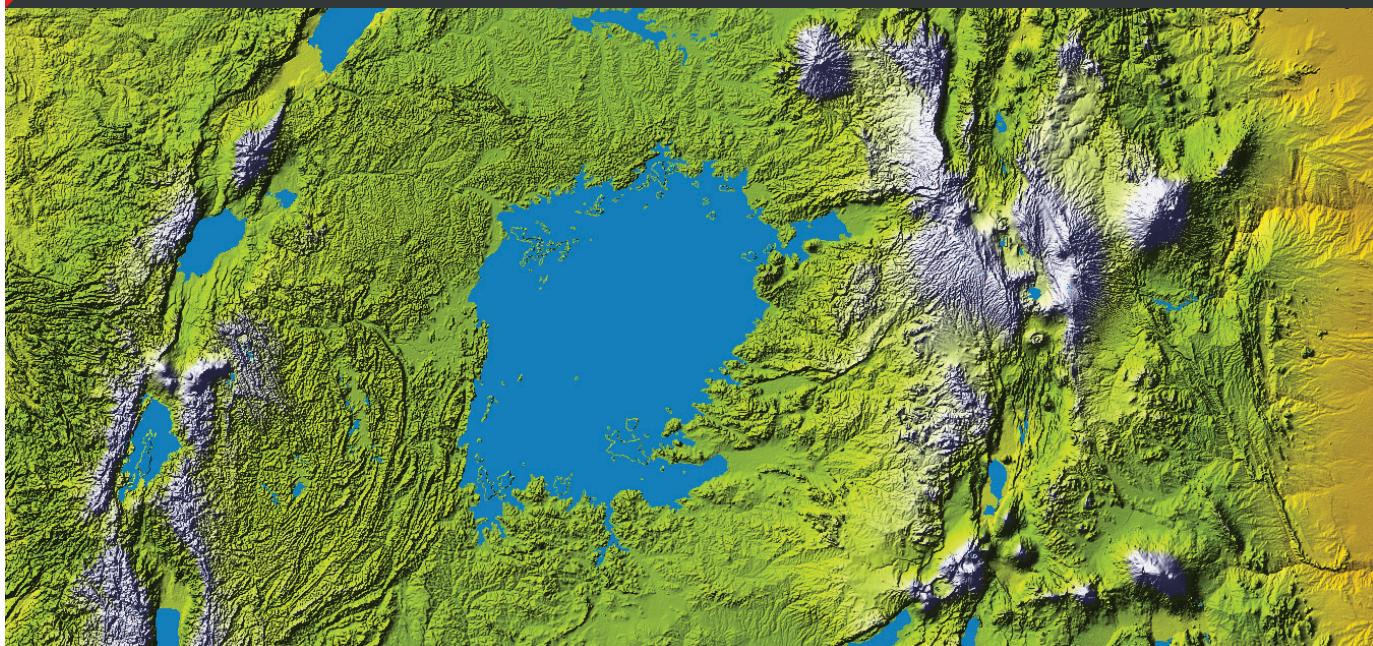


**PROTOTYPE**



# **GEOGRAPHY TEXTBOOK**

## **SENIOR ONE**



**LOWER SECONDARY  
CURRICULUM**



**PROTOTYPE**



# **GEOGRAPHY TEXTBOOK**

## **SENIOR ONE**



**LOWER SECONDARY  
CURRICULUM**



Published 2020

This material has been developed as a prototype for implementation of the revised Lower Secondary Curriculum and as a support for other textbook development interests.

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## Preface

This Learner's Textbook has been written in line with the revised subject syllabus. The knowledge and skills which have been incorporated are what is partly required to produce a learner who has the competences that are required in the 21st century.

This has been done by providing a range of activities which will be conducted both within and outside the classroom setting. The learner is expected to be able to work as an individual, in pairs and groups according to the nature of the activities.

The teacher, as a facilitator, will prepare what the learners are to learn and this textbook is one of the materials which are to be used to support the teaching and learning process.



**Associate Professor Betty Ezati**

Chairperson, NCDC Governing Council

# Acknowledgements

National Curriculum Development Centre (NCDC) would like to express its appreciation to all those who worked tirelessly towards the production of the Learner's Textbook.

Our gratitude goes to the various institutions which provided staff who worked as a panel, the Subject Specialist who initiated the work and the Production Unit at NCDC which ensured that the work produced meets the required standards. Our thanks go to **Enabel** which provided technical support in textbook development.

The Centre is indebted to the learners and teachers who worked with the NCDC Specialist and consultants from Cambridge Education and Curriculum Foundation.

Last but not least, NCDC would like to acknowledge all those behind the scenes who formed part of the team that worked hard to finalise the work on this Learner's Book.

NCDC is committed to uphold the ethics and values of publishing. In developing this material, several sources have been referred to which we might not fully acknowledge.

We welcome any suggestions for improvement to continue making our service delivery better. Please get to us through P. O. Box 7002 Kampala or email us through [admin@ncdc.go.ug](mailto:admin@ncdc.go.ug).



**Grace K. Baguma**

Director, National Curriculum Development Centre

## About this Book

This Learner’s Textbook provides a course in Geography for Senior One, the first year of Secondary school. You should study all chapters of this book. The book has been written following the revised Geography Syllabus for Lower Secondary.

This book is based on an interactive approach to learning. This means that you are expected to learn the geography in this book by doing the activities in each chapter, not just by listening to the teacher or reading the book. The activities are an important part of the book because you will not be able to learn the ideas well unless you do all the activities.

The Senior One Learner’s Textbook consists of nine chapters and each chapter will assist you to understand other chapters ahead. So read the chapters following the order of the book.

As you use this book, you will learn about the nature of Geography as a new subject and the importance of studying it. You are also going to learn how Geography is related to other subjects you are going to study in secondary school. So learning Geography will assist you to understand other subjects in a better way.

In addition, this book will teach you many skills such as drawing, reading and using maps; collecting and communicating information about an area; reading and interpreting pictures and others. You are going to find these useful in your day-to-day activities including in your life after school.

# Chapter One

## Introduction to Geography



Key Words	By the end of this chapter, you should be able to:
<ul style="list-style-type: none"><li>• Environment</li><li>• Human features</li><li>• Human geography</li><li>• Physical features</li><li>• Physical geography</li></ul>	<ul style="list-style-type: none"><li>a) know the meaning of geography and environment.</li><li>b) realise that geography is a study of the relationship between people and their environment, both natural and made by people.</li><li>c) identify and classify the features of the environment by going outside the classroom and observing.</li><li>d) appreciate that the study of geography helps us to understand how our lives are affected by the environment, and how we can preserve the environment so that it remains useful to us.</li><li>e) appreciate that caring for and preserving resources in the local environment, community and country are signs of love for one's country.</li></ul>

## Introduction

In Primary school, you learnt Social Studies, which consists of geography and other subjects. In this chapter, you are going to learn the meaning of geography and the importance of studying it. This will help you make proper plans for using your environment and to give advice to other people about occupations and careers related to geography.

### What is Geography?

#### Activity 1.1: Exploring our environment

Go outside the classroom and do the following:

1. Observe and draw a sketch diagram of the area. Then name all the things you can see in the area.
2. Draw a table to divide the things you have written into natural things and those made by people.
3. Discuss the way you have classified the things in the table and make some changes where necessary.
4. As a class, display the field diagrams you have drawn, the names of features in the area and the table you have made. Comment on each group's work and ask each other questions.
5. Share your views on what you understand by the environment.

You have found out that the area around your school has both natural things and things made by people. All these things are called our surroundings or **environment**. The natural things make up our **physical environment**. All things made by people make up the **human environment**.

#### Activity 1.2: Finding out how the environment affects us

In pairs, study Figure 1.1 and do the following:

1. In your notebook, write down the natural and human features shown in each photograph.
2. Explain how the human activities carried out in each picture are related to the natural environment.

3. In what ways do you think human activities in each picture affect the natural environment?
4. Present what you have written to the rest of the class and comment on each other's work.



(a)



(b)

**Figure 1.1: Photographs showing the geography of different places**

All that you have written about each picture in Figure 1.1 above is the geography of the area where the picture was taken. So when we study geography, we are interested in understanding how the environment affects our lives and how we affect it.

### Activity 1.3: Understanding the meaning of geography

1. In groups, search the internet or carry out library research about what geography is.
2. Write a brief definition and description, and share these with other groups through a class discussion.
3. After agreeing on the meaning of geography, make corrections in your work if necessary.

## Branches of Geography

You have learnt that in geography we study the natural and human environments and how these affect our lives. So geography has two branches, namely physical geography and human geography.

### Activity 1.4: Exploring the nature of geography

Individually, study the list below showing things in our environment. Copy and fill in the table to show which branch of geography studies each of these things.

#### Things in our environment

towns and cities, weather and climate, roads, rocks, hills and mountains, railways, farms, soils, mines, fisheries, factories, vegetation, rivers, lakes

Physical geography	Human geography

In the above activity, you have realised that each branch of geography deals with a different environment. Think of other things which may be studied in each branch of geography. Make a list and share it with your classmates.

## The Value of Studying Geography

### Activity 1.5: Relating geography to your own life

In groups:

1. Discuss how studying geography may benefit you, your community and country.
2. Write down the benefits in your notebooks.
3. Discuss what you have written with other groups.

Studying geography has several benefits. These include helping us make wise use of our environment and conserving it for the future. It gives practical skills in making and using maps, and collecting and presenting information about our surroundings; and creates awareness about other

parts of the world. You will find out more about the value of the subject as you study it.

## How the Environment Affects Us

You are probably aware that most of the things we do in the places where we live depend mainly on the environment we live in. You are going to understand this better as you end this chapter.

### Activity 1.6: Exploring how you relate with the environment

1. Identify and make a list of the ways you and your family use the environment around your home.
2. How do the activities you carry out affect the local environment?
3. Think of any other place you know or you have read about where people use the environment in ways which are different from those in which you use it. What kind of environment is in that place, and how is it different from the one where you live?
4. Write a plan for caring for and conserving the natural environment in your home area so that it remains useful to you and the people who will live there in future.
5. In a discussion, share your action plan with the rest of the class so that you comment on each other's views.

### Activity of Integration

Imagine your friend has completed high school. Among the subjects he/she has studied is Geography. He/she needs your advice on the occupations he/she can engage in. Write a letter advising him/her on how he/she can use the knowledge and skills learnt in Geography to earn a living.

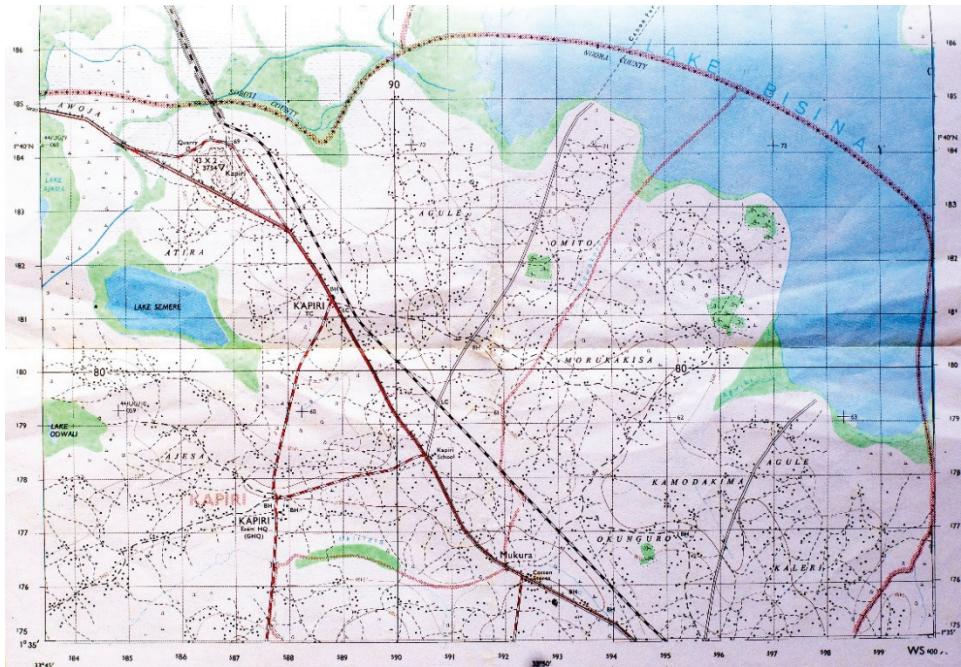
## Chapter Summary

In this chapter, you have learnt that:

1. Geography deals with studying how we are related to our environment.
2. The environment is all the physical and built features around us.
3. Geography has two branches: physical geography and human geography.
4. Studying geography benefits you, your community and the country.
5. Most of the things we do, including the economic activities we carry out, are mainly influenced by the natural environment.
6. Our activities can affect the environment negatively.
7. We need to use our environment wisely so that it remains useful to us.

# Chapter Two

## Showing the Local Area on a Map



Key words	By the end of this chapter, you should be able to:
<ul style="list-style-type: none"> <li>• Compass rose</li> <li>• Landmarks</li> <li>• Map</li> <li>• Mental map</li> <li>• Scale</li> <li>• Symbols</li> </ul>	<ol style="list-style-type: none"> <li>a) know what a map is and how this can be used to show places.</li> <li>b) understand that a map can tell us about places we have never seen.</li> <li>c) understand that maps shrink or reduce the real sizes of things to fit them on paper.</li> <li>d) draw a sketch map of your school or local area.</li> <li>e) use and interpret symbols, and identify features on a map using symbols.</li> <li>f) follow a map to get to places in the local area.</li> <li>g) use a map of the local area to find out information about people living in the area.</li> </ol>

## Introduction

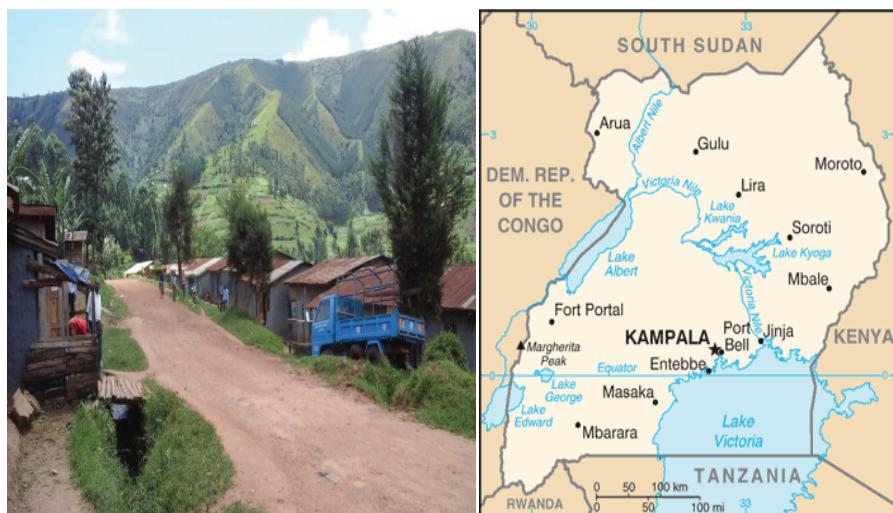
There are many physical and human features in the area where you live and around your school. Can you name some of them? In this chapter, you are going to learn the main physical and human features of a local area and how these can be shown on a map.

## What is a Map?

Think of the route you always follow as you travel from your home to the market or place of worship. Do you always use a map? Every day we use maps to move to different places. These maps are not always drawn but exist in our minds. They are called **mental maps**. There are also maps drawn on flat surfaces such as paper. These represent part of the earth or the whole earth. In Topic 3, you will learn that reading and using maps is one of the ways in which we can find out information about the earth.

### Activity 2.1: Understanding what a map is

Study Figure 2.1 and do the activity that follows.



(a)

(b)



(c)



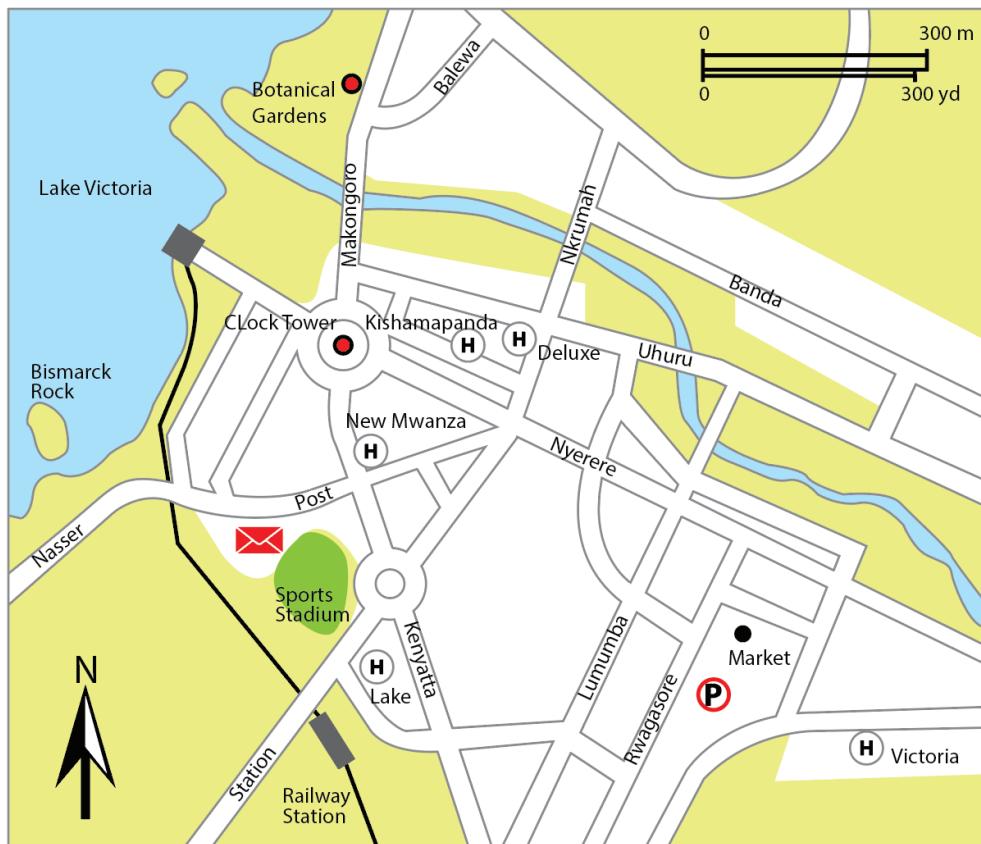
(d)

**Figure 2.1: Maps and photographs**

1. Decide which of the above drawings are maps. Give reasons to support your views.
2. Which ones are photographs? Give reasons to support your views.
3. What kind of features can be shown on maps?
4. How can a photograph be useful when constructing a map of an area?
5. Write at least one sentence explaining what a map is and share it with the rest of the class.

A map is a special kind of drawing of the earth's surface. It can show the whole world or part of it. Again, you have learnt that we represent features on a map by means of outlines but not as pictures. The features on the ground are drawn in **plan** as if the observer is seeing them directly from above.

On a map, real features and places are represented using **symbols**. These may include signs, colours, shades and abbreviations. How do features appear on a photograph? The place on the map where all symbols are explained is called a **key**. You are going to learn more about these later in this topic.



**Figure 2.2: Map of Mwanza Town-Port**

### Activity 2.2: Representing features on a map

Look at Figure 2.2 above and do the following:

1. Identify the symbols used to represent the hotels, botanical garden, market, stadium, railway line, lake, rocky island and ferry terminal.
2. In your notebook, construct a key for the map.

## Mapping a Local Area

You now know what a map is and how physical and built features can be shown on a map. Every time you move to different places, there are certain important features which you see along the way. These assist you in tracing the place you are going to. Think of those features and make a list of them. The features you have listed are called **landmarks**.

**Activity 2.3: Drawing a map of a small area**

1. Draw a map to show a visitor to your area how to get to your school.
2. Exchange your map with your neighbour.
3. Discuss and comment on each other's map.
4. Share your comments with the rest of the class.

When we draw a map of an area such as a village, town or school, we put only the most important features in the area. These enable us to follow routes in the area and to find where certain things are located.

***Qualities of a good map***

Not every map drawn can be used to find our way about or to describe an area. When we draw maps we take great care to ensure that other people can read, interpret and use our maps. Such maps are called good maps.

**Activity 2.4: Identifying qualities of a map**

1. In pairs, draw a map showing the route from your school to home. The map should show the physical and human features found along the way.
2. Swap the maps so that each can find out where the other lives.
3. Can you follow that map and reach your friend's home?
4. What things on the map can assist you in reaching there?
5. Ask your friend to describe the things on your map that can help him/her to follow the map up to your home.

For us to be able to use maps to move around places or to guide other people to places they have never been to, or to describe an area, the map should have certain features that assist us in doing so. In the discussion with your friend, you may have pointed out that you could follow a map to reach each other's home using a map title, key and a **compass rose** or direction finder. These are called qualities of a good map.

**Activity of Integration**

Using the knowledge you have got from this topic, write a letter of not more than one page to your friend in another school explaining how they can produce a map of their home area and how they can use it to understand the local geography of the area.

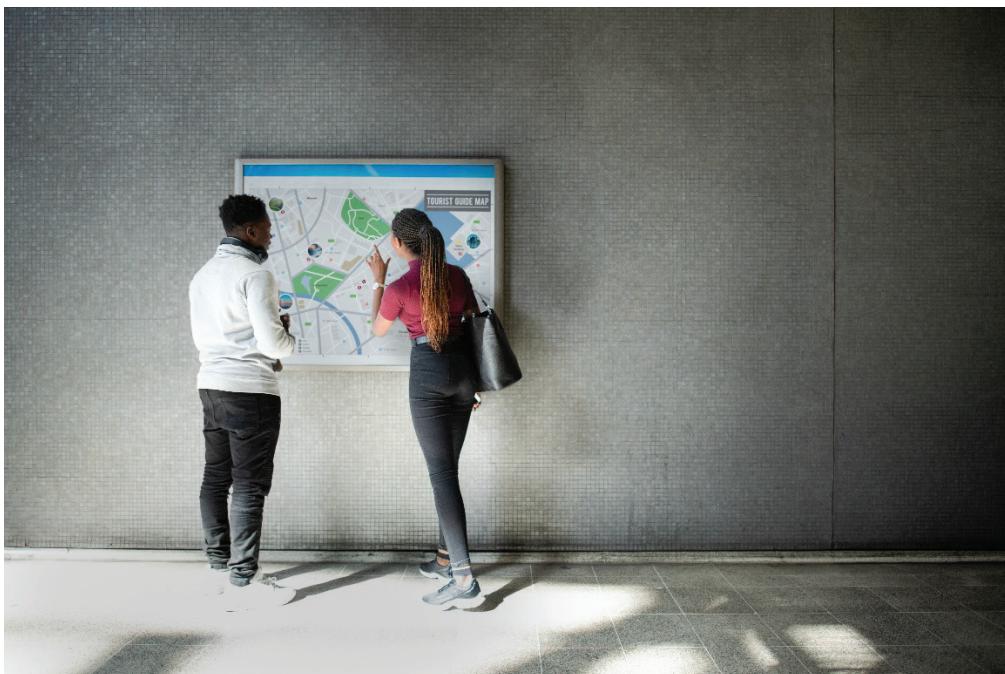
## Chapter Summary

In this chapter, you have learnt that:

1. A map is a special drawing of the earth's surface showing features in plan.
2. We use maps in our day-to-day activities.
3. When drawing a map of any area, we do not include everything in the area.
4. For a map to be useful to us, it should have special qualities.

# Chapter Three

## Maps and Their Use



By the end of this chapter, you should be able to:

- a) draw a sketch map of your school and/or local area.
- b) use and interpret symbols and identify features on a map using a key.
- c) use basic compass points to find directions or features on a map.
- d) follow routes on a map.
- e) draw a map using a simple scale and using a scale on a map.
- f) use letter and number coordinates or bearings and directions to locate places on a map.
- g) locate places on an atlas map using latitude and longitude and describe the places from information on the map.
- h) understand the difference between a map and a photograph.
- i) understand that there are many types of maps on different scales.
- j) use a linear scale and representative fraction to estimate distance, area and size of features on a map.

## Introduction

In Chapter Two, you learnt how you can use a map to represent an area. Can you think of other ways in which maps are useful to us? In this chapter, you are going to learn the main features of a map and how a map is different from the real world or part of the earth it represents.

### Map Scale

In order to represent features and places on a map, we reduce their actual size by a certain amount. To understand this, let us see how scale is used in pictures or photographs.

#### Activity 3.1: Understanding scale



**Figure 3.1: Joel**

Look at the picture of Joel in Figure 3.1 and do the following:

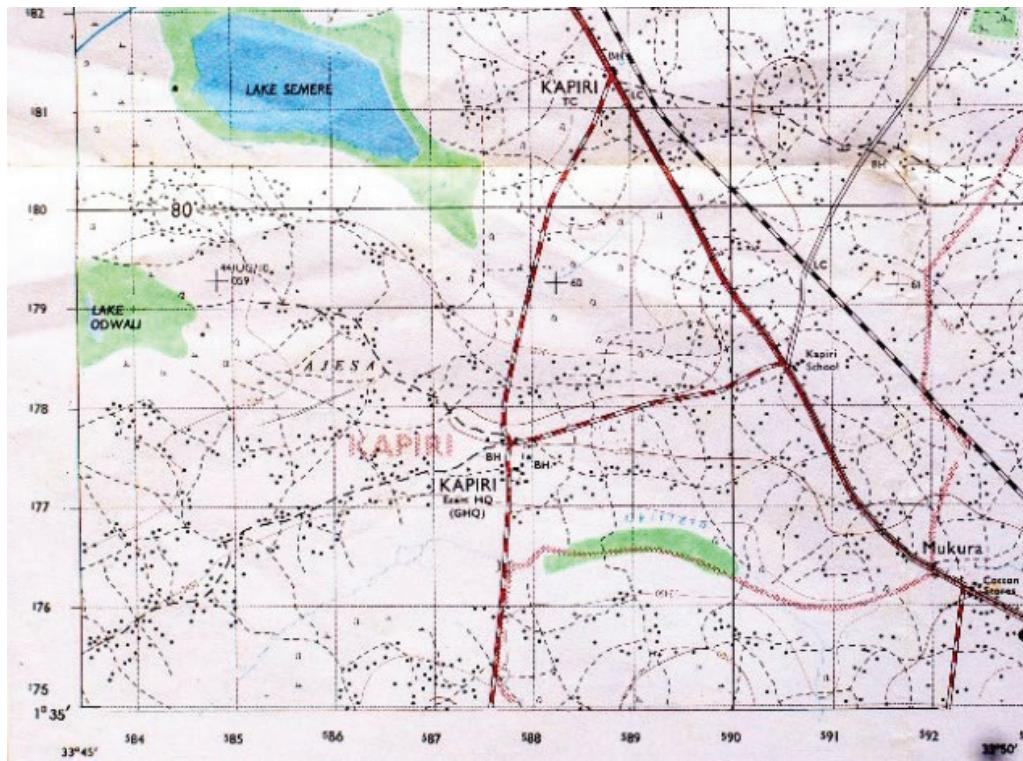
1. Measure the length of his arm and leg in centimetres.
2. Measure his height in centimetres.
3. Do you think that is the real size and height of Joel?
4. If it is not, explain what has happened to Joel's real size.

When a photograph is taken, the size of the object is reduced just as you have seen in the case of Joel above. In reality, Joel is much bigger and taller than his picture. He is about 150 cm tall. In the photograph he is only 5 cm tall. This means that 1cm on the photograph stands for 30 cm on the real person. The photograph is thirty times smaller than his real size. That is to say, every part of Joel's body was reduced 30 times to fit in the photograph. Therefore, the scale of the photograph is 1:30 (1 cm to 30 cm.)

In the same way, when you look at a map of any place, you realise that the features and place represented are much smaller than their actual size. In order to fit real features on a map, we reduce their size by a certain amount. The number of times a real feature is reduced in order to fit on paper is called a **scale**.

## Types of Scale

Map scale can be expressed in different ways. Such different ways of expressing the scale are called **types of scale**. Whichever way it is stated the scale can assist you in using the map. In Activity 3.1 above, you have learnt that the scale used to fit Joel in the photograph is 1:30. This means that every part of Joel on the photograph is 1/30 its real length and size. This is called the **representative fraction scale**. You will find this scale on many maps you are going to use in this chapter. It tells you how much the area shown on the map has been reduced. Thus, you can use it to find out how big the place on the map is on the real ground.



**Scale 1:50,000**

**Figure 3.2: Part of the map of Kapiri**

On most maps, a scale is usually represented as a straight line divided into several numbered units. This is called a **linear scale** or bar scale. It helps you to find how far one place is from another. It also helps you to measure distance along roads, railways and other linear features on the map.



**Figure 3.3: A linear scale**

Find this out on the map in Figure 3.2. Measure the length of each unit on the scale. What distance does one centimetre represent? You have probably found out that every 1 cm on the line scale stands for 500 m or half a kilometre on the ground. If you convert kilometres to centimetres, you will find that 1 cm stands for 50,000 cm. Express it as a representative fraction and see what it comes to. This means that on the map, every 2 cm represent 1 km.

### Activity 3. 2: Exploring scale

In groups, go outside the classroom and do the following:

1. Using a metre rule or a measuring tape, measure the length and width of your classroom block.
2. Draw a map of the classroom block on paper to scale.
3. State the scale you have used to draw the whole block on paper as:
  - i) a representative fraction; and
  - ii) a linear scale.

A scale can also be expressed in words. Look at Figure 3.2 again. Write its scale, 1: 50,000 in words. You could have written it as “Every one unit on the map represents fifty thousand units on the ground where the map was taken from” or “One centimetre on the map represents fifty thousand centimetres”. What you have written is called a **statement scale**.

## Using the Linear Scale to Measure Distance on a Map

Whenever we are going on a journey, we need to get prepared. We need to estimate the amount of money and time we shall spend. This is not always easy if we do not know the distance we are going to travel. When we have a map of the area, it is possible to estimate the whole journey by using its linear scale. What we need is to know the scale of the map.

### Activity 3.3: Applying scale

In groups:

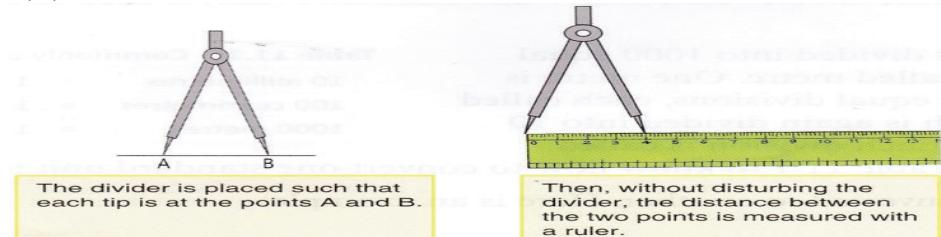
1. Discuss and suggest the tools you need to measure the distance of the walkway or footpath from your classroom to the head teacher’s office.
2. Get any one of the tools you have suggested, move outside and measure that distance.
3. Share your results with other groups.
4. Are all your results the same? If not, why do you think they are different?

You could have noted that the walkway or footpath you have measured is not straight. It has bends or corners. Even on maps, there are several linear features with several bends and corners. These are called **winding**

**features.** We can measure the distances covered by these features using different methods. These include using a pair of dividers, thread or the edge of a piece of paper.

*Using a pair of dividers*

(a)



(b)



**Figure 3.4: How to measure distance using a pair of dividers**

**Activity 3.4: Using dividers**



**Figure 3.5: A road with bends**

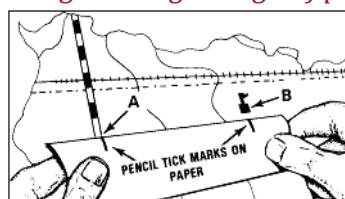
Get a pair of dividers, a foot ruler (scale) and a pencil and do the following:

1. Look at Figure 3.5. From where the road begins, identify a part which is almost straight, mark it off using a pencil and give it a number.
2. Repeat this until you have divided the whole road into fairly straight parts.
3. Using a pair of dividers, measure the length of the first part.
4. Transfer the pair of dividers onto the foot ruler. Place the left hand pointer of the divider at zero cm and read off the length indicated by the right hand pointer.
5. Record the length in your notebook.
6. Repeat steps (iii), (iv) and (v) above until you have measured all parts of the road.
7. Add up all distances measured in order to get the total length of the road.
8. Share your answer with the rest of the class and see whether you all have got the same length.

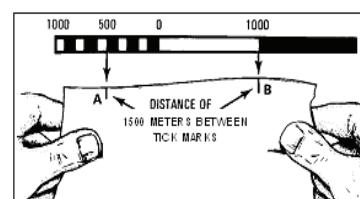
You can use the above method to measure the distance along a road, railway or river. Think of other features which you can measure using the linear scale. Remember that in the case of a map, you read distance against the linear scale instead of a foot ruler. The linear scale on the map is marked with whole numbers from 0 (zero) towards the right, i.e. 1,2,3,4 kilometres and so forth.

We use this side of the scale to measure and read off distances which are in complete whole numbers. To the left of 0, the scale is divided into 10 equal parts. Each of these is 1/10th (one tenth) of a kilometre. We use units to the left of zero to measure distances which are less than a kilometre. Using this method, try to measure the distance of any one road on the map in Figure 3.2.

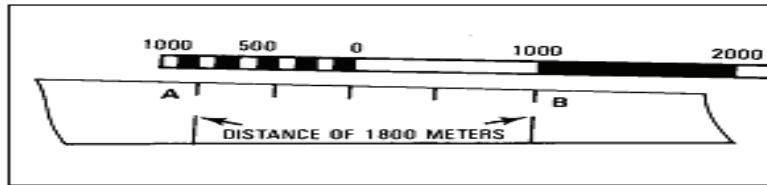
#### *Using a straight edge of paper*



Step 1



Step 2



Step 3

**Figure 3.6: Using an edge of paper to measure distance**

#### **Activity 3.5: Measuring distance with a piece of paper**

In pairs, get a pencil, foot ruler and a small but long piece of paper with a straight edge.

Using Figure 3.5 again, do the following:

1. Towards the end of the left hand side of the edge of paper, put a mark to show the starting point of the road and place it along the road with the marked point against the starting point of the road.
2. Hold the paper firmly against the starting point and turn it along the road until part of the road disappears underneath the edge of paper.
3. Put a mark on both the paper and map at the point where the road leaves the edge of paper. When you do this, then you have measured off a fairly straight portion of the road.
4. Starting at the point you have marked, repeat steps (2) and (3) until you reach the end point of the road and mark it on the edge of paper.
5. Transfer the edge of paper onto the foot ruler and read off the length of the road.
6. Compare your result with the one you got in Activity 3.4.

#### *Using a string or thread*

We can measure distance on a map using a string or cotton thread. To understand this, try the following activity.

#### **Activity 3.6: Measuring with a thread**

1. Carry out library research on how we can use a string or thread to measure distance on a map.
2. Make notes pointing out all the steps involved.

3. Share your notes with the rest of the class.
4. Why do you think it is advisable to use cotton thread when measuring distance?
5. Use the string or thread method to measure the distance along any one road on the map in Figure 3.5 above.

### *Using the linear scale to calculate area on a map*

When using a map, we may be interested in knowing how big certain features are, e.g. a farm, forest, swamp, township or an airfield. Some of these features have shapes which are similar to those of polygons, which you have learnt about in mathematics. These are called features with **regular shapes**. Other features have shapes which do not resemble any polygon. These are called **irregular shapes**. Look at the map of Uganda and find out the kind of shape lakes Victoria and Kyoga have. Whatever shape a feature may have, we can estimate its size or area.

### *Using a mathematical formula*

In Mathematics, you learnt how to calculate the area of different shapes, e.g. a square, rectangle, triangle, circle and others, using certain formulae. Now, you are going to use the same formulae to estimate the area of different features on a map.

#### **Activity 3.7: Applying formulae**

In small groups, get a metre rule or any other measuring tool and do the following:

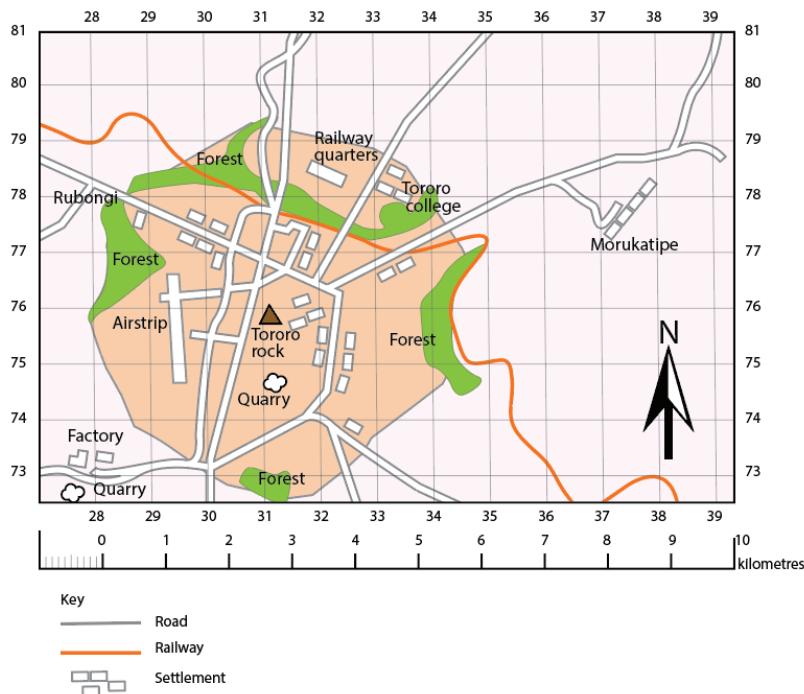
1. Look around your classroom. What kind of shape is it?
2. Draw its outline in your notebook.
3. Calculate the area of the classroom.
4. Explain how you have got the area.

You have noted that your classroom resembles a certain shape. So you have used the formula for calculating the area of that shape to get the area of the classroom. In the same way, we use mathematical formulae to calculate areas of features with regular shapes. Remember to use the linear scale in order to get the measurements or dimensions of the features.

### Activity 3.8: Using a formula on a map

In pairs, study Figure 3.7 and do the following:

1. Calculate the:
  - i) area of the aerodrome
  - ii) area of the railway quarters.



**Figure 3.7: Sketch map of Tororo**

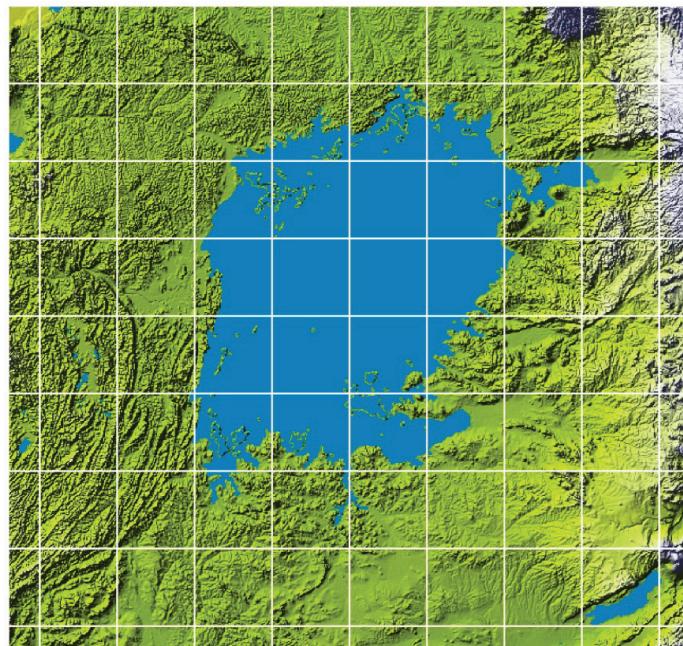
#### Using the map grid

Think of physical and human features in the area around your school or home area with irregular shapes. Make a list of those features. If we want to find out the area of such features on a map, we can use the **map grid** or graph paper method. On most topographic maps, each grid square is usually  $1 \text{ km}^2$ . So the total number of squares covered by the feature is equal to the area of the feature.

**Activity 3.9: Estimating area**

Individually, look at Figure 3.8 and:

1. identify the area covered by the lake.
2. count all grid squares which are fully covered by the lake (assume that each square has an area of 1 square kilometre). Write the number in your notebook.
3. count all squares which are touched but not fully covered by the lake and divide their number by 2. Write the result in your book. Why do you think we divide these by 2?
4. add the values you have got in steps (2) and (3) above. Your final result is the area of the lake.
5. state the formula you have used to get the area of the lake.
6. swap your results with your friend, and then discuss them with your teacher.



**Figure 3.8: Map of Lake Victoria**

You could have found out that you all got much the same answer for the area of the lake. Any minor differences have resulted from the way you have counted the grid squares covered by the map. You can follow the

same steps and also use the same formula you have used above to estimate the area of any feature on a map with an irregular shape.

### *Using a mathematical formula*

Alternatively, we can divide the irregular feature into several shapes whose areas can be calculated using known mathematical formulae. Do Activity 3.10 in order to understand this.



**Figure 3.9: Map of a swamp**

### **Activity 3.10: Applying formula to irregular features**

Look at Figure 3.9 and do the following:

1. Divide the swamp into figures with regular shapes e.g. rectangles, squares, triangles, semi-circles and give each figure or polygon a number.
2. Measure the dimensions of each polygon in centimetres.
3. Using a suitable formula, calculate the area of each polygon.
4. Add the areas of all polygons to get the total area of the swamp.

On a map we use the linear scale to measure the dimensions of the polygons we create from the area covered by the feature with an irregular shape.

## How to Find Places and Features on a Map

On the surface of the earth and on maps, different features are found in different places. To be able to use the map, you need to describe where features are found. Now you are going to learn how you can do this.

### Activity 3.11: Identifying features on a map

Look at Figure 3.2 again and do the following:

1. Identify:
  - i) any three rivers shown on the map.
  - ii) one permanent swamp on the map.
  - iii) one place where a school is found.
2. Explain how you have been able to find those features.

You have noted that certain features can be found using words written against or close to them. These are the **names** or labels of such features.

## Grid and Grid References

Topographic maps have a network of lines drawn all over them. These are called grid lines. They cross one another at right angles and form a grid of squares. These lines can also help you to find features anywhere on the map. The vertical lines are called '**eastings**', as they increase in value as you move east on the map. The horizontal lines are called '**northings**' as they increase in value as you move north on the map (see Figure 3.10).

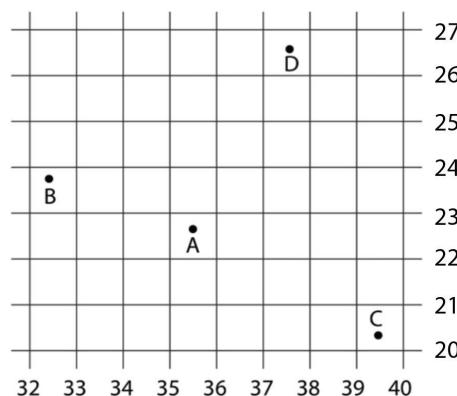
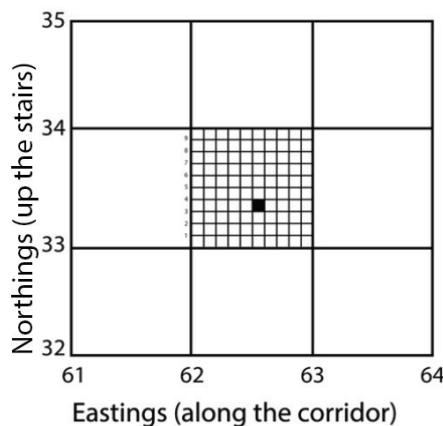


Figure 3.10: Map grid

Each line is identified by a two-figure number, which appears in ascending order. Eastings are always read before northings when stating a location. To remember this order, say... *along the corridor, THEN up the stairs*. The number formed by eastings and northings is called a **grid reference**. It consists of an even number of digits. It is similar to a coordinate in mathematics.

Grid references are of two types, i.e. four-figure and six-figure references. A grid reference is got by stating how far east and north the feature extends. For instance, in Figure 3.10, point **A** lies 36 east and 22 north. The four-figure grid reference for point A is **3522**.

You can also find and state the position of a feature using a six-figure grid reference. You can get this by adding a figure to the easting and a figure to the northing of the four-figure grid reference. The third figure of each reading is one-tenth of a whole number. To get this, divide the grid square into ten equal small squares along the eastings and ten squares along the northings.



**Figure 3.11: Six-figure grid reference**

The feature you are trying to locate will lie in one of these tiny squares. Still remembering to go along the corridor and up the stairs, work out the extra numbers you need and put them into your four-figure grid reference, like **626 334** for the feature shown in Figure 3.11 above.

### Activity 3.12: Using grid reference

In pairs, look at Figure 3.10 and:

1. state the four-figure grid reference of points B, C and D.
2. state the six-figure grid reference of points A, B and C.
3. write at least two sentences explaining the advantages of using four-figure and six-figure grid references to locate features on a map.

## Compass Directions

How would you describe to a friend the route from your home to the nearest trading centre?

You would probably describe it using words like at a certain point “turn left or right”. However, you could do this in a better way by describing the route map. When using a map, we use compass directions.

### Activity 3.13: Revising a compass

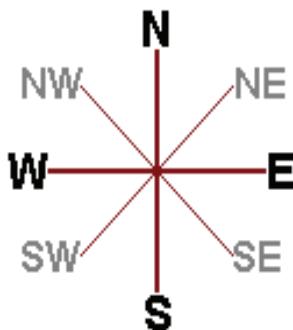
Using your knowledge from Primary school:

1. explain what you understand by a compass.
2. draw a diagram of a compass showing the cardinal points.

The line diagram you have drawn in Activity 3.13 is not the actual compass. It is called a **compass rose** or a direction finder. To be able to use the compass to find directions more accurately, we further subdivided the cardinal directions into four other directions. These are called **intermediate directions** or inter-cardinal points. They are northeast (NE), southeast (SE), southwest (SW) and northwest (NW).

**Note:** Inter-cardinal points combine two directions, e.g. northeast, meaning that you move east, then north at the same time. In other words, northeast lies north of east.

### Activity 3.14: Subdividing a compass



**Figure 3.12: An eight-point compass rose**

Copy the compass rose in Figure 3.12 into your notebook.

1. Using a protractor, measure and state:
  - i) the angles between nearby cardinal directions.
  - ii) the angles between cardinal directions and intermediate directions.
2. Divide the angles between cardinal directions and intermediate directions halfway using straight lines and measure the angle of each.
3. Name the new directions created by subdividing the intermediate directions.

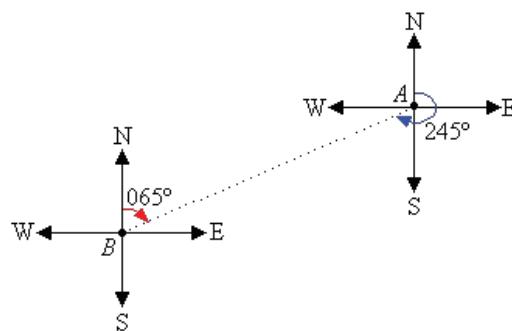
In Activity 3.14, you have come up with a compass rose with 16 points. This is called a **sixteen-point compass rose**. The new directions you have got combine three directions. These enable you to find and describe the directions of all places and features accurately.

To determine the direction of one feature or place from another, draw a compass rose at the point from which you want to describe direction. Then draw a straight pencil line connecting the two points. Read off the direction corresponding or closest to the point whose direction you want to find.

## Bearing

You can also describe the position of a feature or place from another using their distance apart in the form of an angle. The angle is measured clockwise from the north line. This angular distance is called a **bearing**. It is stated with three figures. For angles less than  $100^\circ$  we write a zero before the measured angle, for example, **045°** instead of **45°**. To understand this better, follow the steps below.

To determine the bearing of one point from another, draw a compass rose at the centre of the point from which you want to determine the bearing. Then draw a line joining the two points. Using a protractor, measure clockwise the angle between the north and the line you have drawn joining the two points. Look at Figure 3.13 and state the bearing of A from B and of B from A.



**Figure 3.13: How to determine bearing**

### Activity 3.15: Finding bearing

Study the sketch map of Tororo in Figure 3.7 and do the following:

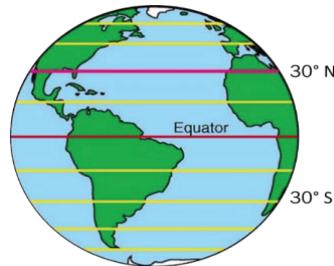
Determine:

1. The bearing of the cement factory from the quarry in Tororo Municipality.
2. The bearing of Tororo College from the ginnery near Mudodo River.
3. The bearing of the ginnery near Mudodo River from Tororo College.

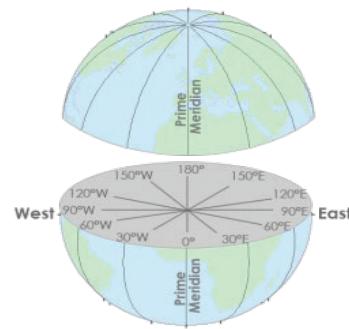
## Latitude and Longitude

The maps you have used above all show small areas with great detail. These are called **large scale** maps. On the other hand, a map showing your country, East Africa or the whole world shows a very large area but with little detail. These are called **small scale** maps. When we want to describe the exact positions of features or places on small scale maps, we use latitude and longitude.

### *Lines of latitude*



**Figure 3.14: (a) Lines of latitude**



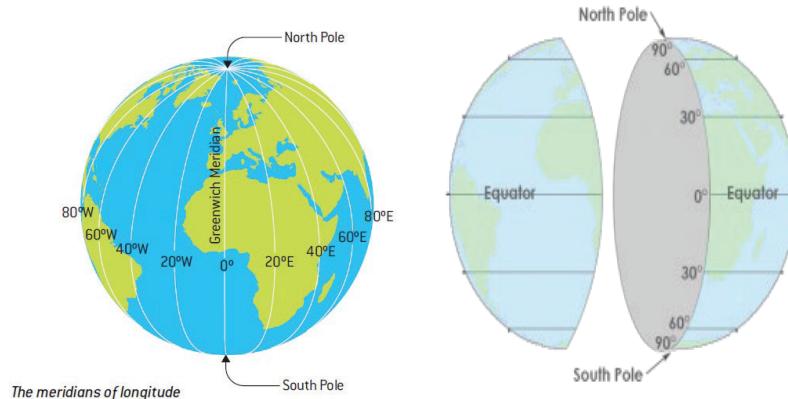
**(b) How the equator divides the world**

### Activity 3.16: Understanding latitude

In pairs, look at Figure 3.14 and do the following:

1. Discuss what you understand by latitude.
2. In your notebook, write at least two sentences explaining latitude.
3. Suggest how lines of latitude are determined and marked on maps.
4. Share what you have written with the class.

Latitude measures how far north or south of the equator a place is located. The equator is the starting point for measuring latitude. For this reason, it is marked as the 0 (zero) degree latitude. It divides the world into two equal parts – north and south, as shown in Figure 3.17 (b). What do we call these parts? The number of latitude degrees increase as we move further away from the equator, all the way up to the 90 degrees latitude at the poles.

*Lines of longitude*

**Figure 3.15 (a): Lines of longitude      (b) How the Prime Meridian divides the earth**

### Activity 3.17: Understanding longitude

In pairs or individually, look at Figure 3.15 and do the following:

1. In your notebook, write at least two sentences explaining what you understand by longitude.
2. Suggest how longitudes are determined and marked on maps.
3. How are longitudes different from latitudes?
4. Share what you have written with the class.

Longitude measures how far a place is east or west of the major vertical line called the **Prime Meridian**. The Prime Meridian runs through Greenwich in England. Because of this, it is also called the **Greenwich Meridian**. It is the starting point for measuring longitude. It is marked as the 0 (zero) degree longitude. It divides the earth into two equal parts – west and east, as shown in Figure 3.15 (b).

### Using latitude and longitude

Lines of latitude and longitude also form a grid system on the map. To find a location on the grid system, simply read the latitude along which a place or feature lies in degrees. Then read the longitude.

At the point where the two lines meet, state the two numbers. These give the coordinates of the feature. For example, in Figure 3.16, Kampala City lies at latitude 0.2 degrees north of the equator and at longitude 32.35

degrees east of the Greenwich Meridian. So the position of Kampala can be stated as  $0.2^{\circ}\text{N } 32.35^{\circ}\text{E}$ .



**Figure 3.16: Map of Uganda with latitude and longitude**

### Activity 3.18

1. Study Figure 3.16 and do the following:  
Using latitude and longitude, find the position of:  
(i) Arua, (ii) Lira, (iii) Mbarara, (iv) Soroti, (v) Moroto and  
(vi)Jinja
2. Now open your atlas and look for the world map showing political units or countries. Using the map:
  - i) Find out the lines of latitude and longitude between which the following countries lie: Angola, Chad, Australia, Ecuador, Uganda, Egypt, India and Iran.
  - ii) Find the cities lying at the following locations:  
 $5.19^{\circ}\text{N } 4.01^{\circ}\text{W}$ ;  $33.56^{\circ}\text{S } 18.28^{\circ}\text{E}$ ;  $38.45^{\circ}\text{S } 62.15^{\circ}\text{W}$ ;  $0.19^{\circ}\text{N } 32.35^{\circ}\text{E}$ ;  
 $1.20^{\circ}\text{N } 103.45^{\circ}\text{E}$ ;  $41.50^{\circ}\text{N } 87.45^{\circ}\text{W}$ ; and  $15.20^{\circ}\text{S } 28.14^{\circ}\text{E}$

## Activity of Integration

Ask your teacher to provide you with a topographic map (scale 1:50000) of the area where your school is found. Study the map and find out places that you would wish to visit if given a chance to go on a geography tour towards the end of the school term.

1. Choose a route that you would follow in order to see a good number of interesting features. Draw a simple map with marked stopover points. Write at least two sentences describing the activities you would do at each stopover point.
2. Determine the distance (in kilometres) your journey would cover from the school to the furthest place you would wish to visit.
3. Estimate the total amount of money you would spend on transport, including the return journey, if the transporter charges 100,000 shillings per kilometre.

## Chapter Summary

In this chapter, you have learnt:

1. that all human beings, including you, move around places using mental and drawn maps.
2. that a map is drawn in plan as if one is looking at features on earth directly from above.
3. that objects or features are represented on a map using symbols.
4. that all features on a map are smaller than their real size because they are reduced using scale.
5. how to draw a map of a local area using symbols and a scale.
6. how to use the linear or bar scale of a map to measure distance and estimate the area or features on the real ground. You can do these using different methods.
7. the difference between small scale and large scale maps.
8. how to find places and the positions of features on maps of different scale.

# Chapter Four

## Ways of Studying Geography

### Govt urged to boost tourism using lakes

**Investment.** South African Airways observes that Uganda is not effectively utilising its water bodies to attract tourists unlike other countries.

BY STEPHEN OTAGE  
 sotage@ug.nationmedia.com

**KAMPALA.** South African Airways has advised the government to copy from previous global tourism destinations and popularise tourism investments around and on the country's water bodies.

Speaking in an interview on Monday, Ms Yogi Birriggwa, the South African Airways Country Manager, said prominent destinations such as Mauritius, Rio-de-Jenairo in Brazil, Southern France, Durban in South Africa and Mombasa in Kenya are popular globally because of their location, investments on and around the water bodies.

She said this makes them attractive and easy to market internationally. "We do not have water sport, no cruises, no weddings, no speed boats, no yachts, no fishing, no beach, and this is what people always ask for immediately they arrive here," she said, adding "You can make a lot of money. Ugandans are doing nothing about it yet they are sitting on a gold mine of opportunities."

She said if someone invested in speed boats between Entebbe and Port Bell of Ggaba beach, the visitors'



Some of the boats at Ggaba Landing Site in Kampala. PHOTO BY STEPHEN OTAGE

unforgettable experiences would market Uganda abroad.

**"Apart from mountain gorillas, Uganda has a lot to offer. If Ssese Islands were in another country, they would be filled with water sports. Southern France, Mombasa and Durban in South Africa are beautifully built around the ocean."** YOGI BIRIGGWA, SOUTH AFRICAN AIRWAYS COUNTRY MANAGER

"When they [visitors] return home, these are the positive stories they will be narrating to their relatives and friends who will, in turn, pick interest in visiting the country," Ms Birriggwa said.

Yesterday, Tourism South Africa, the national body which rebranded South Africa to erase the dark image that had been created by Apartheid, sponsored 10 successful women from Uganda to visit South Africa's prominent tourism destinations. This was aimed at turning them into ambassadors who will influence similar investments to come to Uganda or mentor indigenous Ugandans to set up similar businesses.

The one-week tour is designed to see the beauty of Africa before returning to visit the Malaria-free Pilanesberg National Park, five star accommodation at Saxon Hotel, Intercontinental, Oliver Reginald Tambo Hotel, the Palace Hotel Sun City and 12 Apostles, among other destinations.

Key Words	By the end of this chapter, you should be able to:
<ul style="list-style-type: none"> <li>• Fieldwork</li> <li>• Observation</li> <li>• Questionnaire</li> <li>• Aerial photograph</li> <li>• Ground photograph</li> <li>• Horizon</li> <li>• Oblique photograph</li> </ul>	<ol style="list-style-type: none"> <li>a) understand how to use and apply different techniques used in fieldwork and apply these to studying a local area.</li> <li>b) use maps, aerial images, photographs, graphs and charts to communicate data.</li> <li>c) analyse and present statistics gathered in fieldwork.</li> <li>d) write conclusions to summarise fieldwork.</li> <li>e) know the three different angles from which photographs can be taken and the terms used to describe the different parts of a photograph.</li> <li>f) appreciate the effect of perspective on oblique photographs.</li> <li>g) understand the difference between photographs and maps.</li> <li>h) recognise features on a photograph and make a sketch of an area from a photograph.</li> <li>i) appreciate that fieldwork and photographs are important because geography is the study of the real world.</li> <li>j) use fieldwork to study a local area</li> </ol>

## Introduction

In this chapter, you are going to learn how and where you can find geographical information. After reading about and using the different sources of geographical information, you will be able to suggest which source is most important and why.

### Activity 4.1: Finding out information

In pairs, study Figure 4.1 and do the activities that follow:

(a)

Year	Amount of crop produced in tonnes		
	Paddy rice	Maize	Wheat
2010	25,070	23,000	16,670
2012	23,040	25,000	14,290
2014	24,950	25,040	15,710
2015	24,880	23,530	16,000
2016	25,280	23,180	16,830

(b)

### Govt urged to boost tourism using lakes

**Investment.** South African Airways observes that Uganda is not effectively utilising its water bodies to attract tourists unlike other countries.

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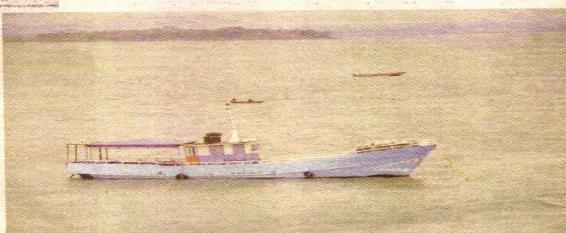
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Some of the boats at Ggaba Landing Site in Kampala. PHOTO BY STEPHEN OTAGE

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The one-week tour is designed to see them through the balloon ride to visit the Malaria-free Pilanesberg National Park, five star accommodation at Saxon Hotel, Intercontinental, Oliver Reginald Tambo Hotel, the Palace Hotel Sun City and 12 Apostles, among other destinations.

(c)



**Figure 4.1: Some sources of geographical information**

1. Summarise the information presented in the table, newspaper extract and photograph.
2. Using the information provided in the table, draw a graph to show the production of any **one** crop from 2010 to 2016.
3. Discuss the advantages and disadvantages of each source of information.
4. In your opinion, which source is most effective in giving geographical information? Give reasons why you think it is the most effective.

## Studying Geography through Fieldwork

### Activity 4.2: Finding out from the field

In groups, go outside the school and:

1. ask people in the local area about the different activities they do.
2. look around and write down the different things you see in the area.
3. write a report about the area studied.
4. through discussion, share your findings with other groups.

You have probably found out from field information about the activities carried out by people in the area around your school. You have also seen the natural features found in the area. The information you collected from the field is the geography of the area around your school. So, the field is one of the sources of geographical information. Visiting an area and collecting information about it is called **fieldwork** study.

### *How can we Study Geography through Fieldwork?*

To be able to understand the steps and methods involved in carrying out fieldwork, do the following activity.

#### **Activity 4.3: Exploring steps in fieldwork**

In a group or as an individual:

1. Choose a topic to be studied in the area outside the classroom.
2. Decide the reasons (objectives) for doing the fieldwork.
3. Decide how you are going to collect information while in the field.
4. Go out to the field and collect the information, emphasising how the natural environment and human features are related.
5. Draw a map showing how physical and human features are distributed in the area.
6. If possible, you may carry out measurements of particular things in the field or you may ask people how much land is used for each activity, how many buildings of a certain kind are in the area, etc.
7. After collecting all the information needed, write a report about the area studied. Through discussion, compare group reports.

While in the field, you collected some information such as that about the relief of the area, vegetation types, and crops grown or how people use their land, type of buildings and so forth, by looking around and seeing things by yourself. This is called **observation**.

Your teacher could also have given you a number of questions to ask people in the field in order to get information from them. This list of questions is called a **questionnaire**.

### Activity 4.4: Understanding methods

In pairs, discuss and suggest possible names for the following methods you could have used to get some information while in the field. Through discussion, share the names you have suggested with the rest of the class.

1. Talking to the local people and asking them questions about the things they do.
2. Measuring the size of gardens, market stalls, buildings and other features in the field.
3. Drawing sketch maps, field transects and panoramas.

### *Writing a Report about Fieldwork*

You collected information about the area you studied during fieldwork. How do you think one can know what the geography of the area you studied is like? Possibly you have thought of telling and explaining to the person what you found out. Since it is not possible to tell everybody what we have got from the field, we write it down so that others can read for themselves. The information we write about the area studied is called a **fieldwork report**. To be able to write a report about your study, do Activity 4.5 below.

### Activity 4.5

Using the information you collected during the field study you did in Activity 4.2 above, follow the steps below and prepare a fieldwork report. Present the report to your teacher for any assistance you may need.

1. Remember the topic and objectives of your study.
2. State the topic and summarise your objectives at the beginning.
3. Briefly describe the area studied, possibly with a map.
4. Write down the information you got about every objective in words.
5. Analyse the statistics you got, if any, and present them in tables, charts or graphs.
6. Include photographs or other maps, if any.
7. Summarise what you found out from the fieldwork, including the relationships between the people of the area and their physical and human environment.

## Learning Geography through Photographs

If we cannot reach a place very easily, we can learn about it by looking at its **photographs**. These can tell us a lot about the geography of even those areas we have never been to. To understand this, do the following activity.

### Activity 4.6

Study Figure 4.2 and do the activities that follow.



**Figure 4.2: Photograph as a source of geographical information**

1. In your notebook, write down the natural and human features you see in the photograph.
2. Explain how any two human features are influenced by the natural environment.
3. In what ways do you think human activities might affect the natural environment shown in the photograph?

All that you have written about Figure 4.1 is the geography of the area where the picture was taken. So studying photographs is another way in which we can get geographical information.

### *Types of photographs*

Photographs are of different types. These depend on the angle at which the photographer looks at the features on the ground through the camera. Which types do you know? Those taken while the photographer is standing on the ground or on another feature connected to the ground are called **ground** photographs. Photographs can also be taken from the air, i.e. when the photographer is not directly connected to the ground. Such photographs can be taken from an aeroplane, a very tall building or a flight balloon. These are called **aerial** photographs. To understand this further, do Activity 4.7.

(a)



(b)



**Figure 4.3: The Rift Valley in Uganda**



(a)



(b)

**Figure 4.4: Kampala City**

#### Activity 4.7

Look at Figures 4.3 and 4.4 and:

1. identify and write in your notebook the buildings and vegetation in each photograph.
2. explain the differences between the photographs shown in each figure.
3. suggest what type of photograph each one is. Give reasons to support your opinion.

You could have realised that aerial photographs are not the same. This is because while in the air, the photographer can look at features on the ground at different angles. Photographs taken when looking at features vertically, i.e. at an angle of 90°, are called **vertical aerial** photographs. These show only the top views of the features on the ground, with all features appearing as flat objects. Those photographs taken looking at features at an angle less than 90° are called **aerial oblique** photographs. These show both the top and side views of objects.

### *Describing where things are on a photograph*

In Chapter Three, you learnt the different ways in which you can find things on maps of different scale. Which one of these can you remember? However, with a photograph we do not usually know which direction the camera was pointing when the person took the photograph. So we cannot use compass points.

When describing features on the ground and aerial oblique photographs, you divide the photograph into regions depending on how far away from the observer the features are. These are foreground, middle ground and background. The part of the photograph which shows the sky is called the horizon. We do not divide this into regions. Can you suggest why this is so?



**Figure 4.5: Divisions of a photograph**

If you want to give the exact positions of features, you subdivide the above three grounds into other regions. These are left foreground, right

foreground; left middle ground, right middle ground; left back ground and right back ground.

### Activity 4.8

Look at photograph (a) in Figure 4.1 again and do the following:

1. Using a straight edge, draw in your notebook, the outline of the photograph and divide it into the first three regions.
2. Subdivide it further into six regions.
3. Identify the features found in each region and write them down.
4. Subdivide it further into nine regions and suggest which names you can give to the new regions.
5. Swap your work with one of your neighbours and comment on each other's work.

When you look at photograph (b) in Figure 4.4, you realise that it does not have any foreground or background. What type of photograph is it? You have probably suggested that it is a vertical aerial photograph. So, when interpreting such a photograph, you use terms like **bottom**, **top**, **left**, **centre** and **right** to describe where things are.

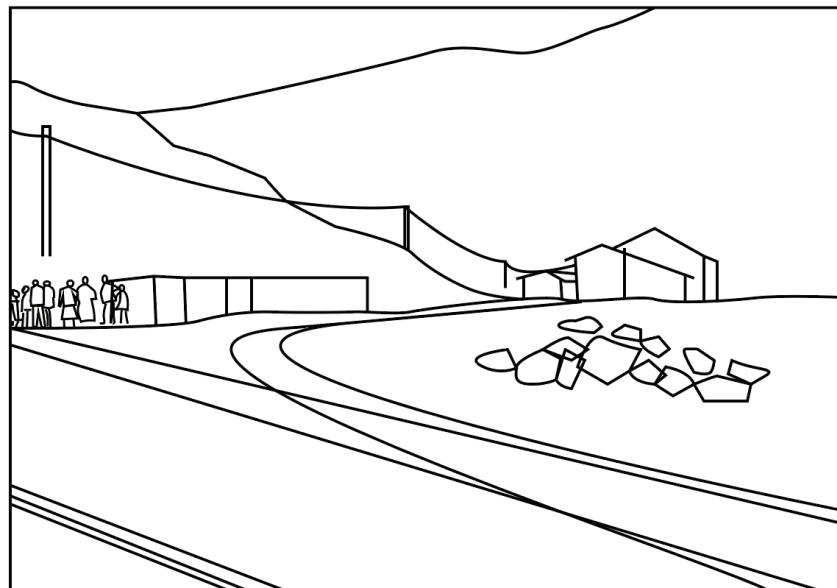
### Activity 4.9

Using these words: bottom, top, left, centre and right, describe the area shown on the photograph in Figure 4.4 (b)

**Note:** On photographs we can describe activities which are taking place as well as what the place looks like.

#### *Drawing a sketch from a photograph*

Sometimes it is useful to draw a sketch based on a photograph to show the **most important** features of the photograph. You do not need to show everything on the photograph but simply what kinds of things are found in each area. For instance, areas of buildings, main roads, types of vegetation, areas of farming, swamps, rivers or lakes, flat land or hills. Try to divide the photo into just three or four kinds of areas. To understand this better, see Figure 4.6.



**Figure 4.6 is a sketch of the area shown in Figure 4.2.**

#### Activity 4.10

Study Figure 4.7 and do the tasks that follow.



**Figure 4.7: Photograph showing Rukiga Hills, Kabale**

1. Draw a sketch of Figure 4.7 to show the main features on the photograph.
2. Divide the sketch you have drawn into appropriate divisions.
3. Name the features on the sketch.
4. Describe the area shown in the photograph.

### **Research Task**

Individually:

1. Conduct a library or internet search about the sources of geographical information and write a report of your findings.
2. In your opinion, which source is most important? Give reasons why you think it is the most important.
3. Present your report to the class through discussion.

### **Activity of Integration**

1. Abu Saidi, a student of Ife High School in Nigeria, wants to study the geography of Tanzania. He has visited your school looking for assistance on how he can find out the information he wants.
2. Using the knowledge and skills you have learnt under this topic, write an advice note of about one page to help him get the information about the geography of Tanzania. Suggest to him which method/methods would be the most useful and why.

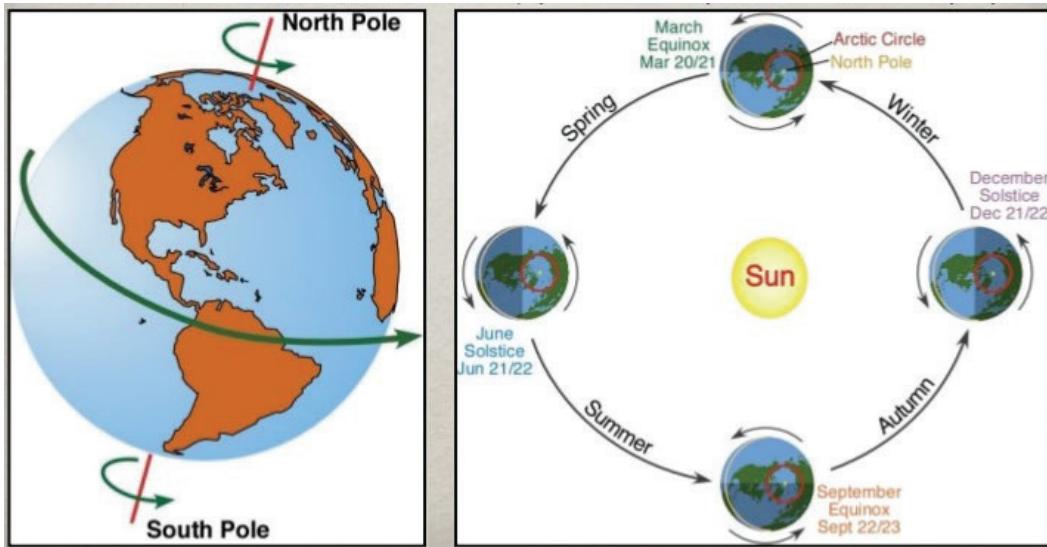
## Chapter Summary

In this chapter, you have learnt:

1. that we can get geographical information from various sources including maps, statistics, graphs, charts, newspapers and other mass media.
2. the advantages and problems associated with each source of information.
3. that photographs are of different types depending on the angle at which they are taken.
4. how to conduct a fieldwork study and record the geography of an area.
5. that fieldwork and reading photographs are very important because they tell us what exactly a place looks like.
6. how to communicate geographical information using tables of statistics, graphs, charts and maps.

# Chapter Five

## The Earth and Its Movements



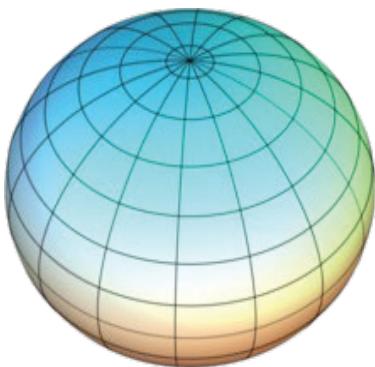
Key Words	By the end of this chapter, you should be able to:
<ul style="list-style-type: none"> <li>• Axis</li> <li>• Oblate spheroid</li> <li>• Rotation</li> <li>• Revolution</li> <li>• Equinox</li> <li>• Solstices</li> <li>• Summer</li> <li>• Autumn</li> <li>• Winter</li> </ul>	<ul style="list-style-type: none"> <li>a) understand the relationship between the earth and the sun and how this affects temperatures and seasons.</li> <li>b) draw diagrams to show the relationship between the earth and the sun's rays and the causes of temperature variations and use these to show why the earth can be divided into tropical, temperate and polar regions.</li> <li>c) understand how the earth's rotation causes day and night.</li> <li>d) calculate time using longitude.</li> <li>e) appreciate how the movement of the earth in relation to the sun affects the way people live: the effect of temperatures and seasons, lengths of day and night.</li> </ul>

## Introduction

In Primary school, you learnt about the solar system and the position of the planet earth in relation to the sun. In this chapter, you are going to learn about the shape of the earth, the movements of the earth and how these movements affect time, climate and people's ways of life in the different parts of the world.

### What Shape is the Earth?

The earth is the planet on which we live. All other living things live on earth. It is the only planet with life. This is because it has enough supply of oxygen and water, which are needed for life. Also, since the earth is not very far from the sun, it has moderate temperatures, that is, it is neither too cold nor too hot. What do you know about the shape of the earth?



**Figure 5.1: A model showing the shape of the earth**

#### Activity 5.1

In pairs, look at Figure 5.1 above and do the following tasks:

1. Identify the positions of the poles, and the equator.
2. Describe what the earth looks like at the poles and at the equator.
3. Describe the shape of the earth.

Through discussion, share what you have written with the class.

You have probably described the earth as a round planet. However, when you look at Figure 5.1, you will realise that the earth is flattened at the North Pole and the South Pole. Again, you will see that it is enlarged at the

position of the equator and becomes smaller as one moves towards the poles. So it is not perfectly round or spherical. This shape is called oblate. Therefore, the true shape of the earth is an **oblate spheroid** or a geoid. The bulging of the earth at the equator is caused by its **rotation**.

## Movements of the Earth

### Activity 5.2

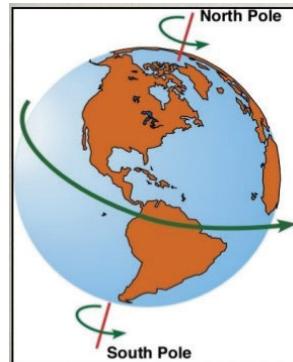
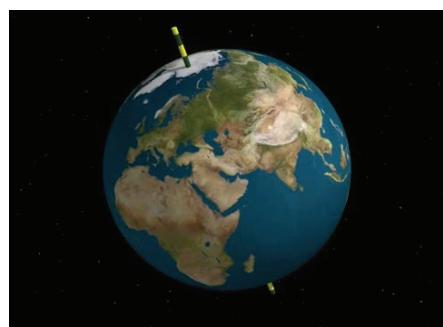
1. Draw a diagram showing the shape of the earth and on it include the main lines of latitude and longitude.
2. Conduct internet or library research about the solar system and make notes with diagrams.
3. Find out why it is called so and how many planets make up the solar system.

All the nine planets in the solar system move around the sun. Each follows a particular path called an **orbit**. No planet enters the orbit of another planet. Imagine what would happen if two huge planets met.

Because you live on the surface of the moving earth, it is not easy to know that it is actually moving. In fact, the earth makes two types of movement. Firstly, it spins or rotates on its axis. This movement is called the earth's **rotation**. Secondly, it moves around the sun. This is called the earth's **revolution**.

#### *The rotation of the earth*

What time of the day do you feel the most heat outside? Is it hottest during the middle of the night, during the morning, or during the afternoon? If we receive heat from the same sun, with the same temperature, then why doesn't temperature outside remain the same the whole day? All these happen because every day the earth rotates on its axis. Figure 5.2 shows the earth's axis.

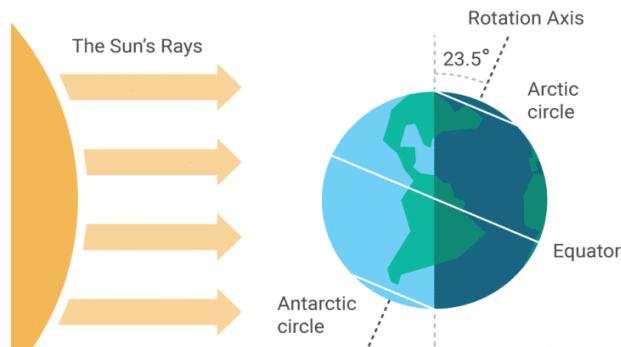


**Figure 5.2: The earth rotates on its axis**

### Activity 5.3

1. In pairs, get a globe or football, torch and marker or bold ink.
2. Using a marker or bold ink, put an X-mark on the ball, in case you do not have a globe.
3. Hold the globe or ball in your hands such that your friend standing at the opposite side flashes a torch upon it.
4. Spin the globe or ball and observe what happens.
5. Write a paragraph to explain what you have observed.
6. Explain how we get daytime and night-time on earth.

In a similar way, the earth normally moves on its axis from the east to the west once every 24 hours. That is one complete rotation. This is why we see the sun rising in the east and setting in the west every day. As the earth rotates, it exposes half of itself to the sun while the rest of it is in darkness. The part of the earth facing the sun experiences daytime while the one hidden away is in night-time.

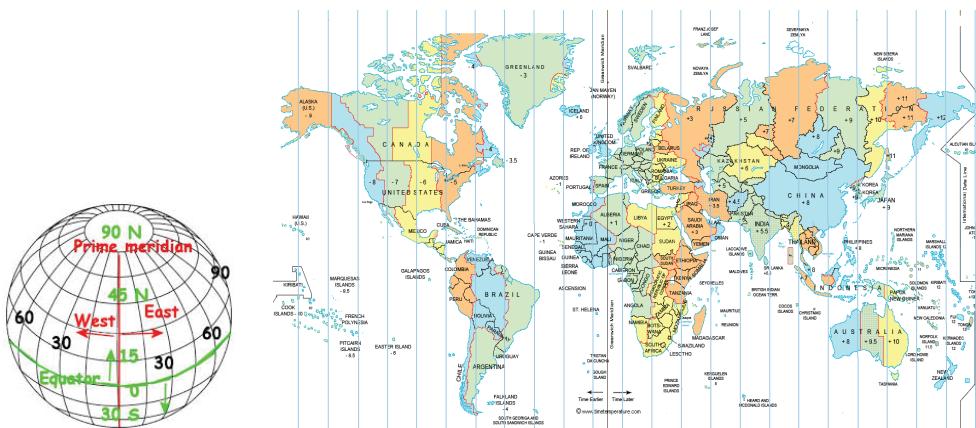


**Figure 5.3: Rotation of the earth around the sun**

### *Why places on earth have different time*

Apart from causing day and night, the rotation of the earth also results in time differences. For every  $15^{\circ}$  of longitude we move from the Prime Meridian eastwards, we gain one hour. And as we move westwards, for every  $15^{\circ}$  of longitude, we lose one hour.

The sun reaches the highest position in the sky at 12 noon. At that time, the Greenwich Meridian lies under the sun. This is called 12 noon local time along the Prime Meridian. Local time at the Greenwich is called **Greenwich Mean Time** or simply GMT. All meridians to the east of the Greenwich Meridian have sunrise before the Prime Meridian. Local time along these meridians is ahead of GMT. Meridians to the west have sunrise after the Greenwich, and the local time is behind GMT. See Figure 5.4.



**Fig 5.4: Longitude and time**

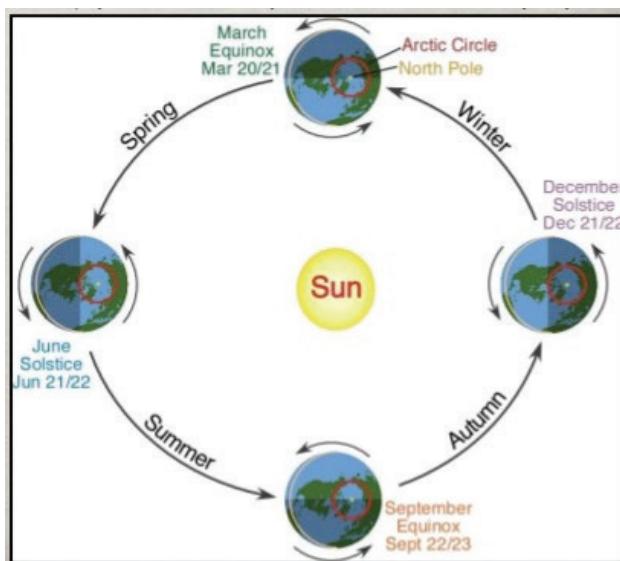
#### Activity 5.4

1. If the time at place X is 1600 hours and GMT is 1400 hours, find out:
  - i) How many hours X is from GMT.
  - ii) The longitude at which place X lies.
2. If the time at Greenwich is 7.00 GMT, calculate the time at:
  - (i)  $75^{\circ}$  E
  - (ii)  $75^{\circ}$  W

### *Revolution of the earth*

The earth takes one year or  $365 \frac{1}{4}$  days to complete its journey around the sun. This journey is called a **revolution**. After every four years, the earth

takes 366 days to complete this same journey. The fourth year is called a **leap year**. All other years have 365 days. The earth's axis always points in the same direction in the sky. It is permanently tilted at an angle of  $66\frac{1}{2}^{\circ}$  to the earth's path.



**Figure 5.5: Revolution of the earth**

The movement of the earth around the sun leads to changes in the position of the latitudes in relation to the sun. On 21<sup>st</sup> March, the sun is overhead at the equator. This is called the **equinox**. Another Equinox occurs on 23<sup>rd</sup> September. On 21<sup>st</sup> June, the sun is overhead at midday at the Tropic of Cancer. This is called the **summer solstice**. On 22<sup>nd</sup> December, the sun is overhead at midday along the Tropic of Capricorn. This is called the **winter solstice**.

### Activity 5.5

Study Figure 5.4 above and do the following:

1. Find out the hottest months in places along the equator.
2. When is it summer in the Northern Hemisphere?
3. When is it spring in the Southern Hemisphere?
4. When is it summer in the Southern Hemisphere?

5. Conduct internet or library research about how the four seasons influence people's activities and way of life.

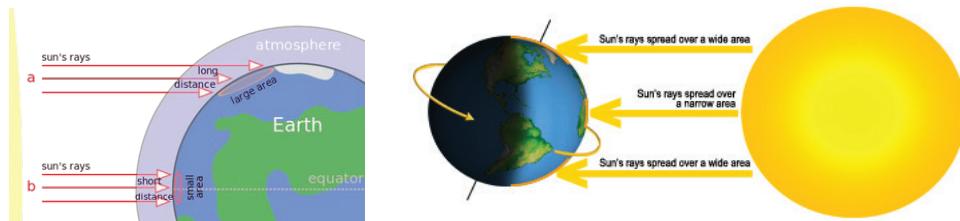
## Why is the Earth Divided into Zones with Different Temperatures?

### Activity: 5.6

1. Conduct internet or library research about world climate zones and in your notebook:
  - i) draw the earth, mark and name the equator, the tropic lines, and the Arctic and Antarctic Circles.
  - ii) mark out the tropical, temperate and the polar zones.
  - iii) describe the characteristics of each of these zones.
  - iv) explain the other factors that cause temperature differences in an area.
  - v) share your report with the class through discussion.

Look at Figure 5.2 again and find out whether the earth is upright. If it is not upright, estimate the angle at which it is inclined. You have realised that the earth slants at an angle of  $66.5^{\circ}$  degrees from the sun. This makes different places on earth lie at different angles from the sun. The places are hit by the sun rays at different angles and so they receive different amounts of heat. At the equator, the sun rays strike the earth directly over a small area. The heat is concentrated over a small area, thus increasing the temperatures.

At higher latitudes, the rays are slanting and spread over a large area. The heat is spread over a large area, thus reducing the temperatures. The distance travelled by the sun rays to strike different places varies. The distance is short at the equator while at the poles it is very long. This partly brings about the temperature differences. The shorter the rays, the greater the heat and the longer the rays, the less the heat. This explains why the temperatures in the areas near the equator are constantly hot. The division of the earth into zones is based on the differences in temperature.



**Figure 5.6: Sun's rays striking the earth's surface**

## Activity of Integration

Imagine one of the daily newspapers in your country has published an article entitled “The sun will soon stop moving”. The National Science Forum has organised a conference to discuss the newspaper article, and your school has been invited to participate in the discussion. Using the knowledge you have learnt in this chapter, prepare a paper of at least one and a half pages that you will present at the conference. In your paper, point out the likely effects on time and people’s lives if the sun stopped moving.

## Chapter Summary

In this chapter, you have learnt:

1. that the earth is the only planet with living things because it has large amounts of water and oxygen, and moderate temperatures.
2. that the earth is spherical in shape.
3. that the sun lies at the centre of the solar system and all planets in this system move around the sun following particular orbits.
4. that the earth makes two movements: rotation and revolution.
5. that the rotation of the earth leads to day and night while the revolution causes seasons.
6. how the distance of a place farther north and south of the equator brings about differences in temperature and climate.

# Chapter Six

## Weather and Climate



Key words	By the end of this chapter, you should be able to:
<ul style="list-style-type: none"><li>• Climate</li><li>• Condensation</li><li>• Dew point</li><li>• Humidity</li><li>• Isohels</li><li>• Isohyets</li><li>• Isonephs</li><li>• Millibars</li><li>• Okta</li><li>• Precipitation</li><li>• Sleet</li><li>• Weather</li><li>• Weather log</li></ul>	<ul style="list-style-type: none"><li>a) understand the difference between weather and climate.</li><li>b) understand the main elements of weather and climate.</li><li>c) understand how to record the main elements of weather.</li><li>d) know how to plot weather on maps and the terms used for plotting.</li><li>e) make some simple instruments for measuring and recording weather.</li><li>f) read or use maps and graphs to describe weather and climate.</li><li>g) know the names and characteristics of the main types of clouds and rainfall.</li><li>h) appreciate that weather affects your day-to-day life and activities.</li><li>i) appreciate the importance of recording weather for farmers and others.</li></ul>

## Introduction

In Primary school, you learnt about the solar system and the position of the planet earth in relation to the sun. In this chapter, you are going to learn about the shape of the earth, the movements of the earth and how these movements affect time, climate and people's ways of life in the different parts of the world.

In your home area, people usually take weather and climate to mean the same thing. In this topic, you are going to learn the difference between weather and climate and how you can measure and record weather in an area. Also, you are going to learn how weather and climate affect your own life and the way people in other parts of the world live.

## Weather and How it is Measured

### Activity 6.1: Understanding weather

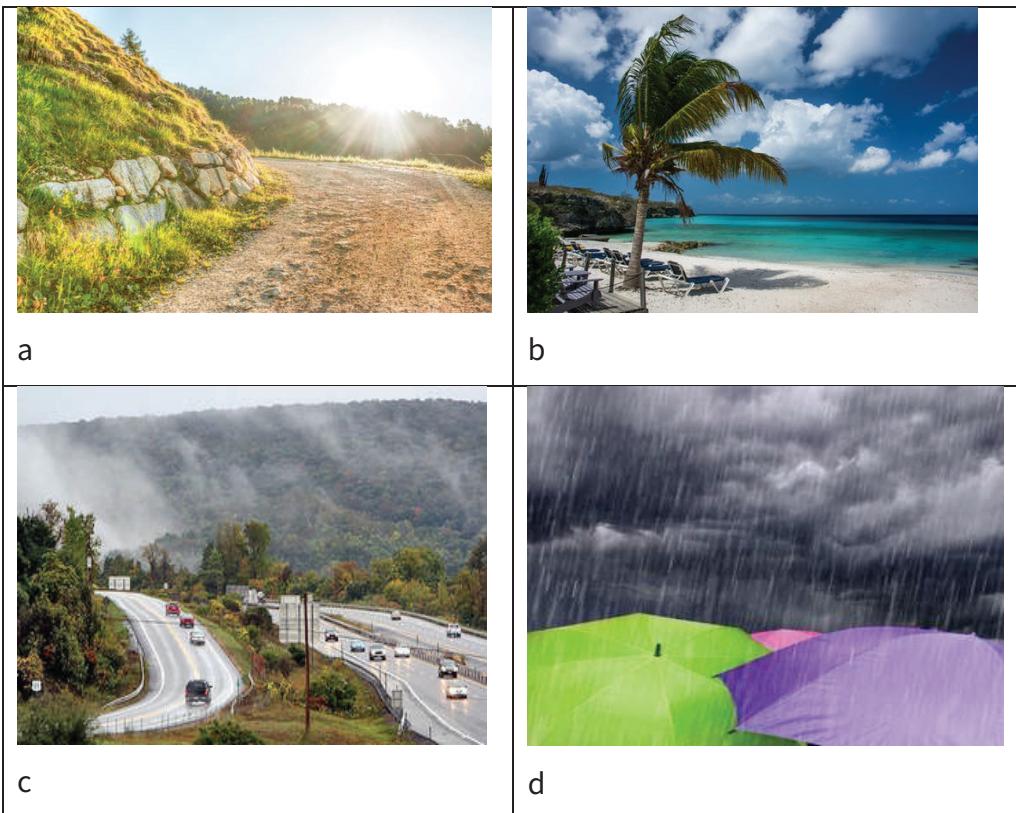
1. Look outside. How would you describe the weather around your school?
2. What was the weather like around your school yesterday?
3. Is today's weather different from that of yesterday or the last three days? If yes, describe the differences.
4. In your own words, explain what you understand by weather.

When we talk of **weather**, we are actually talking about the conditions of the air or atmosphere at a certain time. The weather may be sunny or cloudy. It may be hot or cold, windy or calm. It may be rainy. Our country has many different kinds of weather at any one time. You have probably realised that even a small area like the one where you live or go to school has different weather conditions every day.

### Activity 6.2: Identifying weather conditions

In pairs, study the photographs in Figure 6.1 below and do the following:

1. Identify the different weather conditions in each.
2. Write a paragraph of at least four lines describing the weather conditions in each photograph.
3. Present what you have written to the class.



**Figure 6.1: Conditions in the atmosphere**

## What are Elements of Weather?

### Activity 6.3: Understanding elements of weather

1. In pairs, discuss and list the things you talked about when describing weather in the two activities above.
2. Write them down and share your list with the rest of the class.

The conditions that prevailed in the atmosphere around your school yesterday could have been different from what they are now. What are those conditions called? The things you have listed in Activity 1.3 (a) are called **elements of weather**. Rainfall, sunshine, heat and coldness (temperature), air pressure, air humidity or moisture in the air and clouds are all things which determine the weather conditions of a place.

## How is Weather Different from Climate?

### Activity 6.4: Understanding the difference between weather and climate

In groups, do the following:

1. Discuss the pattern of weather in a year in the area where you live.
2. Write at least two paragraphs describing that pattern.
3. Through discussion, share what you have written with the rest of the class.
4. Suggest a name we can give that weather pattern.

In your description, you have probably written about the times of the year or seasons in which you can expect heavy rain or drought in the area where you live. Or you may have talked about the months when temperatures become hotter than usual. When you describe such a pattern of weather, you are talking about the climate of your area. The kind of weather a place has over a long period of time is its **climate**. The two most important elements used to describe climate are **precipitation** and temperature.

#### *What is precipitation?*

### Activity 6.5: Understanding precipitation

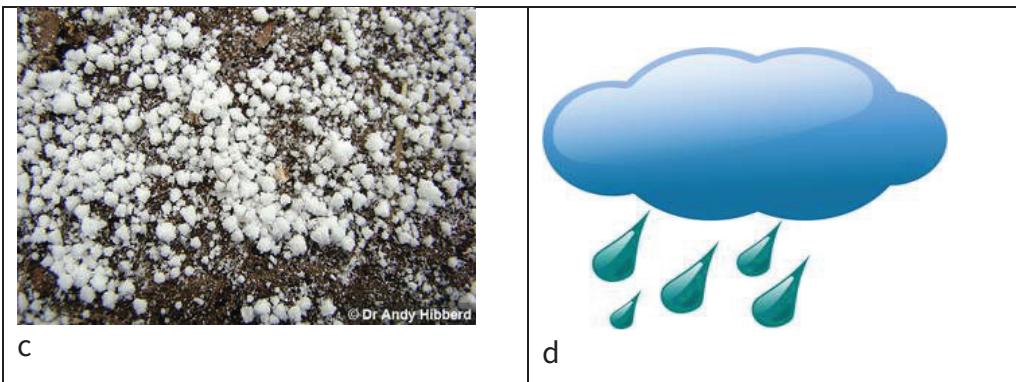
In groups, study the pictures in Figure 6.2 and do the tasks that follow.



a



b



**Figure 6.2: Types of precipitation**

1. Identify the type of precipitation you see in each picture and write it in your notebook.
2. Which of those types of precipitation do you usually experience in your home area or around your school?
3. Write two sentences explaining what you understand by precipitation.

The earth's surface receives moisture from the atmosphere in different forms. All forms of moisture falling from the atmosphere are called **precipitation**. It may be in the form of rain, snow, hail, sleet or mist. In Uganda and the rest of East Africa, rainfall is the most common and important form of precipitation received.

### **What is temperature?**

Have you ever woken up in the morning when there is mist in the air outside the house? What did you feel on your body? What do you always feel when you sit under the sun? You have probably thought of coldness in the case of a misty morning, and hotness in the case of sitting under the sun. The atmosphere usually has different amounts of heat at different times. The amount of heat in the air is called air **temperature**. When you say the morning is cold or the afternoon is hot, you are actually talking about the temperature of the air surrounding you.

## Measuring and recording elements of weather

### Activity 6.6: Measuring weather



a



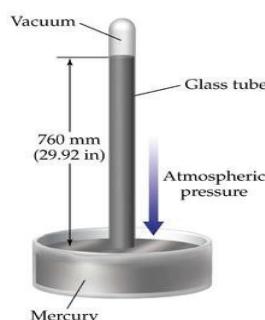
b



c



d



e



f

**Figure 6.3: Some weather measuring instruments**

Study Figure 6.3 above and do the following:

1. Using previous knowledge, identify the weather instrument shown in each picture.
2. Copy and fill in the table below.

Picture	Name of weather instrument	Element of weather it measures
a.		
b.		
c.		
d.		
e.		
f.		

3. For each instrument you have identified, write at least three sentences explaining how it is used to measure and record weather.
4. Present what you have written to the class.
5. What is the name of the place where all weather recording instruments are kept and used?

Weather changes are very important in our daily lives. This is the reason we have to record weather conditions every day in order to make weather forecasts. Weather forecasts enable people to plan their activities and to take precautions against bad weather.

A place where weather is measured and recorded is called a **weather station**.

**Project: Measuring and recording elements of weather in the local area**

You are going to carry out a project to measure and record elements of weather around your school. You will need a book where you will record information about the weather conditions on a daily basis. This is called a **weather log**.

### **Activity 6.7(a): Making a weather log**

1. Write your name on a clean notebook.
2. Write out the days and dates of the month for which you will be recording temperature and rainfall.

### **Activity 6.7(b): Measuring temperature**

Work as a group to carry out this activity at school on a daily basis for a period of three months. You will have to keep a record of the weather elements at your school in your weather log for those three months.

1. Get a thermometer from the science laboratory.
2. Measure and record the lowest and highest temperatures of the day.

The lowest temperature should be measured between 6.00 a.m. and 7.00 a.m. The highest temperature should be between 2.00 p.m. and 3.00 p.m.

### **Activity 6.7 (c): Rainfall and how it is measured**

You are going to make a rain gauge which you will use to measure rainfall. This is a short-term gauge so it is checked after each downpour. Collect the materials listed below and follow the steps outlined to make the gauge.

#### **Materials**

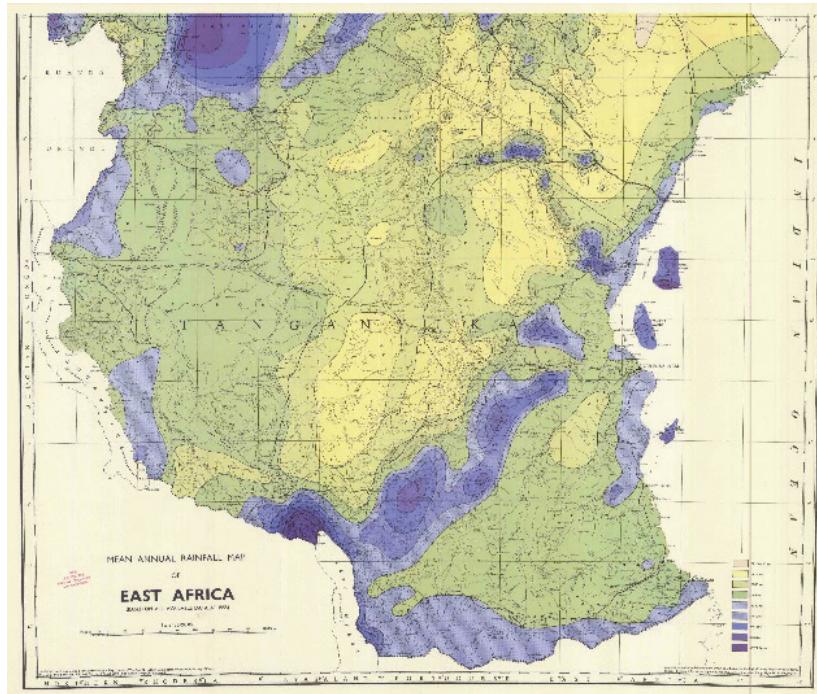
- Sharp scissors
- Fine mesh screen/a transparent polythene sheet
- Nail file
- 2 two-litre bottles (or funnel)
- Permanent marker
- Ruler
- Masking tape
- Saucepan or basin

**Read the following instructions before beginning the activity:**

1. Carefully cut a two-litre bottle with straight sides and a flat bottom into half to make a funnel. File any sharp edges.
2. Place the cut bottle on the uncut bottle so that the spouts/edges are touching and in line.
3. Tightly fix the funnel onto the top of the bottle using the masking tape. Place a transparent polythene sheet over the funnel opening and press it slightly inwards. Tape it in place. Make a hole inside the polythene sheet to direct water into the bottle.
4. Mark the bottle from the bottom  $\frac{1}{2}$  cm apart upwards with the permanent marker. For more accurate readings, tape a ruler to the side of the bottle. Each  $\frac{1}{2}$  cm represents 500 millimetres.
5. Place the rain gauge outside in an open place.
6. Read off and record in your log book the amount of rainfall received once every 24 hours.

The amount of rainfall recorded during the month is the **monthly total rainfall**. The amount of rainfall recorded for a whole year is the **annual total rainfall**. Some months are wet while others are dry. To get the average picture of rainfall received in an area, we divide total annual rainfall by the 12 months in a year. The result is the **mean monthly rainfall**. Rainfall figures for all the months in a year can be represented on a bar graph. This enables us to describe the rainfall pattern of an area.

To show how rainfall is distributed over a country like Uganda or a larger region like East Africa, places receiving equal rainfall amounts are plotted on maps and joined using lines called **isohyets**. The map produced is called a **rainfall map** or **precipitation map** (see Figure 6.4).



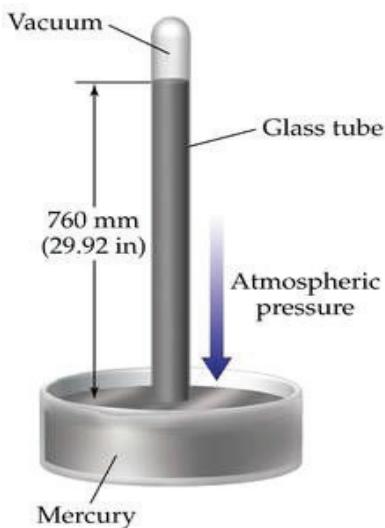
**Figure 6.4: Rainfall map of part of East Africa**

## Atmospheric or Air Pressure

Have you ever slept on a hard surface for long hours? How did you feel when you got up? Why do you think you felt that way? You probably felt some pain in your body. This is because the weight of air that surrounds us or the atmosphere was pressing your body against the ground. This weight is called **atmospheric pressure**.

### *Measuring atmospheric pressure*

Atmospheric pressure is measured using a **barometer**. There are two types of barometer, as shown in Figures 6.5 and 6.6 below.



**Figure 6.5: A mercury barometer** **Figure 6.6: An aneroid barometer**



The mercury barometer consists of a bowl in which mercury is put. A glass tube filled with mercury is then inverted into the bowl. As the air in the atmosphere uses its weight to push down the mercury in the bowl, the mercury level in the glass tube falls while the mercury level in the bowl rises. When the atmospheric pressure falls, the mercury in the glass tube also falls.

When the mercury levels stabilise, the column of the mercury in the glass tube is equivalent to the atmospheric pressure. Atmospheric pressure is measured in units called **millibars**.

#### Activity 6.8: How the aneroid barometer works

1. Carry out internet or library research on how the aneroid barometer is used to measure atmospheric temperature.
2. Write down your findings and present them to the rest of the class through discussion.

## Atmospheric Humidity or Air Humidity

Most of the time, the air around us is not dry. It contains some amount of water in the form of an invisible gas. This gaseous water or moisture is

called **water vapour**. The amount of water vapour held in air is called **humidity**. The water in air comes from different sources, such as from open water bodies and soil by evaporation and from vegetation and other plants by transpiration. Humidity influences the formation of clouds and precipitation.

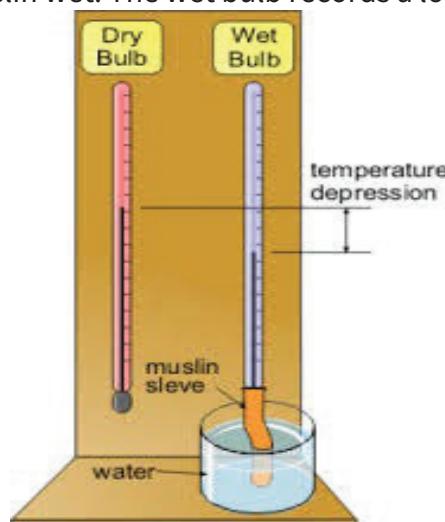
### Activity 6.9: Proving that air contains water

Get a cold mirror or a piece of glass or if your classroom has glass windows, close the window and do the following:

1. Breathe onto the mirror or glass. What do you notice? Have you seen anything coming out of your mouth? Do you see anything on the glass? What happens when you let the glass stay for some time?
2. Write down your observations and share what you have written with your friends.

### How is humidity measured?

Humidity in the atmosphere is measured using a **hygrometer**. The simplest hygrometer is a sling psychrometer. It consists of two thermometers, a wet bulb and a dry bulb thermometer. The wet bulb is wrapped in a wet cloth and dipped into a bowl of water. This keeps the muslin wet. The wet bulb records a lower temperature.



**Figure 6.7: A hygrometer**

When water evaporates from the wet cloth it takes away heat with it. This leads to cooling on the wet bulb thermometer, thus giving a lower reading. The dry bulb records the hotter temperature. It is kept in the normal environment. The difference in temperatures recorded by the two thermometers gives the humidity in the air. A large difference means humidity is low and a small one means humidity is high. If there is no difference, the air is said to be **saturated**. This means that the air cannot take in any more water vapour.

Humidity is recorded as a percentage of the amount of water vapour that the air is holding compared to the amount the same air can hold before it gets saturated. This is called **relative humidity**.

## Sunshine and How it is Measured

In most parts of our country, the sun shines almost every day. Sunshine benefits us in many ways.

### Activity 6.10: How important is sunshine?

In your notebook:

1. explain how sunshine benefits you and your local area.
2. write an article for a local newspaper explaining what would happen if it did not shine for three months in Uganda.



**Figure 6.8: A Campbell Stokes sunshine recorder**

Sunshine is recorded using a Campbell Stokes **sunshine recorder**. This consists of a glass sphere held by a metal frame. Inside the frame is a sensitive card labelled in hours and minutes at the margins. As the sun apparently moves across the sky, its rays burn traces on the card if the sunshine is not constant. If the sunshine is constant, its rays burn a continuous line on the card. The lengths of the burnt sections are added to get the total hours of sunshine for the day. We record sunshine on maps by drawing lines showing places with equal amounts of sunshine. These are called **isohels**.

## Clouds



(a)



(b)

**Figure 6.9: Cloud cover**

### Activity 6.11: Finding out about clouds

In groups, go outside the classroom, observe the sky and:

1. describe the appearance of the clouds.
2. describe the cloud cover using the key provided in Figure 6.10 below.
3. list the types of clouds that you know.
4. explain the importance of clouds to human beings.
5. write and present a report about cloud cover in the area around your school.

-  Clear
-  Scattered clouds  
(approximately 25% cloud cover)
-  Partly cloudy  
(approximately 50% cloud cover)
-  Mostly cloudy  
(approximately 75% cloud cover)
-  Overcast
-  Sky Obscured
-  Sky Cover Missing

**Figure 6.10: Key for cloud cover**

### *Types of clouds*

#### **Activity 6.12**

In pairs, carry out library research on the types of clouds and fill in the table below.

Name	Height	Appearance
Cirrus		
Nimbus		
Stratus		
Cumulonimbus		

The amount of cloud cover is estimated in **oktas**. One okta represents approximately one eighth of the sky covered with clouds. Cloud cover can be represented on maps using lines. These lines join areas with equal average cloudiness over a certain period. They are called **isonephs**.

## Effects of Weather on your Life and that of your Community

You have already learnt how the different elements of weather affect people's ways of life. A number of your activities and those of other people in your community depend mainly on sunshine, temperature and rainfall. During the rainy season, vegetation flourishes and people are busy in their gardens. Weather changes can affect you and your community positively or negatively.

### Activity 6.13

In your notebook, copy and fill in the table below:

Weather condition	Benefits	Negative effects
Rainfall		
Sunshine		
Temperature		

### Activity of Integration

A rural farmers' cooperative society has just acquired a piece of farmland in an area they have never lived in before. They intend to start a mixed farm where they will cultivate crops and keep animals. They need to know the weather pattern of the area in order to carry out farming successfully. The local government Secretary for Production and Marketing has chosen you to give advice to the farmers.

Write an advice note to the farmers' cooperative society, pointing out:

1. the most important elements of weather they need to record and study and why you think they are the most important to them;
2. the instruments they can use to record those elements and the kind of information they should keep about each element;
3. and four ways in which they can use weather information to run the farm.

## Chapter Summary

In this chapter, you have learnt:

1. that weather is the condition of the air around us at a certain time and it is described using its elements.
2. that weather changes in a short time, while climate takes long to change.
3. how to measure and record different elements of weather.
4. that precipitation and temperature are the most important elements of weather used to describe the climate of our country.
5. that weather affects our day-to-day activities and general way of life.

## Chapter Seven

### Location, Size and Relief Regions of East Africa



<b>Key Words</b>	By the end of this chapter, you should be able to:
<ul style="list-style-type: none"><li>• Cliff</li><li>• Deposition</li><li>• Drainage</li><li>• Earthquake</li><li>• Erosion</li><li>• Faulting</li><li>• Glacier</li><li>• Landform</li><li>• Lava</li><li>• Magma</li><li>• Plate tectonics</li><li>• Rift valley</li><li>• Rock</li><li>• Volcano</li><li>• Vulcanicity</li><li>• Warping</li><li>• Wave</li></ul>	<ul style="list-style-type: none"><li>a) use maps, statistics, graphs and diagrams to analyse population.</li><li>b) appreciate that East African countries vary greatly in area and population.</li><li>c) know the East African countries, their approximate population and area.</li><li>d) use contours to show physical features and draw cross-sections from simple contour maps.</li></ul>

## Introduction

From your Primary school, you have always heard your teachers and other people say that our country, Uganda, is found in East Africa. Again, if you have ever travelled to places far away from your home area, you could have noted that the physical features in those places are somewhat different from those around your home. This is because although East Africa is one region, its relief is not uniform everywhere. In this chapter, you are going to learn about the position of East Africa on the African continent, the size of East Africa, the relief features of East Africa and how they were formed.

### What is East Africa?

#### Activity 7.1: Understanding East Africa

In groups, study the atlas and,

1. identify the countries making up East Africa and list them.
2. draw a sketch map to show the location of East Africa.
3. discuss and agree on what is meant by East Africa; then share your views and sketch map with other groups in a whole class discussion.

You have realised that different groups have identified different countries making up East Africa. Some have identified three countries while others have identified six countries. This comes about because of the way we look at East Africa as a region.

Those who have identified three countries look at the traditional East Africa. Those who have identified six countries look at the East African Community. In studying Geography, you are going to take East Africa as **Uganda, Kenya and Tanzania**.

## Location and Size of East Africa

### Activity 7.2:

1. Describe the position of East Africa in relation to other countries and regions.
2. Describe the position of East Africa using latitude and longitude.
3. Draw a sketch map to show the location of East Africa.

### Activity 7.3:

In pairs, search the Internet or any other source for figures (data) showing the size of East African countries.

1. Copy the information into your notebook and use it to draw a pie chart or bar graph.
2. Using the diagram you have drawn, determine the:
  - i) Largest country in East Africa,
  - ii) Smallest country in East Africa.
3. Estimate how many times the largest country is larger than the smallest one. Give a reason to support your estimate.
4. Share what you have written and the diagram you have drawn with other pairs in a whole class discussion.

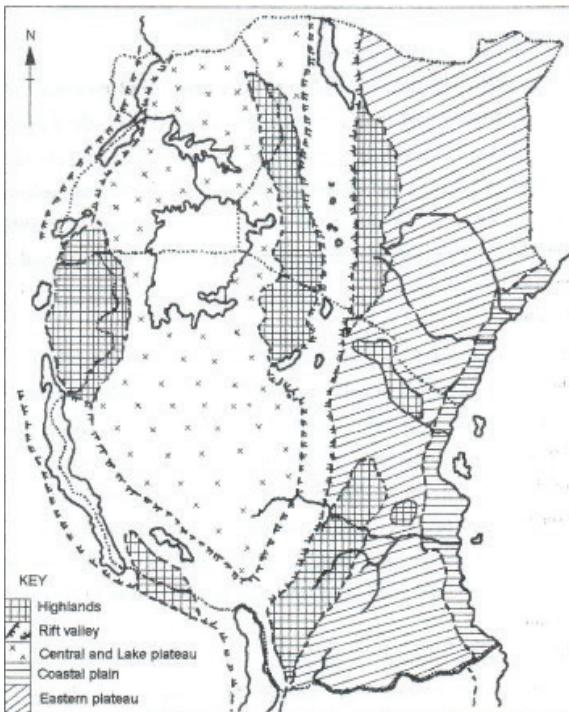
### Activity 7.4:

1. Individually, look for data about the population of the East African countries from any source you can come across.
2. Draw a pie chart to represent the data you have got.
3. Which country has the:
  - i) Largest population
  - ii) Smallest population

## The Relief Regions of East Africa

In your home area or in the area around your school, there are several physical features, which may include mountains, hills, valleys, outcrop rocks and flat plains. All these can be used to describe the appearance of the landscape in the area. These features are called relief features or landforms. Similar features are also found in other parts of Uganda and

the rest of East Africa. A large area of land with almost similar relief features is called a **relief region**.



**Figure 7.1: Map showing the relief regions of East Africa**

### Activity 7.5

In groups, study Figure 7.1 and do the following tasks:

1. Copy the map in your notebook and on it name:
  - i) the countries.
  - ii) the different relief regions of East Africa.
  - iii) at least two mountains in each country.
2. Which relief region covers the largest part of East Africa?
3. Identify the relief region in which your home area is found.

In the above activity, you have found out that East Africa is divided into five major relief regions. Each region has certain characteristics which make it different from other regions. The largest part of Uganda is covered by the **plateau** region. The most important differences between regions lie in the appearance of the landscape and the height. These relief regions have an influence on the local weather and climate. This, in turn,

determines the economic activities people in each region do and their ways of life in general. You are going to find out more about this influence in the following activity.

### Activity 7.6

In groups:

1. Choose one or two relief features in the area around your school and conduct a field study of the feature/features.
2. Use a range of methods to collect information about the feature/features.
3. Explain how the feature/features may influence the weather conditions and climate of the area.
4. Explain how the relief features in the area influence the activities people carry out and the way they live.
5. Draw a sketch map to show the physical environment and human activities carried out in the area.



a



b



c



d



e

**Figure 7.2 Natural hazards**

The area you have studied could have experienced some unusual natural events which have had negative effects on people's lives, property and the environment. Such events are called **hazards**. Think of any hazard which has occurred in another part of your country or elsewhere in East Africa. To understand this better, study the pictures in Figure 7.2.

### Activity 7.7

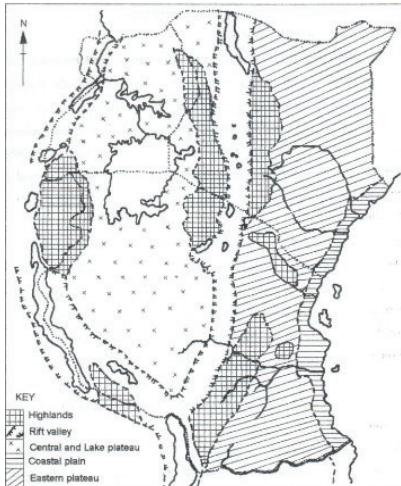
In the same groups you used in Activity 7.6:

1. Ask people living in the area about places which have experienced hazards in the past and the kind of hazards they were. Also identify places which may experience hazards and the kind of likely hazard for each. Mark both places on the sketch map you have drawn.
2. Ask the local people how much harm each hazard caused. Using that information, suggest how harmful the likely hazards might be.
3. Suggest steps that can be taken to prevent such hazards from taking place again.
4. Through discussion, share your findings with the rest of the class.

### Activity of Integration

1. Suppose you have been given a chance to migrate and live in another East African country, which relief region would you prefer to live in the new country? Give reasons for your preference.
2. Suggest the disasters which might strike your new home area and how each might affect you.
3. Suggest ways you would assist people in your new home area to reduce the effects of the disasters.

### Support: Relief regions of East Africa



## Chapter Summary

In this chapter, you have learnt that:

1. the features that can be used to describe the physical appearance of an area are called landforms.
2. a large area of the earth's surface with almost similar landforms is called a relief region. A relief region may be hilly, mountainous, or almost flat.
3. the largest part of East Africa is covered by the plateau.
4. the economic activities that people carry out in any area and their ways of life are partly influenced by the relief.
5. some relief regions experience severe natural events which affect communities negatively. Such events are called **natural hazards**.

# Chapter Eight

## Formation of Major Landforms and Drainage in East Africa



Key Words	By the end of this chapter, you should be able to:
<ul style="list-style-type: none"><li>• Cliff</li><li>• Drainage</li><li>• Earthquake</li><li>• Erosion</li><li>• Faulting</li><li>• Glacier</li><li>• Landform</li><li>• Lava</li><li>• Magma</li><li>• Plate tectonics</li><li>• Rift valley</li><li>• Rock</li><li>• Volcano</li><li>• Warping</li><li>• Wave</li></ul>	<ul style="list-style-type: none"><li>a) locate the major landforms on the map of East Africa.</li><li>b) understand how the main types of rocks are formed.</li><li>c) understand that the main types of landforms were formed by rocks themselves or by rocks being worn away or eroded.</li><li>d) understand the main concept of plate tectonics and how this has led to the formation of the main physical features of East Africa.</li><li>e) draw diagrams to show the formation of important physical features.</li><li>f) understand the characteristics of the main physical features in East Africa.</li><li>g) understand the relationship between drainage and landforms.</li><li>h) recognise landforms on photographs.</li><li>i) understand how your own life and that of your community are affected by physical features.</li><li>j) appreciate that the landforms, rocks and drainage all affect the way people live.</li></ul>

## Introduction

In these relief regions, there are different physical features such as mountains, hills, valleys, outcrop rocks and flat plains. You also learnt that these features are called **landforms**. In this chapter, you are going to explore how these and other landforms were formed; and how the landforms are related to the rocks. You will also learn how landforms influence drainage and the lives of people.

## Rocks and Landforms

### Activity 8.1

In groups, choose **one** of these landforms, i.e. a volcanic mountain or rift valley, and:

1. explain how it was formed.
2. describe the nature of rocks making up the landform.
3. explain how the landform may affect drainage, climate, soils and human activities in the area.
4. share what you have written down with the rest of the class.

### Activity 8.2

As a whole class, conduct a debate on the motion: “There are more problems than benefits in living on a volcanic mountain”.

In Activity 8.1, you have realised that the chosen landform is made up of rock material. All landforms of the earth are made up of rocks. What do you understand by a rock?

Rocks are of different types and sizes. In terms of size, they may range from very tiny particles, such as sand grains, through small stones to very large boulders. Every rock is made up of several **minerals** and if you break it up and examine it scientifically, you can identify each mineral. Some of the minerals found in the rocks are useful to people. You will learn more about this in your Chemistry lessons in Term Three.



**Figure 8.1: Pictures of rocks**

### Activity 8.3

In pairs:

1. Copy the table below in your notebooks, study it and fill in the missing information in the right hand column.

Mineral	Uses
Iron	E.g. Making iron sheets and hoes
Gold	
Copper	
Aluminium	
Silver	
Calcium	

2. Swap the filled table with another pair, comment on each other's work and make the necessary corrections.
3. Think of how life in your community would be if there were no minerals on earth.

When you read the above table, you realise that most of the things we use in our daily lives are made out of minerals. Farm tools used to produce the food we eat, domestic utensils such as saucepans, plates and cups, detergents such as powder soap, and vehicles used for transport are all made from minerals. Our country and many other countries around the world also get large amounts of money through selling minerals and mineral products. Generally, without minerals, all humankind would find life very difficult. To understand this better, look at Figure 8.2.



**Figure 8.2: Some of the things made from minerals**

### *Types of rocks*

All rocks are not similar in colour, hardness, texture and ability to hold water. This is because they were formed by different processes and under different conditions. In geography, we divide rocks into three main types depending on how they were formed.

The first main type of rock is formed when very hot molten rock from deep inside the earth rises to the surface of the earth. Imagine rock material similar to hot porridge boiling and rising through the solid rocks. When the molten rock reaches the surface, it cools and forms a new rock called **igneous rock** or fire-formed rock. You will learn more about this process later in this chapter.

Igneous rocks formed on the surface of the earth are called **extrusive igneous rocks**. Sometimes molten rock from the interior may fail to rise up to the surface of the earth and instead cools inside the local rocks. When this happens, **intrusive** igneous rocks are formed.

### **Activity 8.4**

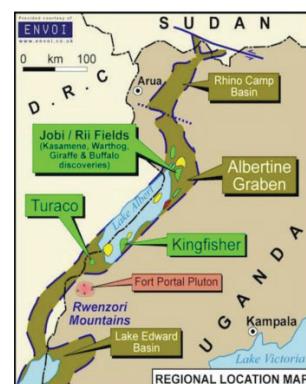
1. Carry out a library or internet search about the formation of igneous rocks, their types and examples.
2. Draw diagrams to illustrate how each type is formed.
3. Construct a table to summarise examples of each type of igneous rock.
4. Suggest ways in which igneous rocks may benefit people living in areas where they are found and your country.

The second main type of rock is formed when the old rocks of the earth are broken down by weathering, or eroded by running water, wind or moving ice. The smaller rock pieces transported are called **sediments**. When sediments are deposited in other places they accumulate, harden and form new rocks called **sedimentary rocks**. Sedimentary rocks formed this way are called **mechanically-formed** sedimentary rocks. Most sedimentary rocks are of this type. Examples are sandstone, shale and loess.

### Activity 8.5

1. Carry out a library or internet search for diagrams showing the formation of different types of sedimentary rocks.
2. Draw the diagrams in your notebook and make a brief description of how each type is formed.

Some sedimentary rocks are formed when the remains of dead plants and animals get deposited together in large amounts. These are said to be **organically-formed** sedimentary rocks. Coal, coral limestone, marble and peat are examples. Do you know that mineral oil or petroleum in the Albert Rift Valley in western Uganda has been formed in this type of sedimentary rock?



**Figure 8.3: Coal, coral limestone; and oil deposits in Albert rift valley**

Other sedimentary rocks are formed in very hot and dry areas experiencing a lot of evaporation. For example, **rock salt** is a rock formed when salty water evaporates and leaves behind salt crystals. When crystals accumulate, they harden and form a hard rock. This is called a

**chemically-formed sedimentary** rock. Other examples of chemically-formed sedimentary rock are gypsum and dolomite.

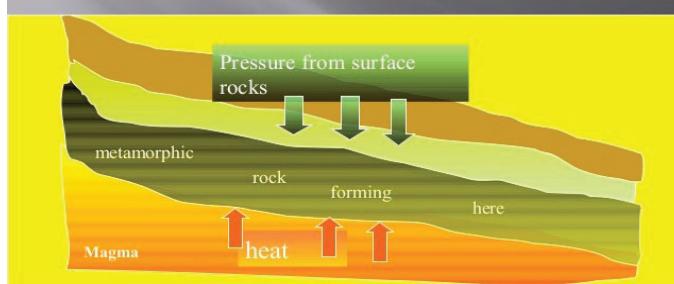
### Activity 8.6

In groups:

1. Discuss and suggest areas in East Africa where each type of sedimentary rock is likely to be found. Give reasons to support the areas you have suggested in each case.
2. Explain how each type of sedimentary rock may affect human activities in the area where it occurs.

The third main type of rock is formed when igneous or sedimentary rocks get changed into new rocks. This change may take place when the areas where these rocks are found experience too much heat or pressure. The heat may come from molten rock which rises from the interior of the earth at temperatures of 1,000 °C or even higher. The new rocks formed this way are called **metamorphic rocks**. For example, marble is a metamorphic rock formed when limestone or dolomite gets changed by heat or pressure. While slate, used for making nice finishes on modern houses, is formed from clay.

- Metamorphic rocks are formed by the effect of heat and pressure on existing rocks.
- This can greatly affect the hardness, texture or layer patterns of the rocks.



**Figure 8.4: How metamorphic rocks are formed**

Each type of rock influences the formation of landforms in a different way. This is because each type has different characteristics, such as hardness and the ability to absorb water.

**Activity 8.7**

1. Copy the map in Figure 7.1 into your notebook and on it shade the type of rock likely to be found in each relief region. Give reasons to explain the distribution of rocks you have shown on the map.
2. Suggest which type of rock is:
  - i) hardest
  - ii) softest
3. How might the landforms in each region have been influenced by the type of rock present?

*Formation of landforms in East Africa*

The landforms of the earth are of two major types. The first type is that of landforms that are formed by the rocks themselves. These are called **structural landforms**. The second type is made up of landforms formed when some processes, such as erosion, work upon rocks and change them into new landforms.

*The forces which shape the earth into landforms***Activity 8.8**

Using your knowledge about the relief regions of East Africa, in groups do the following tasks:

1. Discuss how the rift valley and highlands of East Africa were formed.
2. Suggest where the forces that led to the formation of those landforms originated.
3. What could have caused those forces?
4. Write a report of what you have discussed and share it with other groups through a class discussion.

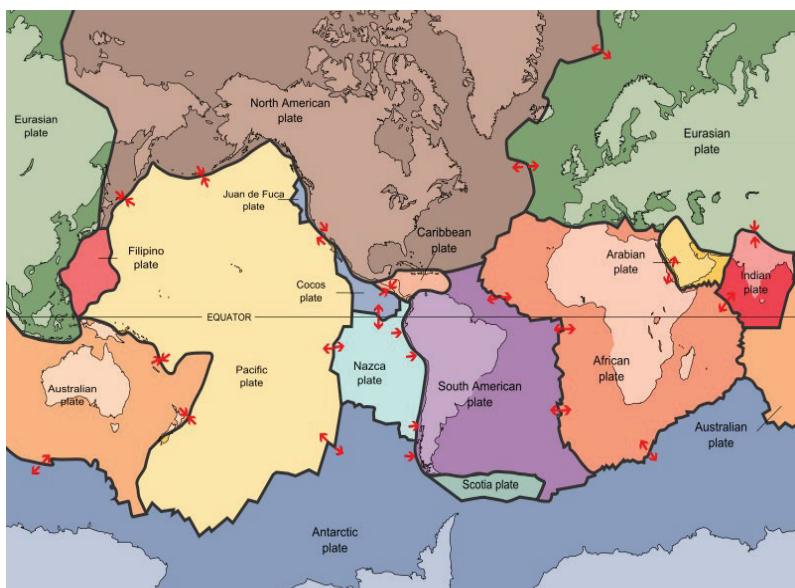
You have probably suggested that the rift valley and some highlands were formed as a result of faulting while other highlands were formed as a result of volcanic eruptions. Also, you could have suggested that both faulting and volcanic eruptions were caused by forces which originated in the interior of the earth. What is not very easy to understand is what caused those forces.

To understand why earthquakes, faulting, volcanic eruptions and folding take place, you need to learn about the nature of the earth.

### Activity 8.9

In pairs or individually, use Figure 8.5 to do the following:

1. Count the plates shown on the map.
2. Make a list of all the tectonic plates.
3. What do the arrows at the boundaries of tectonic plates indicate?



**Figure 8.5: Tectonic plates of the earth**

We cannot get information about the interior of the earth by drilling or mining. The deepest mine in the world is 4.0 km below the surface, and from the surface to the centre of the earth it is more than 6,000 km. By studying earthquakes **geologists** come up with information about the interior of the earth.

Geologists believe that the solid outer layer of the earth, which is about 100 km, rests over a thicker layer of semi-molten rock. As you have learnt in Activity 8.8, the outer layer is made up of solid rocks which can be acted upon by different processes to form landforms. The landforms of East

Africa are of two types namely, **structural landforms** and **erosional landforms**.

### *Earthquakes and landforms formed by faulting*

Have you ever felt an earthquake or heard of an area where it occurred? An earthquake is a sudden shaking of the ground caused by the passage of waves through the earth's rocks. Such waves are called **seismic waves**. Seismic waves are produced when some form of energy stored in the earth's crust is suddenly released within some limited region. Earthquakes most commonly occur in areas with rocks having lines of weakness called **fault lines** or simply **faults**.

#### **Activity 8.10**

Using your knowledge of the relief regions of East Africa:

1. Suggest areas in East Africa where earthquakes are most likely to occur.
2. Explain why you think the areas which you have suggested are likely to experience earthquakes.
3. Look at Figure 8.6 and explain how earthquakes affect people and their property.



(a)



(b)

**Figure 8.6: Effects of the Kagera earthquake, September 2016**

The energy released into the rocks of the earth can lead to large scale cracking or fracturing up to the surface of the earth. When this happens,

we say that faulting has taken place. For example, in Figure 8.5 (b), two fault lines have developed in the road. What do you think is likely to happen in the area if the ground is pulled apart along the fault lines?

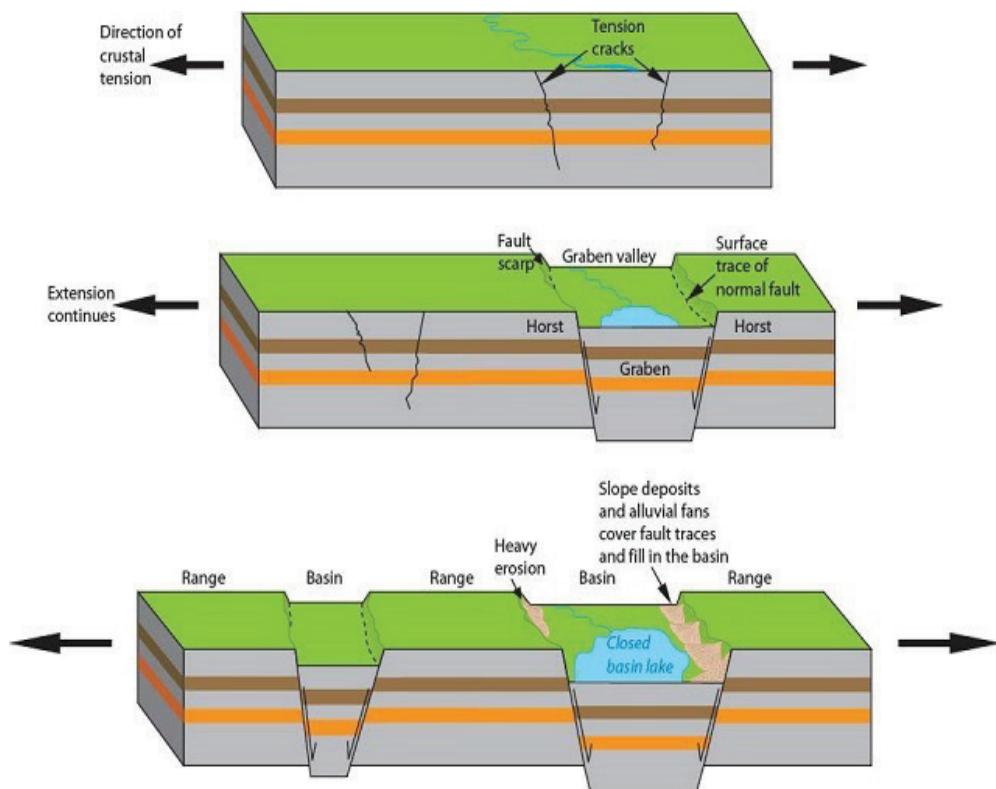
In the same way, when the rocks of the earth experience faulting, there is movement and displacement of land blocks along the fault lines. This leads to the formation of **rift valleys** and **Block Mountains** or **horsts**.

### Activity 8.11

In pairs or groups, study Figure 8.7 and do the following:

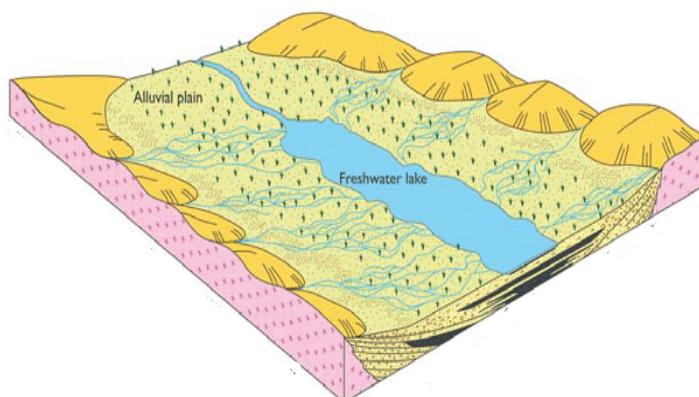
1. Copy the diagrams into your notebooks and give them labels 1-3 to identify the stages in the formation of faulted landforms.
2. Explain the process going on at each stage and how it affects the land block.
3. On the diagram in stage 3, show the rift valley and Block mountains.
4. Suggest how the rift valley and Block Mountains may affect the lives of people in areas where they are found.

The processes which you have described in the previous activity are similar to those that led to the formation of the East African Rift Valley and the Ruwenzori Mountains. The steep walls on both sides of the rift valley are called **fault scarps** or escarpments.



**Figure 8.7: Formation of landforms by faulting**

Within the rift valley, another phase of faulting can take place. This is called **secondary faulting** and it may lead to the formation of a secondary depression. When the secondary depression gets filled with water, it becomes a **rift valley lake**. See Figure 8.8.



**Figure 8.8: A lake in a small graben**

Lake Albert in western Uganda and Lake Tanganyika are examples of such lakes. Think of other examples of rift valley lakes in East Africa.

## Vulcanicity

### Activity 8.12

In groups,

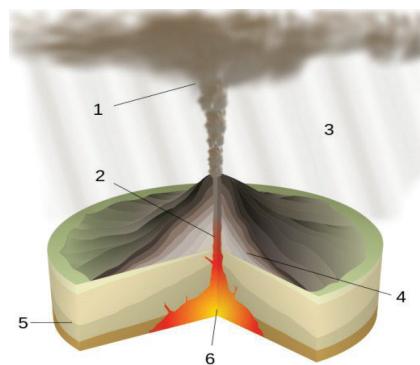
1. Think of the volcanic features you know in Uganda, East Africa, and other parts of the world.
2. Make a list those features.
3. Swap your list with another group and see the features you have in common.
4. Discuss and agree on what is meant by vulcanicity and volcanicity.

Imagine you are cooking porridge in a closed pot or kettle. What do you think will happen to the cooking porridge if you heat it at high temperature? You have probably thought of the porridge trying to escape by forcing the pot cover open or through the spout of the kettle.

In the same way, the solid layer of the earth on which we live rests upon a porridge-like inner layer. The inner layer is made up of molten rock material called **magma**. Apart from molten rock material, magma can also contain ash, cinders, and gases. To understand this, look at Figure 8.9.



(a)



(b)

**Figure 8.9: Magma being pushed out of a volcano**

Magma exists in a molten state because of the extremely hot temperature in the interior of the earth. When magma gets overheated, the pressure inside the inner layer rises and forces the molten rock to rise like boiling porridge. The cracks or openings through which magma is forced out of the interior of the earth are called volcanic vents. The process by which magma escapes from the interior of the earth is called a volcanic eruption.

When magma reaches the surface of the earth, it cools, becomes solid and forms a rock called **lava**. All physical features formed from lava are called **volcanic features**.

### *Features of a volcano*

#### **Activity 8.13**

In pairs,

1. Carry out a library or internet search about the features of a volcano.
2. Copy Figure 8.9 (b) into your notebooks and using the information you have got from the search, name the features labelled 1-6.

When volcanic eruptions occur, they do not lead to the formation of volcanic mountains only but also create other landforms. Volcanic eruptions also lead to the formation of lakes.

#### **Activity 8.14**

In groups,

1. Carry out a library or internet search on landforms resulting from volcanic eruptions.
2. Make a list of the major landforms and draw diagrams to explain how each landform is formed.
3. Find out the types of lakes formed due to volcanic eruption; and draw diagrams to explain how each type is formed.
4. Suggest how the volcanic landforms and drainage features might be useful to people.
5. Suggest the disadvantages associated with volcanic landforms and lakes.

## Warping

In Chapter Seven, you learnt that much of East Africa is a plateau. What do you understand by a plateau? The East African plateau has been affected by many processes which have created depressions and hills. Some of the large depressions have been filled with water to form lakes.

### Activity 8.15

In groups,

1. Choose two people to hold a sheet of newspaper or a piece of cloth by its corners.
2. Let them slowly lift the extreme ends of the paper or cloth as the rest of you observe and note down what happens.
3. Write down what you have observed and draw a diagram to illustrate your observation.
4. Share what you have written and the diagram you have drawn with other groups through a whole class discussion.

What you have observed is called sagging. In the same way, when certain parts of the East African plateau were acted upon by forces which originated in the interior several million years ago and pushed the eastern and western sides of the plateau upwards, the central part sagged in. That process is called **down warping**. It led to the formation of very large depressions. These depressions are now occupied by lakes.

### Activity 8.16

In pairs,

1. Open the atlas and look at the map of East Africa showing physical features.
2. Suggest lakes in East Africa which were formed as a result of down warping. Give reasons to support your suggestion.
3. Draw a sketch map of East Africa showing the down warped lakes and other drainage features connected to them.

## Activity of Integration

Imagine strong earth movements have occurred in Butinnindi village, in central Uganda. Using diagrams to illustrate your ideas, explain any two effects these earth movements might have on the landscape in the area. Suggest how those effects on landscape might affect the way people in Butinnindi live; and the problems which might arise from the change in the landscape.

## Chapter Summary

In this chapter, you have learnt that:

1. all the landforms of the earth are made up of rocks.
2. every rock is made up of several minerals, some of which are useful to us.
3. the rocks of the earth can be divided into three types depending on how they were formed.
4. East Africa has different landforms because the region has been affected by several physical processes, including earth movements.
5. structural landforms were formed by processes originating in the movement of tectonic plates.
6. landforms have a strong influence on the drainage of an area.
7. rocks, landforms and drainage influence the way people live, especially the economic and leisure activities they carry out.

# Chapter Nine

## Climate and Natural Vegetation of East Africa



### TROPICAL RAIN FORESTS

These forests grow in areas where rainfall is more than 200 Cms.

They include the tropical semi-evergreen forests and Tropical evergreen Forests.

The trees do not have any particular season to cast off their leaves.

The forests are also known the archetypal rain forests.

Key Words	After reading this chapter and practising its activities, you should be able to:
<ul style="list-style-type: none"> <li>• Arid climate</li> <li>• Diurnal range</li> <li>• Double maxima</li> <li>• Equatorial climate</li> <li>• Leeward side</li> <li>• Montane climate</li> <li>• Rain shadow</li> <li>• Savanna climate</li> <li>• Semi-arid climate</li> <li>• Steppe</li> <li>• Windward side</li> </ul>	<p data-bbox="596 1101 1260 1710"> <b>a)</b> understand the characteristics of the climates of Uganda and the rest of East Africa and the factors influencing them.  <b>b)</b> understand through fieldwork the characteristics of the vegetation and how it is affected by the climates.  <b>c)</b> draw graphs to show the different climates.  <b>d)</b> draw a map showing the climates and vegetation of East Africa.  <b>e)</b> recognise and describe a climate from a graph.  <b>f)</b> recognise and describe types of vegetation from photographs.  <b>g)</b> understand through case studies how selected climates and types of vegetation affect the way of life of the people in those areas.     </p>

## Introduction

In this chapter, you are going to learn about the different types of climate and natural vegetation in East Africa. You are going to learn how these two are natural resources that need to be appreciated and sustainably used for the benefit of the people of Uganda in all generations.

### Activity 9.1

1. Explain what you understand by climate.
2. List any five climates you know.
3. Describe two of the climates listed above.

You have probably used words like hot, wet and dry to describe the two climates. Describing climate means pointing out its main **characteristics**. It is these characteristics that differentiate one climate from another. You are going to learn about the characteristics of the main climates in East Africa.

## What are the Characteristics of the Main Types of Climate?

Learning about the characteristics of climates will help you to understand why each climate is different from other climates. This will enable you to understand why there are many types of climate in East Africa.

### Equatorial Climate

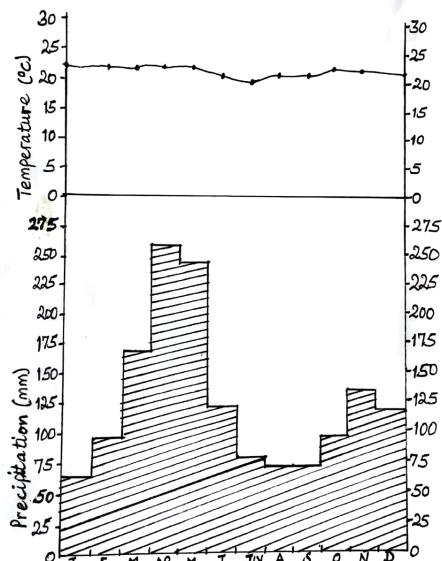
This climate is found in areas that lie between 5°N and 5°S of the Equator. In East Africa, the Equatorial climate is experienced around the Lake Victoria basin, including the islands within the lake. To understand this better, do Activity 9.2.

### Activity 9.2

In pairs or individually, study Figure 9.1 and do the following tasks:

1. Write down the months in which the highest amount of rainfall is received at Entebbe.

2. How many seasons of highest rainfall does Entebbe experience? Why do you think the area experiences that number of seasons?
3. Is the relative humidity at Entebbe high or low? Give reasons to support your answer.
4. Calculate the annual range of temperature for Entebbe. Is the range high or low?
5. Calculate the total annual rainfall for Entebbe. Is the rainfall low, moderate, or heavy?



**Figure 9.1: An equatorial climate, Entebbe**

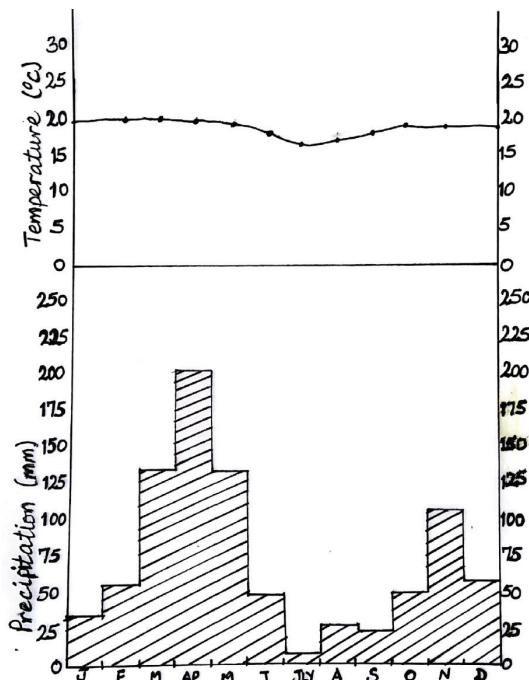
The climate of Entebbe is similar to that of other areas within the Lake Victoria region of East Africa. You have realised that areas with an Equatorial climate receive two peaks of heavy rainfall. This is called **double maxima** rainfall distribution. The climate of the Lake Victoria region is called **Modified Equatorial** climate. That means that this region receives heavier rainfall than other equatorial lands and does not have any month without rainfall.

### Mountain or Montane Climate

This type of climate is mainly found in the highlands, especially in the mountains. Think of areas in East Africa which are likely to be having this

type of climate. In these areas, temperatures are generally low and air pressure decreases with altitude. Areas with the montane climate receive mainly relief rainfall, which is heavier on the windward side. The leeward side receives very little rainfall. Why do you think this is so? The condition you have explained is called the **rain shadow** effect.

To understand the characteristics of Mountain climate, study Figure 9.2



**Figure 9.2: A mountain type of climate**

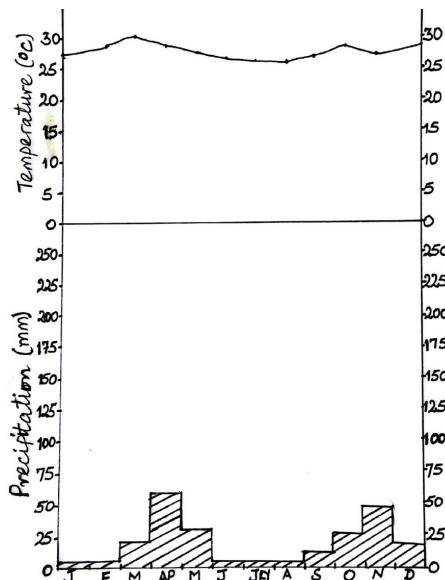
### Activity 9.3

Study Figure 9.2 and do the following tasks:

1. Which months have the highest rainfall?
2. Which months have the lowest rainfall?
3. Describe rainfall distribution in Nairobi.
4. Which are the hottest months?
5. Which months have the lowest temperatures?
6. Calculate the total rainfall for Nairobi.

7. Copy the graph into your notebook.

## Semi-arid and Arid Climate



**Figure 9.3: Semi-arid climate, Wajir, Kenya**

### Activity 9.4

In groups, study Figure 9.3 and do the following:

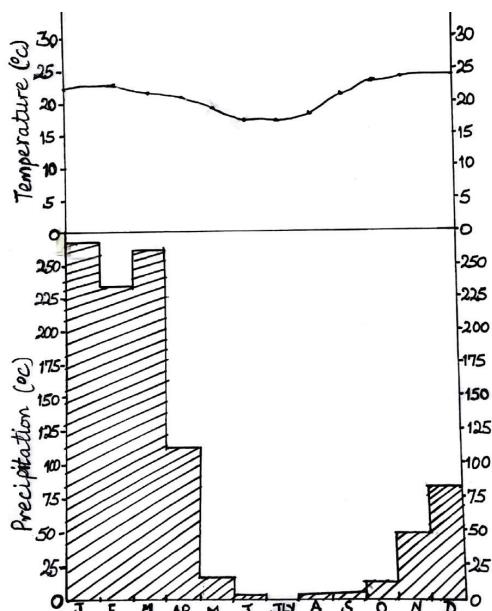
1. Copy the figure into your notebooks.
2. Find out the months with the heaviest rainfall.
3. Which months have the lowest rainfall?
4. Describe the characteristics of the climate of the area represented by Figure 9.3.
5. Suggest the likely economic activities carried out by the people living in the area represented by the graph. Give reasons for each activity you suggest.

This type of climate is found in northern and north-eastern Kenya, e.g. the Chalbi Desert, Karamoja in north-eastern Uganda, Nyiri desert in southern Kenya, in central Tanzania and in north-eastern parts of Tanzania, e.g. the Masai **steppe**. It is also experienced in the Ankole-Masaka corridor in

Uganda. Areas in the Western Rift Valley region around Lake George and Lake Edward also experience a semi-desert climate.

## Tropical or Savannah Climate

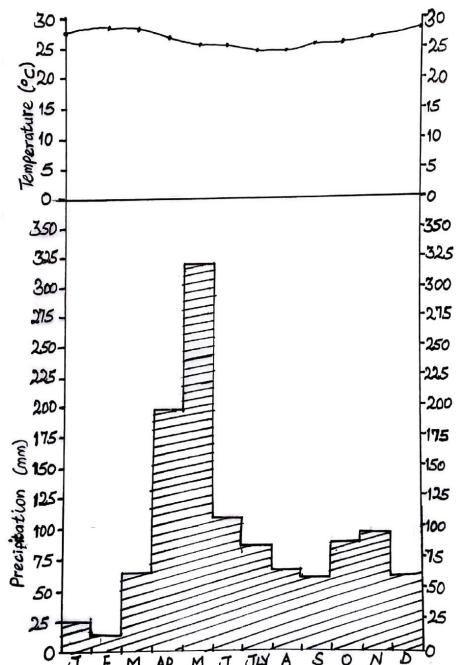
This type of climate covers the greatest part of East Africa. It is found next to the equatorial region, both north and south of the equator. It may not differ much from the equatorial climate. Generally, Savannah lands receive less rainfall than places in the Equatorial climate region. Also, they have well marked rainy and dry seasons. You can understand the other characteristics of the Savannah climate by studying Figure 9.4.



**Figure 9.4: Tropical climate, Songea, Tanzania**

## The Coastal Tropical Climate

This type of climate is experienced in the coastal region of East Africa in places like Malindi, Mombasa, Tanga and Dar es Salaam. The climate is modified by the Southeast Trade Winds and the sea. The rainfall is heavy and well distributed throughout the year and ranges between 1,000 mm and 1,800 mm. The area experiences high temperatures throughout the year. Why do you think temperatures are hot in this region? Figure 9.5 is a climate graph of Mombasa, an area with a coastal tropical climate.



**Figure 9.5: A typical coastal tropical climate, Mombasa, Kenya**

## What Factors Influence Climate in East Africa?

In Chapter Five, you learnt about the revolution of the earth while in Chapter Seven you learnt about the relief of East Africa. Now you are going to learn how these and other factors affect the climate of East Africa, including that of your home area.

### Activity 9.5

In pairs or groups, use your knowledge of the movements of the earth to do the following tasks:

1. When is the sun overhead at the equator?
2. Explain what happens in the region close to the equator when the sun is overhead at the equator.
3. Why does the region close to the equator receive two peaks of rainfall?
4. When is the sun overhead at the Tropic of Cancer?

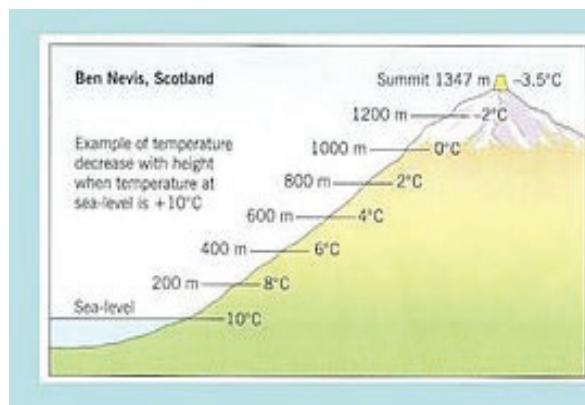
5. When do areas close to the Tropic of Cancer receive rain and why?
6. When is the sun overhead at the Tropic of Capricorn?
7. When do areas close to the Tropic of Capricorn receive rainfall and why?
8. Share what you have written through a whole class discussion.

## The Inter Tropical Convergence Zone (ITCZ)

The overhead sun causes much heating of the ground. This in turn causes a low pressure zone which attracts winds from high pressure zones. The low pressure zone within the tropics in which the winds from the northern and southern hemispheres meet is called the **Inter Tropical Convergence Zone (ITCZ)**. The ITCZ keeps on moving following the position of the overhead sun. Warm air rises, which leads to conventional rainfall. The conventional rains in most cases are stormy, so this region is referred to as the **thunderstorm zone**. The seasonal rainfall pattern in most parts of East Africa is caused by the ITCZ.

## Height

Another important factor influencing the climate of East Africa is height of land above sea level. It is also called **altitude**. Imagine you are flying in a balloon with a thermometer in your hand. The thermometer reading will drop as you rise higher. This is illustrated in Figure 9.6.

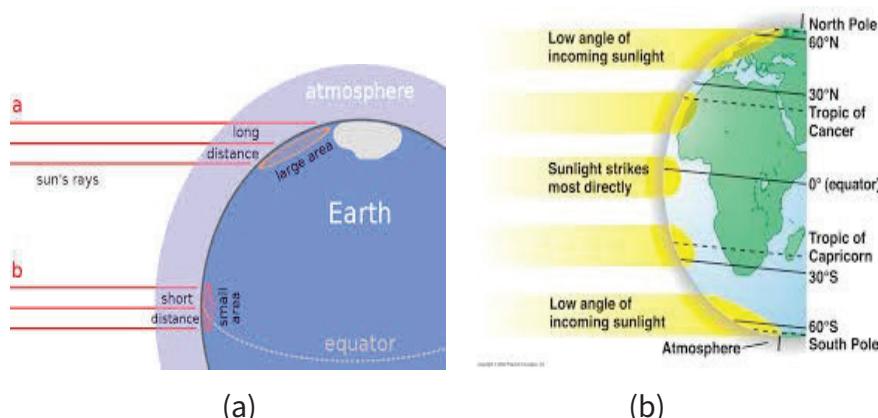


**Figure 9.6: How altitude affects temperature**

This means that temperature decreases with a rise in height. This is because air is thin, dry and dust free at high altitudes. Such air cannot absorb and keep much heat. This implies that altitude influences temperature and climate.

## Latitude

The areas within the tropics,  $23\frac{1}{2}^{\circ}\text{N}$  and  $\text{S}$  of the equator receive the most heat because the sun is overhead in these areas all year round. East Africa lies astride the equator  $4^{\circ}\text{N}$  to  $12^{\circ}\text{S}$ . The region experiences a Tropical-Equatorial climate with constant heat and conventional rainfall. Figure 9.6 shows the influence of latitude on the climate of East Africa.



**Figure 9.7: Influence of latitude on climate in East Africa**

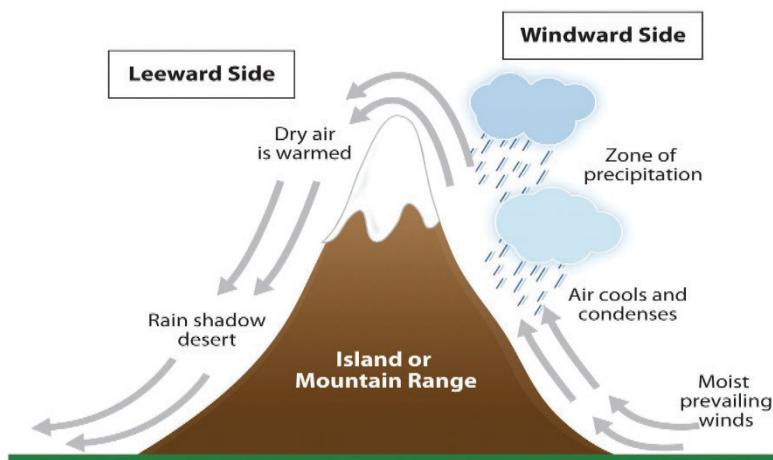
### Activity 9.6

1. Copy the figure into your exercise book.
2. Explain what is taking place in the diagrams above.

## Relief

Relief influences the formation and distribution of rainfall in East Africa. Rain is formed when warm, moist air blows over a mountain. The warm, moist air condenses, and forms clouds and rainfall. The side of the mountain from which the prevailing winds blow receives heavy rainfall. This is called the **windward side**. The side to which the winds move after

dropping rainfall receives little or no rainfall. This is called the **leeward side**. The leeward side is said to be in the **rain shadow**. Figure 9.8 below shows how relief influences rainfall.



**Figure 9.8: Influence of relief on rainfall**

### Activity 9.7

In your notebook:

1. Make notes on how the highland regions in East Africa influence rainfall formation and distribution.
2. Copy the figure above.

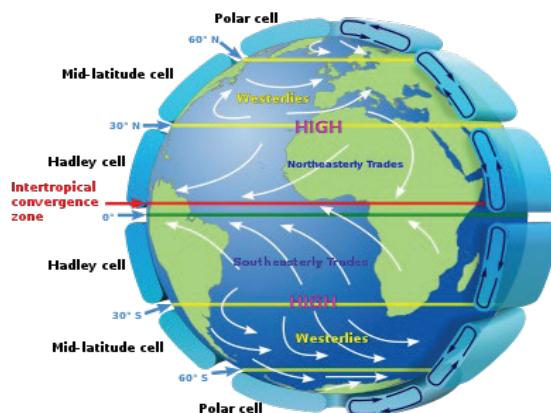
## Distance from the Sea

In East Africa, the Indian Ocean has a great effect on rainfall and temperature. Coastal areas, for example Dar es Salaam and Mombasa, are wetter than inland areas. Clouds form when warm air from inland areas meets cool air from the sea.

## Rotation of the Earth

If the earth were not rotating, winds would move straight from one pole to the other. This is not the case, however. As the earth rotates on its axis, its

speed is highest at the equator. This causes the winds blowing from the poles southwards and northwards to change their direction as they cross the equator. When this happens, we say that the winds have been **deflected**. Winds in the Northern Hemisphere are deflected to the right while those in the Southern Hemisphere are deflected to the left. This means that the deflected winds are forced to cause rainfall in a different area. For example, in December, the southeast shores of Lake Victoria are warmer and wetter because the winds are deflected to the area. See Figure 9.9.



**Figure 9.9: Effects of deflected winds on climate**

## The Alignment of the Coast

In East Africa, the Kenyan coast lies parallel to the Northeast Trade Winds because the coast bends inwards. The islands of Pemba and Zanzibar lie in opposition to the wind direction, so they receive relief rainfall, while the coast of Kenya remains dry between October and December. Figure 9.10 shows the straight alignment of the East African coast.



**Figure 9.10: Alignment of the East African coastline**

### Activity 9.8

In your notebook:

1. Copy the figure above.
2. On the map, mark the Southeast and the Northwest Trade Winds.
3. Explain why the coastal areas of East Africa receive little rainfall.
4. Read the summary below and copy it.

### Activity 9.9

In groups, do the following:

1. Move around the local area.

2. Observe the type of vegetation in the area.
3. List the types of vegetation observed.
4. Write down the characteristics of the different types of vegetation.
5. Identify the climate in the local area.
6. Discuss how climate affects each type of vegetation.
7. Write a group report with diagrams of the type of vegetation observed and present it to the class.
8. Discuss the dangers of overuse of vegetation.
9. Copy the table below and fill it in.

## Types of Vegetation in East Africa

Country	Types of vegetation	Characteristics of vegetation
Tanzania		
Uganda		
Kenya		

**Figure 9.11: Types and characteristics of vegetation in East Africa**

### How climate and vegetation types affect people's ways of life

#### Activity 9.10

In pairs or individually, read the extract below and do the tasks that follow:

The climate of Kalangala district is generally moist and humid all year round. The area has small seasonal variations of temperature, humidity and wind throughout the year. The dry season is experienced between December and March, and again in June–July. The two periods have frequent thunderstorms.

The climate is characterised by high annual rainfall amounts that are well distributed. The mean annual rainfall received ranges from 1,125 to 2,250 mm.

The annual rainfall is highest over the open lake and there is a marked gradient drop of 50 mm per 1.6 km landward. The windward shores of the lake shores exposed to the moist air are wetter than the lee shores, which are sheltered from the moist winds. The rainfall maxima are associated with the onset of the southeast (SE) or northeast (NE) Monsoon winds.

The vegetation in Kalangala district is predominantly characterised by medium altitude moist evergreen forests. This vegetation occurs at altitudes ranging from 600 to 1,550 m. It forms closed stands rising 30 to 45 metres high, with abundant lianas. Grasses are generally absent or are broad-leaved and fire-sensitive.



**Figure 9.12: Tropical rainforest**

The lakeside consists of dense and impenetrable forests with numerous shrubs on the ground. There are also small to medium sized evergreen tree species with roots extending to as high as 3.6 m up the main stem.

The district is richly endowed with tropical high forest resources covering 221.5 km<sup>2</sup>. The predominant forest cover in the district comprises tropical high forest species. Most of the forest is filled with primates such as monkeys and other species of wildlife, including the sitatunga antelopes and exotic bird species. The Ssese islands are truly a bird watchers' paradise.

There are a variety of fruits on the island. These include mangoes, bananas, papaya, watermelons, pineapples and jackfruit. Timber and fuel constitute the major commercial benefits of forests for the residents. As a result of these two commercial uses, the forest resources are heavily exploited.

Agriculture is the second major economic activity in the district. There are two main farming activities in Kalangala district, i.e. livestock rearing and food and cash crop production. Robusta is the main cash crop grown. The food crops comprise mainly bananas, sweet potatoes, beans and a variety of vegetables. The bananas are generally stunted and produce undersized bunches. Robusta coffee trees grow well around homesteads. The yield of the coffee trees is not as high as on the mainland.

(Adapted from: *Kalangala District, State of the Environment Report, 2005*)

1. In about three sentences, summarise the climate of Kalangala district.
2. Explain why the windward side of the lake shore gets more rainfall than the leeward side.
3. List the economic activities carried out in Kalangala district.
4. Describe the characteristics of the forests in Kalangala district.
5. Basing on the natural resources mentioned in the extract, suggest other likely economic activities carried out in Kalangala that are not mentioned in the extract.
6. Imagine you live in this district. What economic activities would you carry out and why?
7. If you were living in this area, what types of clothes would you wear and why?

## Drawing a Climate Graph

Climate figures are always shown in a table, as you can see in Figure 9.13. This information can also be shown on a bar graph. When you look at the graph, you are able to understand the information more easily than when it is in a table. From the graph we can describe the climate of an area. You are going to draw a climate graph using the information in Figure 9.13.

**Activity 9.11**

Study the table in Figure 9.13 and do the activity that follows.

	J	F	M	A	M	J	J	A	S	O	N	D
Temp (°C)	21	21	21	22	22	21	21	21	21	21	21	21
Rainfall (mm)	155	176	243	357	288	80	49	69	99	165	211	209

**Figure 9.13: Climatic statistics for Bukoba, Tanzania**

1. Copy the table into your exercise book.
2. Draw a graph to represent the climate of Bukoba.
3. Which is the hottest month in the year?
4. Which is the wettest month at Bukoba?
5. Calculate the total annual rainfall for Bukoba.
6. Describe the rainfall distribution at Bukoba.
7. Explain the relationship between temperature and rainfall distribution at Bukoba.

**Activity 9.13**

1. Using the internet or other sources, make notes on the different vegetation types of East Africa.
2. Draw a map of East Africa showing the vegetation types.
3. Explain the ways of life of people living in each vegetation zone.

## What are the Factors that Affect the Climates of East Africa?

The differences in the climatic patterns you have given above are due to a number of factors. These factors are mainly physical in nature. In some regions human activities are increasingly playing a role. These factors include relief/altitude, water bodies, the Inter Tropical Convergence Zone (ITCZ), latitudes, the location of the earth, coastal alignment, vegetation cover, the distance from the sea, wind masses and human activities.

### Activity 9.14

In pairs or groups:

1. Conduct library research and make notes about factors influencing the climate of East Africa.
2. Present your report to the class through discussion.

### Activity of Integration

Climatic statistics for station Y

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Rainfall (mm)	8	25	76	132	175	150	178	180	140	112	145	36
Temperature (°C)	26	27	26	26	24	24	23	23	24	24	25	24

Study the table above and do the following tasks:

1. Calculate:
  - i) the total annual rainfall for station Y.
  - ii) the mean annual temperature for station Y.
2. Draw a suitable graph to represent the climate of station Y.
3. Using the graph you have drawn, describe the climate of station Y.
4. Suggest the type of vegetation found in the region where station Y is located. Give reasons to support your suggestion.
5. Draw a map of East Africa and on it shade the likely regions where station Y is located.
6. If you were given a chance to settle in the area where station Y is found, what kind of economic activities would you carry out? Give reasons to support the choice of each activity you suggest.

## Chapter Summary

In this chapter, you have learnt:

1. that East Africa has several climates because the region has different relief features, water bodies, and winds blowing across the region.
2. the different types of vegetation in East Africa and their characteristics.
3. how the different climates and vegetation types of East Africa are distributed and related.
4. that people's way of life is largely influenced by climate and partly by vegetation.
5. how the apparent movement of the sun and the movement of the ITCZ affect temperature, wind movement and distribution of rainfall in East Africa.

## Glossary

**Centimetre** – A measure of distance in the metric system. A centimetre (cm) is slightly less than half an inch.

**Climate** – The pattern of weather that a place has over a period of years. Temperature and precipitation are the two most important elements of weather that are used to describe climate.

**Compass rose** – A small line drawing on a map, used to show directions.

**Coral** – A type of limestone rock substance made up of the skeletons of a certain type of tiny sea animals.

**Equator** – A line drawn on maps and globes, that runs round the earth exactly halfway between the North Pole and the South Pole. It is labelled 0° latitude. In Uganda, the equator is well marked on the surface of the earth in several places like at Kayabwe, Kikorongo and on Equator Island in Lake Victoria, Entebbe Municipality.

**Environment** – All the natural and human features surrounding us. Vegetation, water bodies, soil, gardens, buildings and lawns are our environment.

**Hail** – Precipitation in the form of pieces of snow. It falls as stones called hailstones.

**Hemisphere** – The name given to any half of the earth.

**Humid** – Damp or wet. Humidity is the measure of the amount of water vapour in the air at any given time.

**Key** – A device on a map which is used to tell what real things or places the symbols on the map stand for or represent.

**Landform** – A natural feature of the earth's surface. A hill, valley or mountain is a landform.

**Landmark** – Something or an object which is easily recognisable in an area.

**Latitude** – Distance, measured in degrees, north or south of the equator. Lines of latitude are used to locate places on the earth.

**Longitude** – Distance, measured in degrees, east or west of the Prime Meridian. Lines of longitude are used to locate places on earth. All lines of longitude pass through the North Pole and the South Pole.

**Meridian** – Another name for a line of longitude.

**Mineral** – A natural substance found in the earth, that is neither plant nor animal.

**Mountain** – A part of the earth's surface that rises sharply from the land around it. A mountain has a wide base and narrows to a peak.

**North Pole** – The northernmost place in the world. The North Pole is located in the Arctic Ocean.

**Orbit** – An oval shaped path followed by a planet as it moves around the sun. The earth revolves around the sun following its orbit.

**Plateau** – A large, high, nearly level area that is raised above the surrounding land. Much of Uganda is a plateau.

**Precipitation** – Moisture that falls from the atmosphere on to the surface of the earth in the form of rain, snow, sleet, hail, fog or mist.

**Prime Meridian** – A line of longitude that passes through the Royal Observatory in Greenwich, England. It is also known as the Greenwich Meridian. It is the  $0^{\circ}$  line of longitude, from which distances east or west are measured in degrees.

**Questionnaire** – A written list of questions used to collect information about people and their activities during fieldwork study. It is usually given to the person to read and fill in the relevant answers.

**Revolution** – One complete turn of the earth around the sun. It usually takes the earth  $365\frac{1}{4}$  days to complete its revolution.

**Rotation** – The movement of the earth that involves spinning on its axis. The earth takes 24 hours to complete one rotation.

**Scale** – The relationship between the real size of features or objects and the size used to represent the same features or objects on a map or model. Also, the numbered line drawn on maps, which shows this relationship.

**Sleet** – Rain falling as frozen water.

**South Pole** – The southernmost place in the world. The South Pole is located in the continent of Antarctica.

**Symbol** – Something that stands for, represents or suggests something else.

**Temperature** – The amount of heat or cold as measured on a given scale, such as the Celsius or Centigrade scale. It tells how hot or how cold something is.

**Tropic of Cancer** – A line of latitude that runs round the earth at  $23\frac{1}{2}^{\circ}$  north of the equator.

**Tropic of Capricorn** – A line of latitude that runs round the earth at  $23\frac{1}{2}^{\circ}$  south of the equator..

**Valley** – A long, low area, usually found between hills or mountains or along a river.

**Volcano** – An opening in the earth, out of which smoke, other gases, ashes and molten rock may pour from time to time.

**Weather** – The condition of the air surrounding the earth at a certain time, in terms of precipitation, temperature and other elements.

**Weather station** – The place where the conditions which determine the weather of an area are monitored and recorded.





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