THE REPUBLIC OF UGANDA

Ministry of Education and Sports

HOME-STUDY LEARNING

GEOGRAPHY

August 2020

NCDC
NATIONAL CURRICULUM DEVELOPMENT CENTRE

Published 2020

This material has been developed as a home-study intervention for schools during the lockdown caused by the COVID-19 pandemic to support continuity of learning.

National Curriculum Development Centre
P.O. Box 7002,
Kampala- Uganda
www.ncdc.go.ug

FOREWORD

Following the outbreak of the COVID-19 pandemic, government of Uganda closed all schools and other educational institutions to minimize the spread of the coronavirus. This has affected more than 36,314 primary schools, 3129 secondary schools, 430,778 teachers and 12,777,390 learners.

The COVID-19 outbreak and subsequent closure of all has had drastically impacted on learning especially curriculum coverage, loss of interest in education and learner readiness in case schools open. This could result in massive rates of learner dropouts due to unwanted pregnancies and lack of school fees among others.

To mitigate the impact of the pandemic on the education system in Uganda, the Ministry of Education and Sports (MoES) constituted a Sector Response Taskforce (SRT) to strengthen the sector's preparedness and response measures. The SRT and National Curriculum Development Centre developed print home-study materials, radio and television scripts for some selected subjects for all learners from Pre-Primary to Advanced Level. The materials will enhance continued learning and learning for progression during this period of the lockdown, and will still be relevant when schools resume.

The materials focused on critical competences in all subjects in the curricula to enable the learners to achieve without the teachers' guidance. Therefore effort should be made for all learners to access and use these materials during the lockdown. Similarly, teachers are advised to get these materials in order to plan appropriately for further learning when schools resume, while parents/guardians need to ensure that their children access copies of these materials and use them appropriately.
I recognise the effort of National Curriculum Development Centre in responding to this emergency through appropriate guidance and the timely development of these home study materials. I recommend them for use by all learners during the lockdown.

Alex Kakooza
Permanent Secretary
Ministry of Education and Sports

ACKNOWLEDGEMENTS

National Curriculum Development Centre (NCDC) would like to express its appreciation to all those who worked tirelessly towards the production of home–study materials for Pre-Primary, Primary and Secondary Levels of Education during the COVID-19 lockdown in Uganda.

The Centre appreciates the contribution from all those who guided the development of these materials to make sure they are of quality; Development partners - SESIL, Save the Children and UNICEF; all the Panel members of the various subjects; sister institutions - UNEB and DES for their valuable contributions.

NCDC takes the responsibility for any shortcomings that might be identified in this publication and welcomes suggestions for improvement. The comments and suggestions may be communicated to NCDC through P.O. Box 7002 Kampala or email admin@ncdc.go.ug or by visiting our website at http://ncdc.go.ug/node/13.

Grace K. Baguma
Director,
National Curriculum Development Centre

ABOUT THIS BOOKLET

Dear learner, you are welcome to this home-study package. This content focuses on critical competences in the syllabus.

The content is organised into lesson units. Each unit has lesson activities, summary notes and assessment activities. Some lessons have projects that you need to carry out at home during this period. You are free to use other reference materials to get more information for specific topics.

Seek guidance from people at home who are knowledgeable to clarify in case of a challenge. The knowledge you can acquire from this content can be supplemented with other learning options that may be offered on radio, television, newspaper learning programmes. More learning materials can also be accessed by visiting our website at www.ncdc.go.ug or ncdc-go-ug.digital/. You can access the website using an internet enabled computer or mobile phone.

We encourage you to present your work to your class teacher when schools resume so that your teacher is able to know what you learned during the time you have been away from school. This will form part of your assessment. Your teacher will also assess the assignments you will have done and do corrections where you might not have done it right.

The content has been developed with full awareness of the home learning environment without direct supervision of the teacher. The methods, examples and activities used in the materials have been carefully selected to facilitate continuity of learning.

You are therefore in charge of your own learning. You need to give yourself favourable time for learning. This material can as well be used beyond the home-study situation. Keep it for reference anytime.

Develop your learning timetable to ca ter for continuity of learning and other responsibilities given to you at home.

Enjoy learning

Term 1

TOPIC: INLAND WATER TRANSPORT; A CASE STUDY OF GREAT LAKES AND ST. LAWRENCE SEAWAY

Sub-Topic: The Construction of Great Lakes and St. Lawrence Seaway Project

Lesson 1: Reasons for construction of the St. Lawrence Seaway and Problems faced

By the end of this lesson you should be able to:

i) use the map of North America to show major lakes.
ii) describe the aims for construction of St. Lawrence Seaway.
iii) explain the problems faced during the construction of St. Lawrence Seaway.

You will need:
notebook, pen, pencil, rubber, ICT tools

Instructions

- Try to do all the activities programmed for each day
- Remember that some activities may take more than one hour to complete
- Read instructions carefully before you begin doing each activity
- In case you find an activity difficult, ask an older person around to assist you.

Introduction
In lesson 2, you learnt about problems which were faced on water transport on Great lakes and St. Lawrence River before the construction of the Seaway. In this lesson you are going to learn about aims for construction and problems still faced on the Seaway.

These problems which were faced on water transport are referred to as shipping hazards which made navigation difficult from the Atlantic coast to the interior of United States of America and Canada.

Activity 1
Read the text and answer the questions that follow:
Assuming in your home area, you have a river whose course is narrow and shallow. At the shallow point the river deposits large amounts of silt. This has resulted in floods in the surrounding areas. Still in its course there are sections with several islands or rocks twining several times.

There are points on its course where it falls sharply over a hard rock forming waterfalls. This limits navigation at this point. However, these obstacles are not found along the whole course of the river. There are sections which are clear and navigable.

1. Do you think the river in your home area can be used for transport?
2. What should be done by leaders in your home area to improve water transport on that river?
3. What objectives would you set up to guide construction of a project similar to the St. Lawrence Seaway on the river?

4. Which problems are leaders likely to face while constructing the project on the river in your home area?
5. Do you think the objectives for the construction of the St. Lawrence Seaway were similar to the ones you have suggested for the river project in your home area?

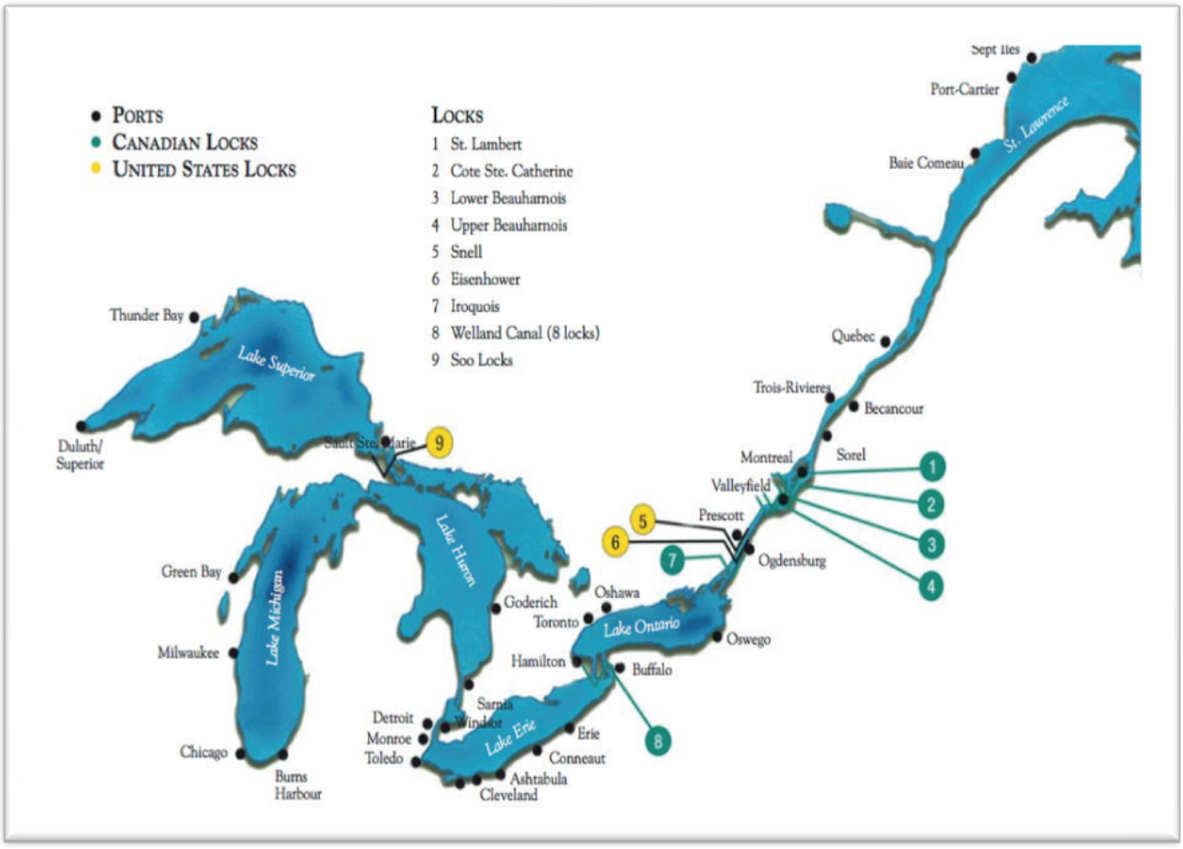


Figure 1.1: Map Showing the Great Lakes and St Lawrence Seaway

Activity 2

1. Using the knowledge, you have acquired about the river in your home area, explain four conditions which led to the construction of St. Lawrence Seaway?
2. What problems did the constructors face during the construction of St. Lawrence Seaway?

Activity 3

1. In your notebook, draw the map of Uganda showing Lakes and Rivers
2. Using the knowledge of St. Lawrence Seaway project, what do you think, are problems facing water transport in Uganda today?

Figure 2: Map of Uganda showing lakes and rives

Follow-up Activity

1. Cope the table below in your note book and fill in lakes and rivers used for transport in North America and Uganda

Table 1

	North America	Uganda
4 Lakes		
2 Rivers		

2. How can the Government of Uganda use the ideas from the St. Lawrence Seaway project to improve water transport in the country?
3. Describe the shipping hazards which hindered navigation along St. Lawrence River and the Great Lakes before the construction of the St. Lawrence Seaway.

Summary

In this lesson you have learnt that:

- USA and Canada faced different problems during the construction of St. Lawrence Seaway which include flooding of the Seaway, freezing during winter, and fog which used to affect visibility.
- The aims for construction of the seaway were: to ease transportation of bulky raw materials, to generate power, to overcome rapids and waterfalls.

Glossary	
Traffic	Vehicles moving on the road
Congestion	Many ships or vehicles on the road or on the water way.
Vessels	Ships or large boats used for transport.
Gates	Outside wall
Dredging	To remove mud or sand
Hazards	Something dangerous or cause accident
Hindered	To make something difficult to happen
Locks	Part of the river or canal that you close with gates to raise or lower the level of water
Canals	A long narrow area of water made for ships to travel along.
Navigation	When you decide which direction your ship should go on the water body
Coast	The land next to the sea
Interior	The inside part of something
Aims	Something you want to achieve

References:

1. Geography of North America by R. G White
2. Geography of North America by David Waugh
3. Geography of North America by Matovu Yiga

TOPIC: ST. LAWRENCE SEAWAY AND GREAT LAKES REGION

Sub-topic: Construction of St. Lawrence Seaway project

Lesson 2: Transportation along the Great Lakes and St. Lawrence Seaway and Problems faced

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

i) explain problems which are still being faced on St. Lawrence Seaway and in the Great Lakes Region.
ii) suggest possible solutions to problems still being faced along the seaway.
iii) identify commodities transported along the seaway.

What you need:

notebook, pen, ICT tools (where possible), pencil, rubber

Introduction

In Lesson 2 you learnt that, problems which faced water transport on Great lakes and St. Lawrence River were mainly natural barriers such as waterfalls, rapids, gradient differences and shallow stretch of the river. These have been overcome by the construction of locks and canals, constant dredging to maintain the depth of over seven

point five meters for the use of wheat carriers, cargo burgers and freighters. Engineering skills had to be applied to modify these water bodies which several challenges. In this lesson you are going to look at the problems still being faced on the Great Lakes and St. Lawrence Seaway.

Activity 1
Read the passage and find out answers for activity 1 given above.

Along St. Lawrence Seaway, there is too much traffic causing congestion and delays particularly along the lower St. Lawrence which limit the number of vessels and people who decide to use the seaway. However, the governments of United States and Canada decided to construct the gates at Soo canal, St Sault Marie canal, and St. Lambert lock at Montreal to control traffic congestion. Also traffic wardens and police have been recruited to control traffic flow. Along the lower St. Lawrence River, Lake Erie, Soo canal are affected by siltation and this requires constant dredging which is expensive and drains revenue collected from the Seaway users. The freezing of St. Lawrence River during winter from December to March limits the use of the seaway. Because of this, ice breakers have been introduced to remove the frozen snow or ice to make the seaway operational throughout the year. Some sections of St. Lawrence canal are narrow and shallow for example at Sault St Marie and in the lower St. Lawrence River respectively. This limits the use of wide ships and heavy vessels which reduce the total cargo handled. USA and Canada have begun deepening of existing shallow waters and widening or enlarging of the seaway to accommodate more traffic.

1. Identify the problems which are still being faced along St. Lawrence Seaway.
2. Explain how the problems are being solved.
3. Which lessons does Uganda learn from St. Lawrence Seaway project?

Summary
In this lesson you have learnt that:

- problems still faced on the Seaway are: fog which affects visibility, freezing of the seaway during winter s transport, and some areas are still narrow and shallow n the seaway.
- commodities transported along the seaway are; crude oil, coal, coffee, cocoa.

Glossary

Word	**Meaning**
Shallow	Not deep
Narrow	Short distance from one side to another
Fog	Cloud air near the ground/ cloud which form in the lower atmosphere
Visibility	The distance you can see especially when this is affected by the weather conditions
Gradient	Slope

TOPIC: NEW ENGLAND; AN ESTABLISHED AGRICULTURAL AND INDUSTRIAL REGION

Sub-topic: Location and Agriculture in New England

Lesson 3: Location and Composition of New England and Agriculture in New England

By the end of the lesson you should be able to:

i) describe the location and composition of New England.
ii) describe types of farming in Agriculture.
iii) explain factors which have favoured agriculture in New England.

You will need:
notebook, pen, pencil, rubber

Introduction
In Primary School, you learnt how to locate things. Do you still remember the ways we describe the location of something? In this lesson you are going to learn about the location of New England. You will also look at agriculture in New England.

Activity 1
Look at Figure 9.and do the following tasks:

1. List the states which make up New England.
2. Describe location and composition of New England.
3. Explain the types of Agriculture in New England.
4. Draw a map to show New England.
5. Explain the factors favouring the development of agriculture in New England.

You have probably described the location of New England as follows: New England is a located in North America, in the eastern part of the United States of America, East of St. Lawrence River and New York State. It is found North of New York city, south west of the Gulf of St Lawrence and along the western coast line of the Atlantic Ocean.

New England is a collective name given to the six states of north Eastern United states and these are:

- Maine
- New Hampshire
- Vermont
- Massachusetts
- Connecticut and
- Rhode Island

Figure 9.1: New England States

Activity 2

Read the text and do activities that follow.

Agricultural activity existed in New England before European settlers arrived in the region. The development of manufacturing industries and towns led to increased demand for raw materials and food. Farmers were forced to increase capital investment in agriculture to make it more efficient and productive. The majority of civilian diet used to come from corn (maize). Other crops grown include peas, okra, pepper, tomatoes, peanuts, beans, pumpkins, rye, and tobacco. Rice and potatoes were later introduced.

1. Using the information given in the text above, identify common crops grown both in Uganda and New England.
2. Explain what is meant by agriculture.
3. Describe different types of agriculture?

Activity 3

Read the passage and answer questions that follow.

In your home District, there are farmers with farms covering large hectares of land. On these farms different crops are grown in well drained areas. These include beans, potatoes, maize, pumpkins, fruits and vegetables. Specialization of labour is done involving doing different activities like planting, harvesting, applying fertilizers, and marketing. However, during busy season some activities come to a standstill.

Crops are transported and taken to all nearby small trading centres. Some of the crops are taken to the main city where they are sold to customers. In other districts farmers grow the same crops and this reduces on the sales. In areas with thin soils and crop diseases crop growing is limited. This greatly affects crop production.

1. Describe five conditions that support the development of agriculture in your home district.
2. Suggest five factors which might have led to the development of agriculture in New England.

Follow up Activity

1. Why is agriculture in Uganda still practiced on small scale by many farmers?
2. Why is agriculture referred to as the backbone of Uganda?

Summary

In this lesson you have learnt that:

- New England is located in North America in the north Eastern part of United States of America.
- The types of farming practiced in New England are, Dairy farming and Market Gardening.
- Factors which support agriculture are moist climate, reliable transport network, adequate capital to invest in farming, and ready market for products.

TOPIC: THE DEVELOPMENT OF A SEMI-ARID ENVIRONMENT: A CASE STUDY OF SOUTHERN CALIFORNIA

Sub-topic: Relief Features and Climate of California

Lesson 4: Location, Relief, Drainage and Climate of California

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

i) describe the location of California.
ii) describe relief of California.
iii) describe characteristics of climate and drainage of California.

What you need:

- notebook, pencil, rubber, foot ruler, ICT tools

Introduction

In Primary school SST, you learnt about the climate of East Africa. What do you remember about areas with a semi-arid climate? Think about the economic activities carried out and ways of life of people living in Semi-arid areas. In this lesson you are going to learn about California, a highly developed state with a semi-arid climate. You will learn about its relief, drainage and climate, and how this influences development.

Where is California located?

Figure 10.1: Location of California

Activity 1
Look at **Figure 10.1** and do the following tasks:

1. Copy the map into your notebook.
2. In about four sentences, describe the location of California State.

In your description you could have talked about the states surrounding California in the north, east, south east and in the south. You could also have talked about the Pacific Ocean. All that you have said is true about the location of California in the United States of America. Possibly you may add that it is located in the Pacific Region of USA. It is one of the five Pacific states in the western part of USA.

What is the relief of California like?
Generally, California is a mountainous state. However, a close look at the state from the north south wards shows that it has varying relief. These include mountain ranges, valleys and the delta land of rivers Sacramento and San Joaquin. There are also low lands around Los Angeles.

Figure 10.2: Relief and Drainage of California

Activity 2
Look at Figure 10.2 and do the following:

1. Copy Figure 10.2 into your notebook.
2. List the relief features of California which belong to each of the following categories:
   (i) Mountains
   (ii) Valleys
   (iii) Low lands

The relief of California has strong influence on climate, drainage, settlement and agriculture.

The Climate of California
If we talk about the climate of California in general terms, we can say that it is of a Mediterranean type. However, like relief, the climate of the state is not the same everywhere. The northern part is wetter than the southern one. This explains why the Coast Ranges and Sierra Nevada Mountains have dense forests while the southern valleys and low lands have desert and semi-desert vegetation. In fact, most of California has a dry climate. Find the names of places with desert climate on ***Figure 10.2.***

Average precipitation is less than 500mm per year. Summers are hot while winters are warm in most of central and southern California. Much of the rainfall comes in winter when moist winds blow into the interior. Rainfall in summer is very rare.

Activity 3
Look at **Figures 10.3** and **10.4** which show the climate of two places; one in northern California and the other in Southern California, and do the following:

1. Copy the two graphs into your notebook.
2. Describe the climate of each place.
3. Suggest which of the two places is in:
   i) Northern California
   ii) Southern California. Give reasons to support your answer.
4. Suggest which of the two places might need to be irrigated in order to carry out farming successfully. Give reasons to support your answer.

Activity 4

1. Using the knowledge, you got in Senior One about factors affecting climate, explain how the following factors affect the climate of California:
   - Mountains and valleys
   - The presence of a warm ocean current along the coast
   - Position in temperate latitudes

You may use words like rain bearing winds, drier parts, wetter parts, and rain shadow effect.

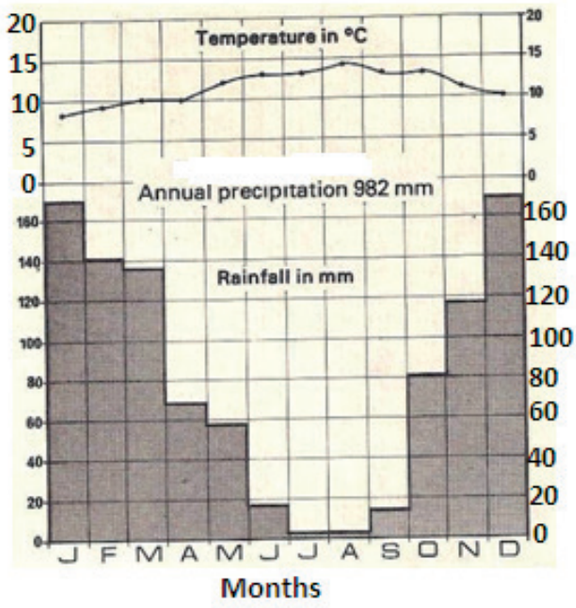


Figure 13.3: Climate of Eureka

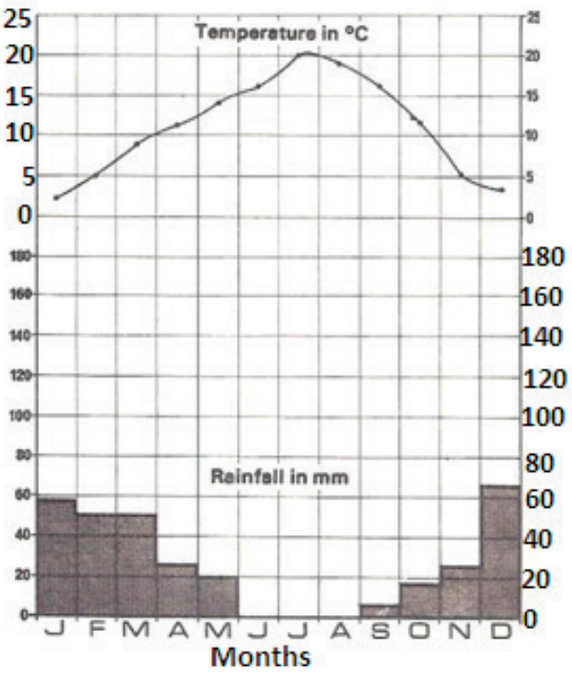


Figure 13.4: Climate of Modesto

There are three main factors which affect the climate of California namely: relief especially mountains, Ocean currents, and latitude.

Summary

In this lesson you have learnt that:

- California's relief is divided into three and these are; the coastal plain, the Sierra Nevada Mountains and the central Valley.
- The climate of California is cool with mild winters and with hot summers.
- California is drained by rivers Sacramento in the north, San Joaquin in the south.

Lesson 5: Types of Farming in California

By the end of the lesson you should be able to:

i) identify type of farming in California.
ii) draw a map to show the types of Agriculture in California.
iii) recognize the types of farming as indicated on photographs.

What you need

atlas, notebook, pen, pencil, rubber, ICT tools (if possible)

Introduction

California is an agricultural state despite being a semi-arid region. This area receives low and unreliable rainfall. The northern part which receives more rainfall has less fertile soil. However, the problem of dry climate has been addressed through forming the water transfer scheme to transfer water where conditions were more terrible to support farming through irrigation.

Activity 1

Look at ***Figure 11.1*** showing types of agriculture in California and do the following tasks:

1. Copy the map into your notebook and use the Atlas or textbook on North America to name the river and the farming areas which are not named in Figure 11.1.
2. Identify types of farming carried out in California.
3. In about two sentences, describe the general distribution of farming activities in California.
4. List the places where:
   (i) Crop growing is important,
   (ii) Dairy farming is carried out.

Figure 11.1: Map showing types of agriculture in California

In the above Activity you have probably found out that in California the most important farming area is the Central Valley. Other important areas are the Imperial Valley near the Salton Sea and at the margins of urban areas along the coast. These are mainly areas of fertile soils which are deposited by rivers originating in the mountains.

Many crops are grown in these fertile valleys. Apart from those you have found out from the map others are apricots, dates, and figs. There is also rice and cotton. The vegetables grown include lettuce, tichokes, tomatoes and berries. Figure 11.2 show some of these crops.

Figure 11.2: Some of the crops grown in California

Activity 2
Study ***Figure 11.3*** and do the following tasks:

1. Identify the activity taking place in the picture.
2. Why do you think there are many workers employed on the farm?
3. What benefits do you think the people of California get from this farm?
4. Suggest two reasons why this farm uses large amounts of capital.
5. Would you recommend Ugandan farmers to open up such a farm? Give reasons for your answer.

Figure 11.3: A Fruit farm in California

Besides dairy farming, livestock farmers in California rear beef cattle and chicken in order to supply meat to the large urban population. Surplus beef is sold to other states in USA. Some of it is exported. Figure 11.3 shows live stock farms in California.

Activity 3
Study **Figure 11.3** and do the following tasks:

1. Describe the methods of livestock farming shown in photographs.
2. Which or the two photographs do you think was taken close to an urban area? Give reasons to support your answer.

a) a modern diary farm ***b) a beef ranch***

Figure 11.3: Livestock farms in California

Summary
In this lesson you have learnt that:

- There are two main types of farming carried out in California, namely Arable farming and Livestock farming.
- The major farming areas in California are the Central Valley, Imperial Valley, areas around urban areas and the coastal low lands of Los Angeles.
- Arable farming involves growing citrus fruits like oranges, berries, vegetables, tomatoes, grapes, apricots, wheat and others.
- Livestock farmers rear dairy cattle, beef cattle, chicken, and pigs.
- Around urban centres such as San Francisco, Sacramento, Fresno, Los Angeles, San Diego and others, farmers practice Market gardening and dairy farming.

Follow-up Activity
Copy and complete the table below in your notebook by filling examples of crops belonging to each category.

Fruits	Vegetables	Cereals	Fodder crops	Fibers

Lesson 6: Irrigation farming in California

By the end of the lesson you should be able to:

i) locate major irrigated areas on the map of California.
ii) describe the methods used to supply water to farms in California.
iii) explain factors which have favoured irrigation farming/ agriculture in California.
iv) explain the importance of agriculture to the development of people of California

What you need:
atlas, notebook, pen, pencil, rubber, ICT Tools (if possible)

Introduction
In Lesson 10, you learnt about the climate and drainage of California. Which part of California is dry? In lesson 11 you learnt about the types of farming in California. In which relief region of California are most farms found? What kind of climate does the region experience? In this lesson, you are going to learn how California has become the leading farming state in USA despite it being largely a dry region.

Which parts of California do practice Irrigation farming? In Lesson 10 you learnt that the climate of California is not uniform all over the state. You also learnt that the Northern part of California is wet while the southern part is dry. So irrigation is more important in the southern part of the state. Again, the southern part receives rainfall in winter when the temperatures are too low to allow crop growth. The northern part is also mountainous and therefore not good for farming. The southern part consists of fertile low lying valleys which are suitable for farming.

So water has to be physically transferred from areas where it is received in large amounts, but least demanded and in some cases wasted, to where it is very scarce and most demanded. Therefore, water has to be moved from rugged mountains and snowfields to plains and also from river valleys to farm lands.

The **Central Valley** is the largest and most important irrigated area both in California and America. Other important irrigated lands in the state include the **Imperial Valley, Coachella Valley**, and the **low lands of Los Angeles**.

Activity 1 Look at ***Figure 12.1*** and do the following.

1. Copy the map into your notebook.
2. With the help of the atlas or a textbook map of California, name the:
   (i) Valley marked 1,
   (ii) Rivers marked 2 and 3,
   (iii) Aqueducts marked A and B
   (iv) Canals marked X, Y, and Z
3. Explain why all rivers in California flow from the east to the west.

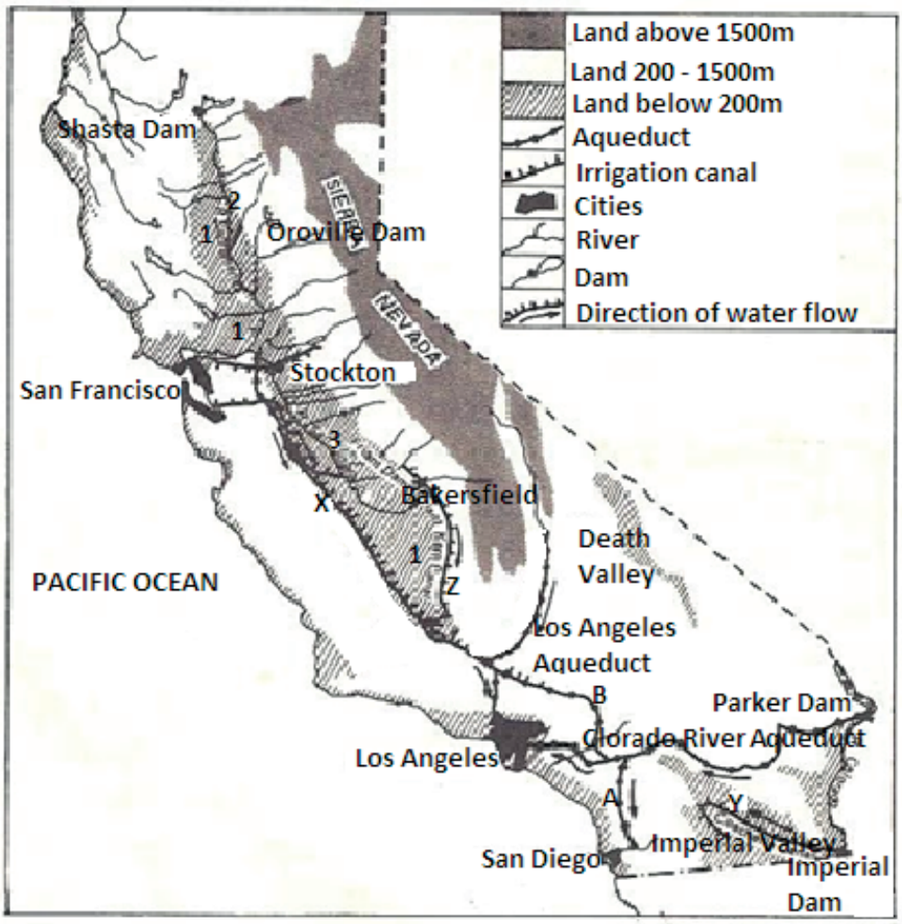


Fig 12.1: Irrigated areas in California

How is water moved from the mountains to the farms?
Since there is more water in the northern rivers especially in the Sacramento, for farming to be successful water has to be moved from the north to the South.

Water has to be stored in large amounts before it is sent to farms and cities. Numerous dams have been built especially along the western slopes of the Sierra Nevada Mountains. In Activity 1 above, you have identified at least three of these water storage dams.

From the dams, water is pumped into canals which carry it to the farms. Numerous pumping stations have been built along the rivers.

Activity 2
Using the information which you found out in Activity 1 above, name the:

(i) Dams which store water along rivers Sacramento and Feather in the north, respectively.
(ii) Dam which stores water along river San Joaquin
(iii) Canal which carries water southwards up to farmlands around Mendota.

Due to the ever-increasing demand for water both in the cities and crop farms, canals cannot supply all the water needed by the people of California. Additional water is transported using large pipelines called **aqueducts.** Aqueducts have an advantage over canals in that they can be used to lift water across mountains to farms. For example, along the western side of the Central Valley, the **California Aqueduct** the Delta Mendota canal and it carries additional water southward up to Tracy.

Similar aqueducts in the region include the **Mokelume aqueduct**, and the **Hetch Hetchy aqueduct.** This one carries water from the **Hetch Hetchy** reservoir to join the Delta-Mendota Canal. Both supply water to farmers and city dwellers of San Francisco. On these main aqueducts smaller aqueducts are connected to distribute water to the various farmlands. In Activity 1above you managed to identify some of these smaller aqueducts. They include North Bay Aqueduct, South Bay Aqueduct, Los Angeles Aqueduct, and San Diego Aqueduct. Can you mention the others smaller aqueducts?

Why has irrigation farming been successful in California?
Activity 3
Using ideas from lessons 10, 11, and 12, explain how the following factors have enabled the development of irrigation farming in California:

1. Relief of the irrigated lands especially the Central Valley
2. Soils
3. Presence of rivers Sacramento, San Joaquin, and Colorado
4. Market for Mediterranean fruits and vegetables
5. High levels of technology

Besides the factors which you have explained above, there are other factors which have favoured irrigation farming in California. First, the Sierra Nevada Mountains trap moist winds and form heavy precipitation in winter. This in turn forms snow cover which is an important source of summer streams which are sources of water used for irrigation.

Secondly, capital to finance water storage and irrigation programs has been readily available from the state treasury and Federal funds. Thirdly, California has a good and efficient transport network in all irrigated lands. The construction of railway lines in Southern California and the development of refrigerated rail cars have enabled the movement of fresh fruits to the markets in the eastern states of USA. Lastly, California has a dry Mediterranean climate which is not conducive for most crop pests and disease causing organisms; yet it is favorable for growth and ripening of irrigated crops.

Summary
In this lesson you have learnt that:California has the largest irrigated area on the American Continent, the Central Valley.

- The major irrigated areas in California are the Central Valley, Imperial Valley, Coachella Valley, and the low lands of Los Angeles.
- Irrigation farming is important in southern California because it is a dry area yet with fertile valleys and low lands.
- The major water supplying facilities to the irrigated lands are pumping stations, canals, and aqueducts.
- The development of irrigation farming in California has been favoured by both physical and human factors.

Follow-up Activity

1. Do you think the methods of irrigating farmland used in California are suitable for Uganda? Give reasons to support your answer.
2. Carry out textbook or Internet research about the importance of irrigation farming in California.

Term 2

TOPIC: INTRODUCTION TO EAST AFRICA

Lesson 7: Composition, Location, Size and Population of East Africa

By the end of the lesson, the learner should be able to:

i) draw a map to show the location of East Africa.
ii) describe location of East Africa.
iii) state the total population and density of population of East Africa.
iv) draw charts and graphs to represent statistical information.

What you need:
notebook, pen,rubber, Atlas , Map of East Africa, ICT tools

Introduction
In Primary School Social Studies, you learnt about East Africa and the East African Community. What do you understand by East Africa? How many countries are in East Africa? Can you list them in your notebook? In this lesson you are going to learn about the location and composition of East Africa.

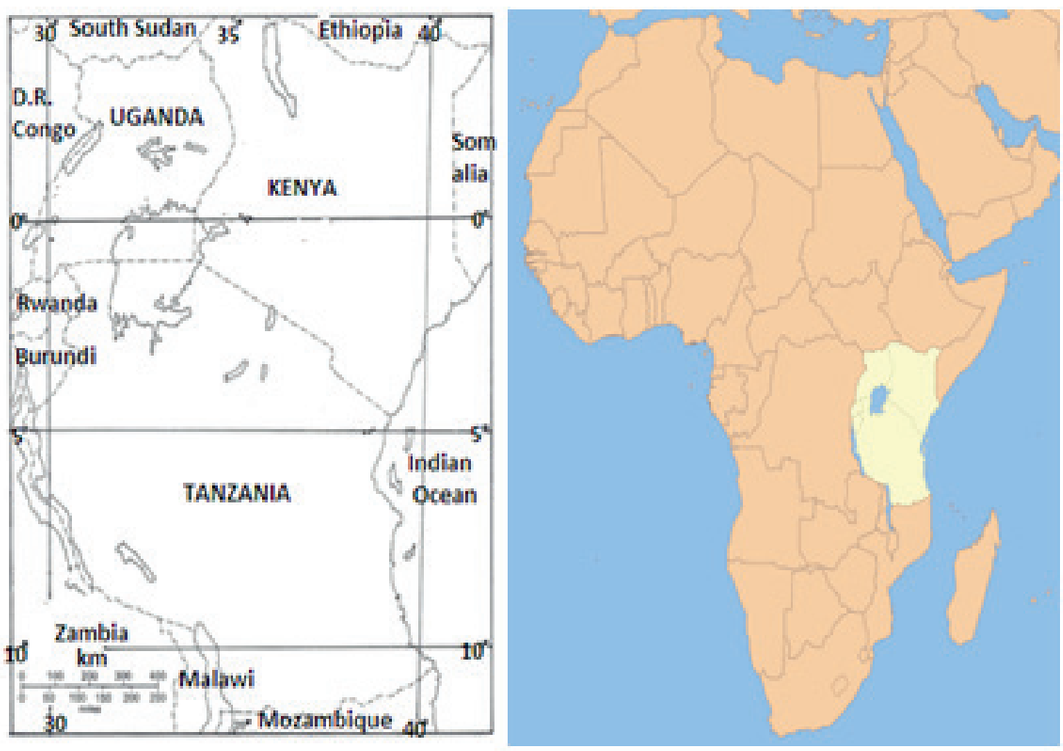


figure 13.1

What is East Africa?

The Location of East Africa

Activity 1
Study the atlas or look Figure 13.1 and:

1. Identify the countries making up East Africa and list them.
2. How many countries are they?
3. In about two sentences, explain what you understand by the term East Africa.

You have realized that is made up of three countries. Sometimes people say that East Africa also includes Rwanda and Burundi. Others think that East Africa consists of six countries. Why do you think some people say so? You could have suggested that such people think of East Africa to mean the East African Community. In studying geography, you are going to take East Africa as the three counties: Uganda, Kenya and Tanzania.

Location and Size of East Africa

Activity 2
Look at Figure 13.1 again and do the following:

1. Copy both maps into your notebook to show the location of East Africa.
2. Describe the position of East Africa in relation to the countries surrounding it.
3. Describe the position of East Africa using latitude and longitude.
4. Which country in East Africa is locked?
5. In one paragraph, describe the position of East Africa in Africa.

You now know that we can describe the location of East Africa in Africa using the side or direction of Africa where it is found and the countries surrounding it. We can also use a Latitude (how far north and south of the Equator) and Longitude (how far east or west of the Prime Meridian) the region extends. Possibly we can also add that East Africa is found nearly in the centre of the African plateau.

The Size of East Africa

When we talk of size we usually mean how big something is. So when we talk of the size of East Africa we are talking about the area covered by East Africa. You can know this by adding up the areas of the three countries which make up the region. To understand this, do the following Activity.

Activity 3
Study ***Figure 13.2***, a table showing the size of East African countries and do the tasks that follow.

Country	**Area (in Square Kilometers)**
Uganda	236,040
Kenya	580,367
Tanzania	945,087
Total (East Africa)	**1,761,494**
Total (Africa)	**30,065,000**

Figure 13.2: Size of East African countries

1. Copy the information into your notebook and use it to draw a pie chart.
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 large than the smallest one. Give a reason to support your estimate.
4. Calculate the percentage area of the African continent occupied by East Africa.

The Population of East Africa

Population is another aspect which we can use to describe how big a country or region is. This is because the size of population, partly determines the potential market for goods and services produced in the country or region. This in turn determines the possibility for developing industry and agriculture in the region. For instance, China is developing very fast because she has the largest population in the world and hence a large home market for her goods.

We can also use the density of population to tell how people are concentrated in East Africa. Population density means the number of people living in a unit area of land. The most commonly used unit area is a square kilometer. That is why population density is usually defined as the number of people per square kilometer. To get the population density for any political or administrative area, we divide the total population by the land area. For example, the area of Kampala District is 189 square kilometers, and its area is 1,650,800km^2. To get the population density for Kampala we divide the population of the district by its area; i.e. 1,650,800/189km^2 =8,772 persons per km^2. This means that in every one square kilometer of land in Kampala, there are 8,772 people.

Activity 4

Study Figure 13.3, a table showing the area and population of East African countries and do the tasks that follow.

Country	**Area (Km$^{2)}$**	**Population**	**Population Density**
Uganda	236,040	45,741,007	?
Kenya	580,367	53,771,296	?
Tanzania	945,087	59,734,218	?
Total	**1,761,494**	**159,246,521**	

Figure 13.3: Area and population of East African countries

1. Copy the table into your notebook.
2. Draw a bar graph to show the population of East African countries.
3. Calculate the population density for each country and fill in the table.
4. Which country has the highest density of population?
5. Which country has the lowest density of population?

Summary
In this lesson you have learnt that:

- East Africa is made up of three countries; Uganda, Kenya and Tanzania.
- The three East African countries are part of the East African Community.
- Kenya and Tanzania are directly connected to the Indian Ocean coast while Uganda is a land-locked country.
- East Africa is located in the eastern part of the African continent, and nearly in the centre of the African plateau.
- East Africa is one million, seven hundred sixty-one thousand, four hundred ninety-four (1,761,494) square kilometers.
- The concentration of population in east Africa varies from one country to another mainly because of differences in climate, soil fertility, relief, and land area.

Follow-up Activity
Are the three countries, the only ones which make up the East African Community? If not give reasons.

(i) Differentiate between longitudes and latitudes.
(ii) Name countries that boarder East Africa.
(iii) Which East African country do you think is disadvantaged by its position? Explain these disadvantages.
(iv) Suggest reasons why the countries of East Africa have different population densities.

References

1. Geography of East Africa by Nzabona
2. Geography of East Africa Ordinary Level by Carol Mukasa, Sserwanga Herbert Kaggwa, Isanga Emmanuel.

Lesson 8: The Relief of East Africa

By the end of this lesson you should be able to:

i) identify types of relief in East Africa.
ii) draw a map to show the relief of East Africa.
iii) describe each relief region of East Africa.

What you need:
Atlas or map of East Africa showing relief regions, Pencil, Pen, Notebook, Rubber

Introduction
In your home area 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. `In this lesson you are going to learn about relief and relief regions of East Africa.

What is a relief region?
Relief refers to the general appearance of land in an area. The area may be hilly, mountainous, a flat plain or a plateau. If a certain type of relief covers a reasonably large area, we call that a **relief region.** East Africa has several relief regions. How many of them do you remember from your Primary School Social studies? In the following Activity you are going to learn about these regions in great detail.

Activity 1
You may need the Atlas for this Activity

Look at ***Figure 14.1*** and do the following tasks:

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

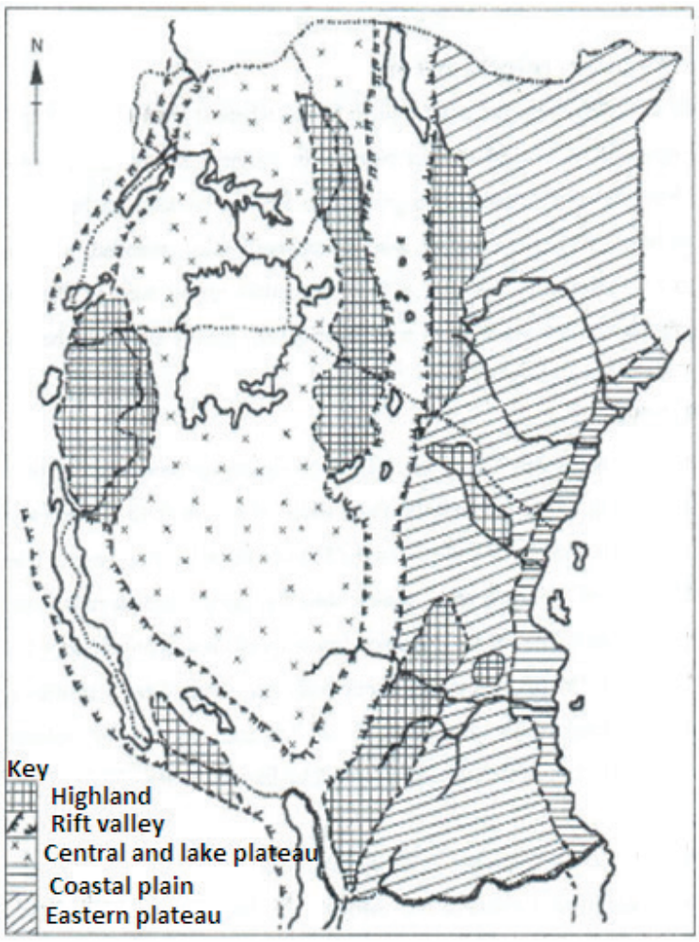


Figure 14.4: Relief regions of East Africa

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 some influence on the local weather and climate. This, in turn, affects the economic activities people in each region do and their ways of life in general.

Activity 2
Look at **Figure14.1** and do the following tasks:

1. Copy the diagram in your notebook and on it mark and name different relief types shown.
2. List the relief types shown on the diagram.
3. What are some of the advantages of the relief types you have identified above?
4. What problems are faced by people living in the areas which you have identified above?
5. Using ideas from the diagram, describe the relief of East Africa.

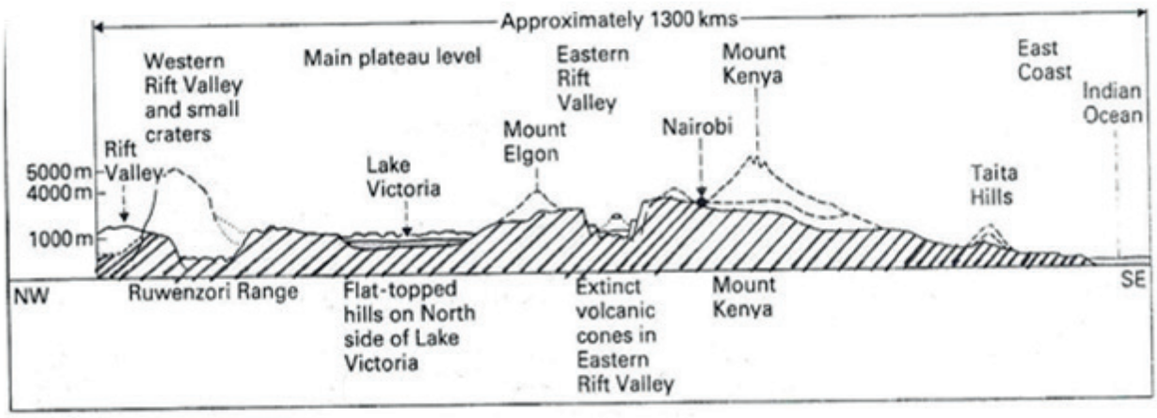


Figure14.1: A cross-section along the Equator from the Indian Ocean the western boarder of East Africa

The Coastal Plain
The coastal plain is a low lying area at the African Coast. It is bordered by Indian Ocean in the East along the coastline of Kenya and Tanzania. It contains sands and silt. It has coral reefs, sedimentary rocks, drowned river valleys, deltas and is crossed by several rivers and streams which pour their waters into the Indian Ocean. Examples of such rivers include Tana, Galana, Pangani, Rufigi, Ruvuma, and Kilombero. Crops grown in the coastal region include cloves, cotton, rice, sisal, sugarcane, and cashew nuts. There are also several mangrove swamps and beaches on the coastal plain. Find some of the beaches in Figure 14.2. Because of the low altitude, the coastal plain is generally hot.

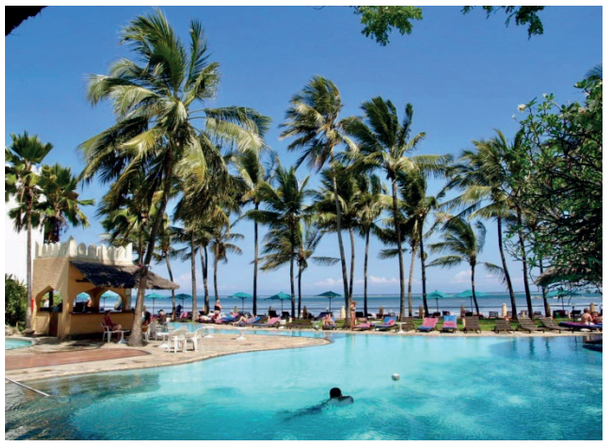



Figure 14.2: Beaches at MombasaThe Coastal Plain

The Eastern Plateau

This region comes next to the coastal plain in terms of altitude. It occupies the Eastern parts of Kenya and Tanzania. It is also found in Southern Tanzania. Which is the other plateau of East Africa? In which part of East Africa is it found? It is generally flat, hot and dry. Because of its dry climatic conditions, in Kenya it is commonly referred to as the **Nyika Plataea**.

The Central and Lake Plateau

If your home is not found in Kigezi region, Kasese and Bundibugyo, the Elgon region or on the slopes of mountains Moroto and Kadam, you are most likely to be living on the plateau. The plateau of Uganda is part of the Central and Lake Plateau of East Africa.

Figure 14.3: Lake Victoria Plateau

The East African plateau is characterized by:
It is a generally raised flat surface broken by numerous river and stream valleys. In the Lake Victoria basin, especially in Uganda, the plateau has numerous flat topped hills. These are most commonly known as the Buganda hills. Find these hills in Figure 14.3. It is mainly covered by a very old metamorphic rock known as the **basement complex.** In Teso region, some parts of northern Uganda and in Nyanza province of Kenya the plateau has isolated rocky hills called **Inselbergs.** Kacumbala, Ngeta, Nakasongola, and Umi hills in Adjumani are good examples of inselbergs. Majority of the population of East Africa are found on the plateau.

Activity 3

1. In about two sentences, explain what you understand by a plateau.
2. Suggest reasons why most people in East Africa live in the plateau region.
3. Outline the economic activities carried out by people living in the plateau region of East Africa.

Follow-up activity

1. Carry out textbook or Internet research about the Highland regions of East Africa.
2. Using ideas about the Coastal plain and the plateau regions, write a research report and in it point out:
   (i) Where the highland regions are found
   (ii) Examples of highlands
   (iii) Characteristics of highland regions
   (iv) How the highlands affect human activities
3. Explain the problems likely to be faced by people living in the highland regions.
4. When schools reopen, hand in your research report to your teacher of Geography for further help.

Summary
In this lesson you have learnt that:

- The features that can be used to describe the physical appearance of an area are called relief features or landforms.
- A large area of the earth's surface with almost similar landforms is called a relief region.
- East Africa is divided into five major relief regions, namely the coastal plain, the eastern plateau, East African Highlands, the Rift valley region; and the Lake Victoria and Central plateau.
- The largest part of East Africa is covered by the plateau region.
- The nature of relief affects local climate, human activities and life styles.
- The majority of the peoples of East Africa live in the plateau region.

Lesson 9: Rift Valley Region

By the end of the lesson, you should be able to:

i) identify the arms of the East African rift valley.
ii) locate the rift valley region on a map.
iii) describe the characteristics of the rift valley region of East Africa.

Introduction

A rift valley is a wide and long depression on the earth's surface with steep slopes on the sides. The East African rift valley is part of the Great African Rift Valley which stretches for about 7200km in 14 countries. To understand this, look at ***Figure 15.1.***

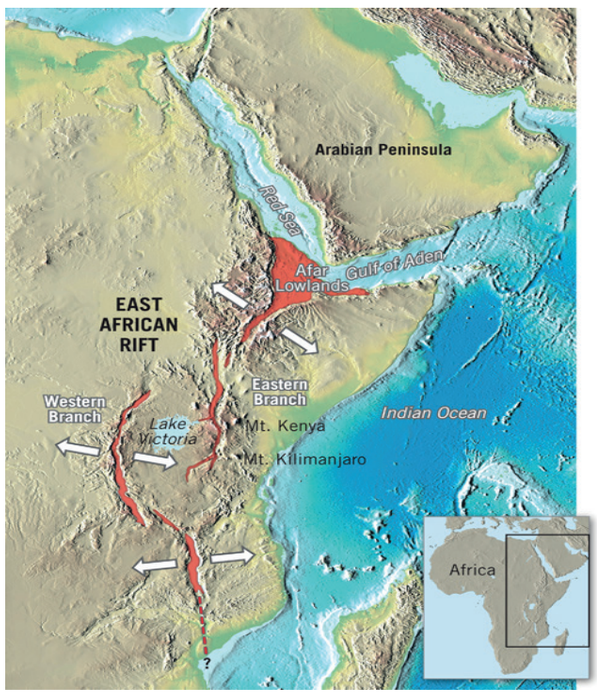


Figure 15.1: Extent of the Great African rift valley

The East African rift valley has two arms; the eastern and western arms. The western arm contains lakes Albert, George, Edward, Tanganyika, Malawi and others. The western arm runs through Tanzania, Rwanda, and Burundi to Uganda.

Figure 15.2: Part of the rift valley in western Uganda

Activity 1

1. In your notebook, draw a landscape sketch of Figure 15.2 and on it mark and label the;
   (i) Escarpment,
   (ii) Depression created by land slide,
   (iii) Rift valley floor. and
   (iv) Vegetation types.
2. Identify one type of land use shown in the photograph.
3. Suggest two factors which have favoured the land use you have identified in (2) above.

The eastern arm runs from the Red Sea and the Gulf of Eden in northeastern Africa, through central Kenya to southern Tanzania. It contains lakes like Turkana, Baringo, Naivasha, Nakuru, Elementaita, Magadi and others.

The rift valley region is generally hot and dry. Because of this, it is mainly covered by savanna vegetation. However, a few places in the western arm in Uganda have thick forests.

Summary
In this lesson you have learnt that:

- the East African rift valley is a wide and long depression on the earth's surface.
- the rift valley region of East Africa is part of the Great African rift valley.
- the rift valley affects local climate, vegetation cover and land use.

Follow-up Activity 2

1. Imagine your family has migrated to the western arm of the rift valley in Kenya. Giving reasons outline the economic activities you would carry out in your new home area.
2. Outline likely problems your family would face in the new home area.

TOPIC: ROCKS OF EAST AFRICA

Lesson 10: Formation and Classification of Rocks

By the end of the lesson the learner should be able to:

i) describe composition and classification of rocks.
ii) explain the formation of igneous and sedimentary rocks.
iii) use diagrams to explain the formation of igneous rocks and sedimentary.
iv) recognise igneous and sedimentary rocks in the field.

You will need:
pen, pencil, rubber, rock samples, photographs of rocks

Introduction

When you look around your home area, you see several landforms. They may be hills, outcrop rocks, a flat plain, valleys or a mountain. All those landforms are made up of rocks. Did you know that even the soil you see at one time was a hard rock? In this lesson, you are going to learn more about rocks, their characteristics and their importance to people of East Africa.

What is a rock?

Activity 1

1. Move around your home area for about 5 minutes and; Collect any natural stones or pebbles which you can see.
2. Hit them hard using another stone or metal.
3. What do you see?
4. Pick a pinch of soil and feel it using your hands. Is it as hard as the stones or boulders?

In the above Activity you have probably realised that 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 have probably learnt about this in your chemistry lessons in your Chemistry lessons. See some examples of rocks in Figure 16.1

Figure 16.1: Pictures of rocks

Activity 2

1. Think of how life in your community and country would be if there were no minerals on earth.
2. In your notebook outline the importance of rocks in our lives.
3. List the minerals which Uganda exports to other countries.

You have noted that most of the things we use in our daily lives are made out of minerals. Farm tools, domestic utensils such as saucepans, and the vehicles we 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.

Types of rocks

The rocks of the earth's crust are different in terms of 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.

Igneous rocks

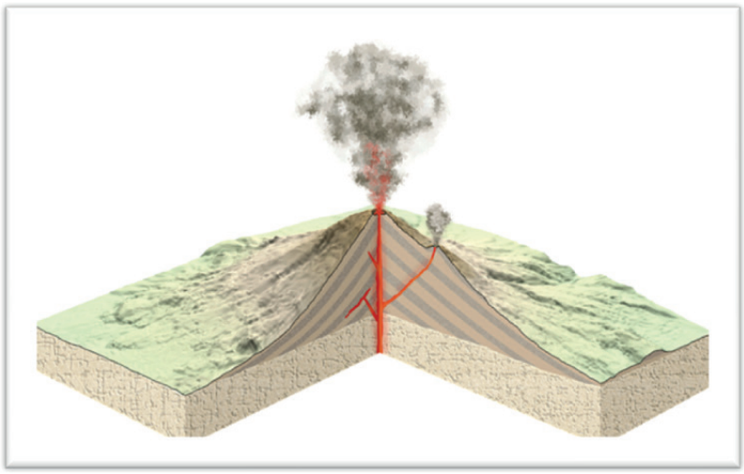


Figure 16.2: Formation of igneous rocks

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.

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. Igneous rocks formed on the surface of the earth are called **extrusive igneous rocks**.

Extrusive Rocks	**Intrusive Rocks**
Rhyolite	Granite
Obsidian	Diorite
Basalt	Gabbro
Andesite	Peridotite

Figure 16.3: Table showing examples of 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. Find examples of intrusive igneous rocks in Figure 16.3 above.

Activity 3

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.

Sedimentary rocks

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. To understand this process, look at Figure 16.4.

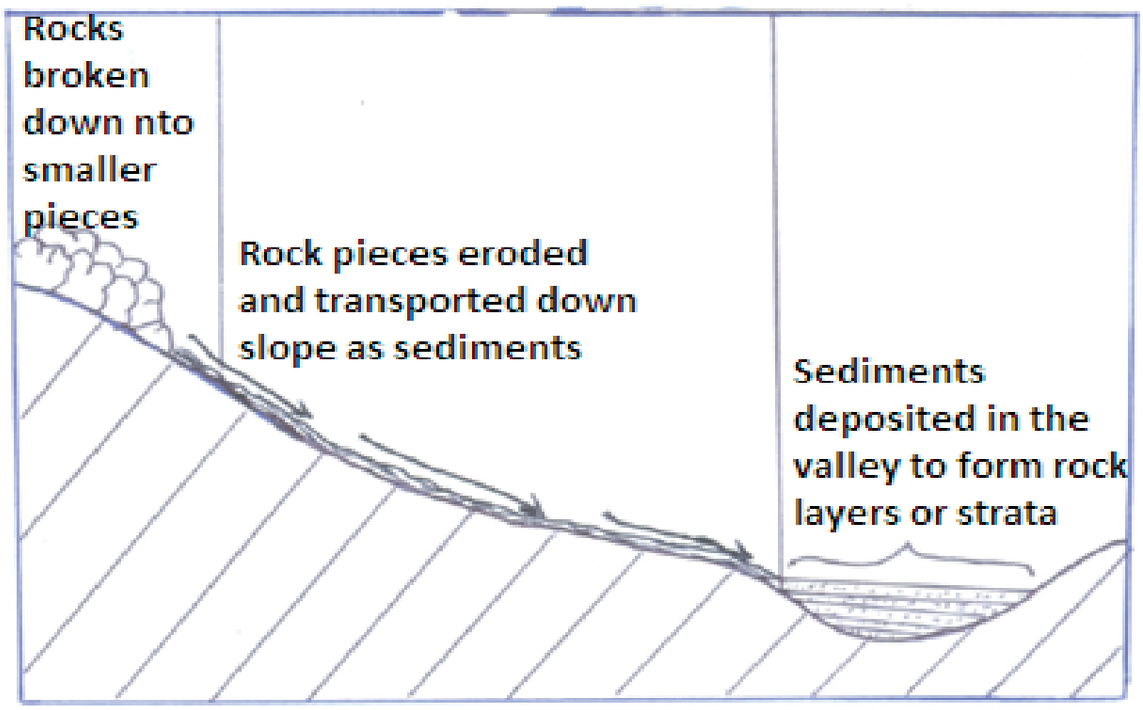


Figure 16.4: Formation of Sedimentary rocks

Most sedimentary rocks are of this type. Examples are **sandstone, shale and loess**.

Activity 4

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 called **organically-formed** sedimentary rocks. **Coal, coral limestone, marble and peat** are examples. Did you know that mineral oil or petroleum in the Albert Rift Valley in western Uganda has been formed in this type of sedimentary rock? The sediments and organic materials which form sedimentary rocks are laid down in layers. Even when the rock hardens it keeps visible layers called **strata** (singular-stratum).

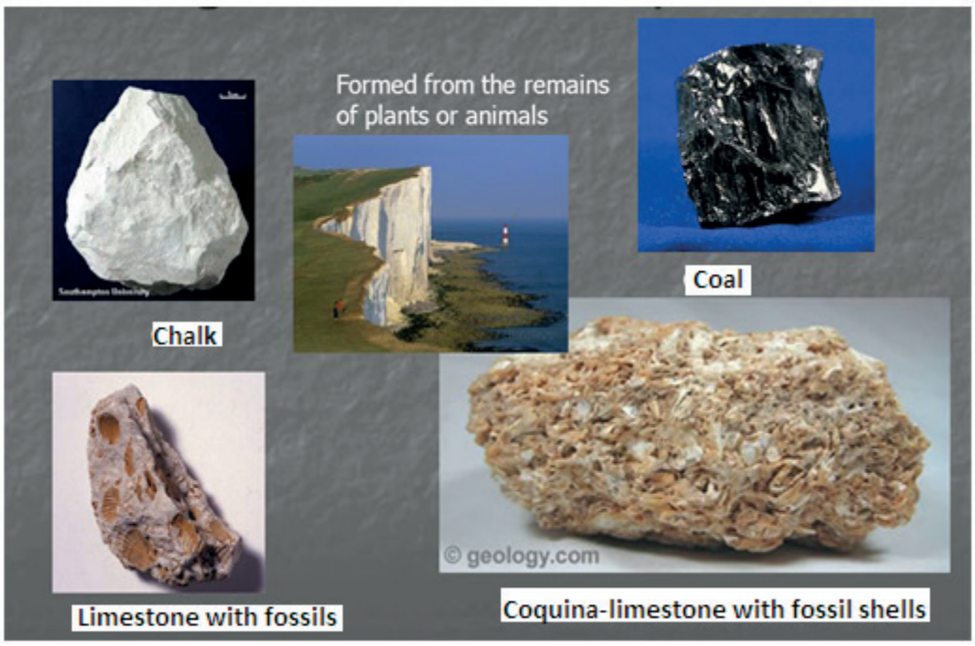


Figure 16.5: Examples of organic sedimentary rocks

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. Find out other examples in Figure 16.6.

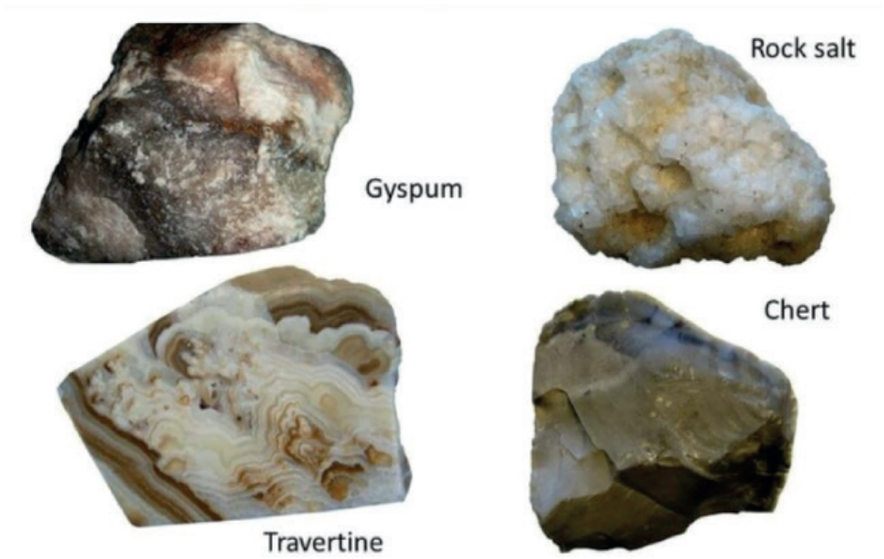


Figure 16.6: Chemically formed Sedimentary rocks

Summary
In this lesson you have learnt:

- that every rock is made up of several minerals.
- that rocks are divided into three main types depending on how they have been formed, namely igneous, sedimentary and metamorphic rocks.
- how igneous and sedimentary rocks are formed by volcanic eruption and sedimentation, respectively.
- sedimentary rocks can be easily distinguished from other rocks because they show visible layers called strata.

Lesson 11: Formation Metamorphic rocks

By the end of the lesson the learner should be able to:

i) explain the formation of metamorphic rocks.
ii) use diagrams to explain the formation of metamorphic rocks.
iii) recognise metamorphic rocks in the field.

You will need:
pen, pencil, rubber, rock samples, photographs of rocks

Introduction
In Lesson 16 you learnt about the formation of igneous and sedimentary rocks. You also learnt that sedimentary rocks are formed from other old rocks by weathering, erosion and deposition. In this lesson you are going to look at how igneous and sedimentary rocks can undergo physical and chemical changes to form new rocks altogether.

Metamorphic rocks
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 a metamorphic rock formed from clay. Another example of metamorphic rock is **Quartzite.** This is the most commonly seen rock on Uganda's plateau.

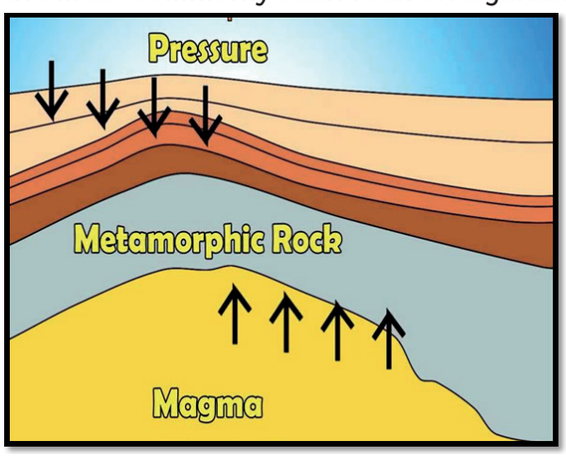


Figure 17.1: How metamorphic rocks are formed

Activity 1

Look at **Figure 17.1** and do the following tasks:

1. Identify the original type of rock being acted upon by magma and pressure. Give reasons to support your answer.
2. Explain how magma leads to the formation of metamorphic rock.
3. Explain how pressure leads to the formation of metamorphic rock.

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 2

1. Carry out research about advantages and disadvantages of rocks to people who live around them.
2. Write a research report and when schools reopen, share it with your teacher of Geography for further help.

Summary

In this lesson you have learned that:

- Metamorphic are very hard rocks.
- Metamorphic rocks are formed from already existing igneous and sedimentary rocks.
- They are formed due to heat, pressure or a combination of heat and pressure.

Follow up activity

Look at the maps in Figure 16.6 and do the tasks that follow.

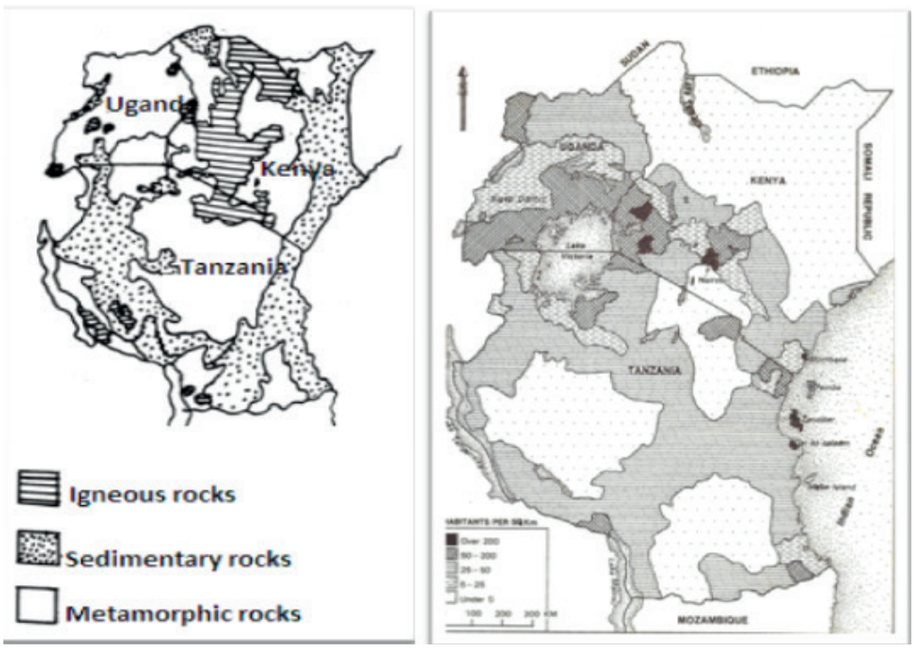


Figure 16.1: Relationship between rocks and population in East Africa

1. Use the atlas and find out areas shown on the map with Dense population,
2. Moderate population, and Low population
3. Find out the types of rock in each area identified in (1) above.
4. Explain the relationship between rock types and population distribution.

SUB-TOPIC: FEATURES FORMED BY FAULTING

Lesson 12: Types of faults and formation of a rift valley

By the end of the lesson you should be able to:

i) define faulting, list features formed.
ii) know and describe types of faults.
iii) describe formation of a rift valley.

You will need

pencil, pen, rubber, notebook, foot ruler, diagrams showing faulted landforms

Introduction

In senior one you learnt about physical features. In this lesson you are going to learn more about physical features in East Africa, For example, mountains, hills, plateaus, valleys. Some physical features in East Africa were formed by different forces which operate within the earth's surface and on top of the earth's surface.

Forces which operate within and inside the earth's surface are called earth movements/internal forces and endogenic processes. These forces include faulting, warping, folding and vulcanicity.

Activity 1
In your notebook:

1. Write about two sentences to explain what is meant by the term faulting.
2. List features which were formed due to faulting.

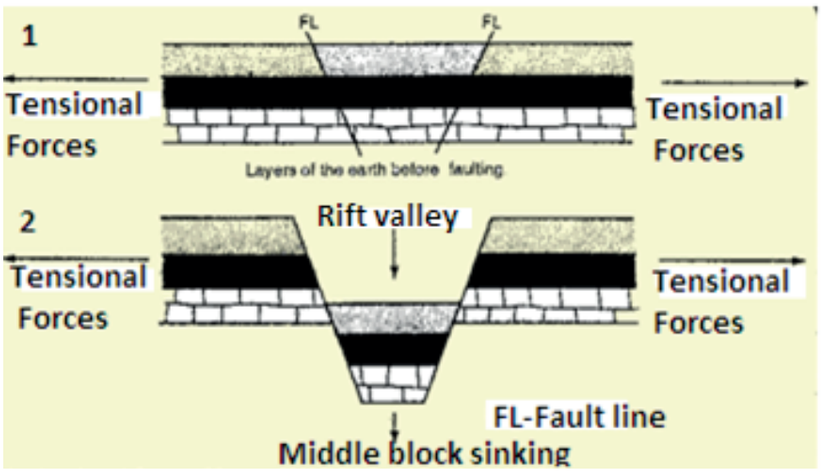
Read the text and do the activities that follow.

Faulting led to the formation of faults and these faults include, **normal faults reversed faults and Tear faults**

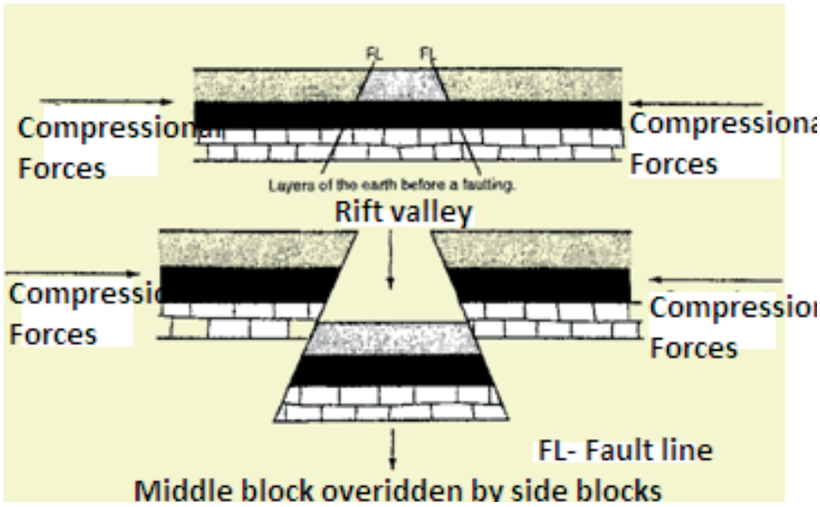
Faulting led to the formation of a rift valley. A rift valley is a long depression on the earth's surface and it is bordered by fault scarps either sides.

If the fence of the wall gets cracks and eventually the cracks become big, this leads the middle block /part of the wall to fall down. When the middle part falls down, there will be space created and the side blocks will remain standing.

Tensional forces acted on the earth crust pulling layers of rocks in opposite direction leading to formation of **normal faults**. When these forces continued to pull layers of earth's crust apart, forced the middle part earth crust to sink forming a depression, that depression is what we call a rift valley.



A rift valley was also formed by compressional forces. These acted on layers of rocks of the earth crust pushing them towards each other leading to formation of reversed faults. When these forces continued to push rocks towards each other, out blocks were pushed up over the central block (middle part). The central block remained behind forming a depression. This led to the formation of a rift valley.



Activity 2

1. Mention the process which led to the formation of a rift valley.
2. Mention the forces which led to the formation of a rift valley.
3. In your notebook, copy both diagrams and uses them to describe how a rift valley was formed.
4. What do you think are advantages of a rift valley?
5. Outline problems faced by people who live around a rift valley region.
6. Explain how your country can put to good use of the natural resources in the rift valley.
7. Why do you think, you need to learn about a rift valley?

Summary
In this lesson, you have learnt that:

i) faulting is the tearing of the earth's crust due to tension or compressional forces.
ii) types of faults include normal, reversed and tear.
iii) faulting led to the formation of a rift valley and forces like tension and compression where involved in its formation.
iv) a rift valley is of great importance to people of East Africa such as a tourist attraction, provision of land for farming and settlement, contains lakes used for fishing transport.

Follow-up activity

1. Explain the difference between:
   (i) Tensional forces and Compressional forces
   (ii) Normal faults and reversed faults
2. Describe how these faults are formed.

SUB-TOPIC: PHYSICAL FEATURES FORMED BY FAULTING

Lesson 13: Formation of Block Mountain in East Africa

By the end of the lesson you should be able to:

- draw diagrams to explain the formation of Mountains.
- identify Block Mountains in East Africa.
- describe the formation of Block Mountains.

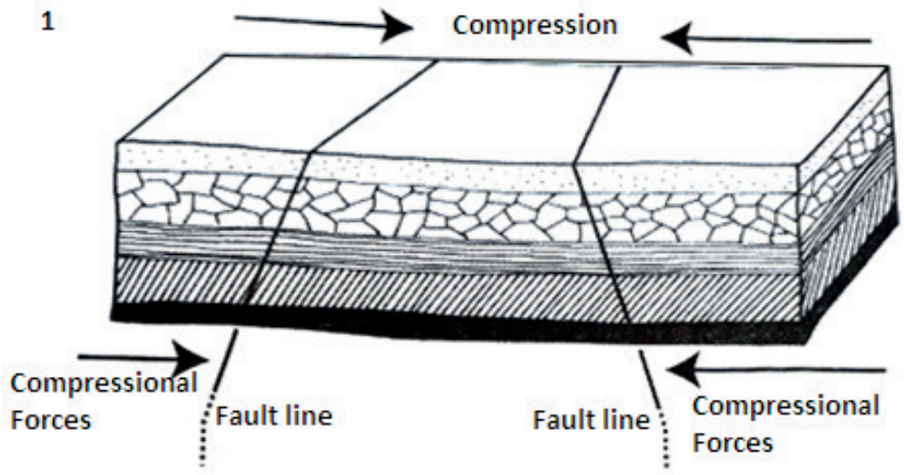
You will need:
pen, pencil, notebook, rubber

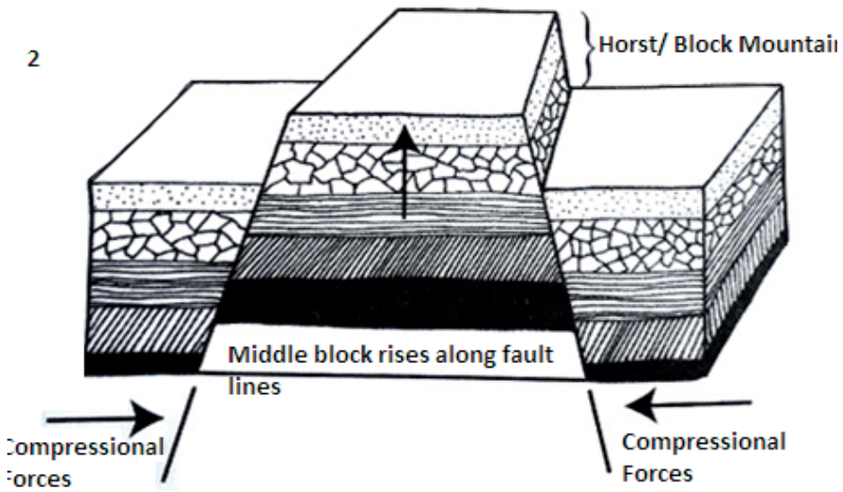
Introduction
In primary school SST, you learnt about the types of mountains in East Africa. Do you remember what a block mountain is and how it is formed? In this lesson, you are going to learn more about the formation of Block Mountains in East Africa. You will also look at how Block Mountains affect human activities.

Activity 1

1. Define a block mountain.
2. Give examples of Block Mountains you know.
3. Give reasons why mountains are important to people in the surrounding areas.
4. These block mountains formed sometime back, why do you think you need to learn about them?

Read an extract and do the activities that follow.
Block mountains are formed due to tensional forces or compressional forces. The tensional forces acted on the earth crust forming a series of normal fault lines and blocks. As they intensified they pulled the side blocks apart of the Central block forcing them to sink. The Central block remained stable and standing above the surrounding forming a block mountain.





The compressional forces acted on the earth crust forming a series of reversed lines and blocks. As they intensified, the side blocks were pushed against the central block therefore forcing it to rise above the side blocks of land. The raised middle block formed a block mountain and the side blocks were reduced by erosion hence creating a horst /block mountain.

Activity 2

1. Mention the process which led to the formation of the block mountain.
2. Copy diagrams in you not book and on them mark and name the features there.
3. Using diagrams describe how a block mountain was formed
4. Which forces were involved to the formation of Block Mountains?
5. Explain the economic importance of Block Mountains to the people who live around.
6. What problems are likely to be faced by people living around mountainous regions?

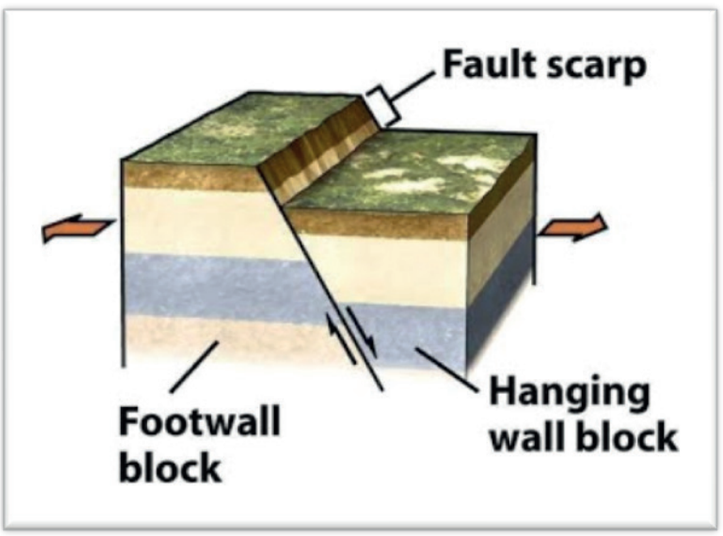
Summary
In this lesson, you have learnt that;

i) A block mountain is a highland standing above the surrounding.

ii) Block Mountains in East Africa include Rwenzori, Usambara, Uluguru and others.

iii) Block Mountains were formed by both Tensional and Compressional forces.

Follow Up Activity



1. Copy the diagram into your notebook.
2. Identify the processes acting upon the land blocks.
3. Explain how the processes which you have identified leads to the formation of a fault scarp or escarpment.
4. Search textbooks or the Internet and find out examples of fault scarps in East Africa.

SUB-TOPIC: VULCANICITY

Lesson 14: Forms of Vulcanicity and Formation of the Intensive Features

By the end of the lesson, you should be able to:

i) explain what vulcanicity is.
ii) identify features formed by vulcanicity.

You will need:
notebook, pen, pencil, rubber

Introduction
You have probably ever learnt about volcanoes and how they are formed. Can you list the features formed due to volcanicity? Have you ever visited any volcanic feature? In this lesson, you are going to learn more about the physical features formed by vulcanicity.

Activity 1

1. In your notebook, explain what you understand by Volcanicity.
2. List the volcanic features in East Africa you know.
3. What do you think causes heat and pressure within the earth?

In the above Activity all the features you have listed were formed on the surface of the earth. However, there are situations when molten rock rises from the interior of the earth and fails to reach the earth's surface. When this happens, the rock forms features inside the earth's crust.

Vulcanicity is one of the processes which originate in the interior of the earth and affect the appearance of landscape. It involves the movement of the molten rock and gases from deep inside the earth into the rocks of the earth's crust or onto the earth's surface. The molten rock is known as **magma**. Deep inside the earth there is a lot of heat and high pressure which cause rocks to melt and form magma.

When molten rock rises through the rocks of the earth's crust on to the surface, it cools and solidifies to form **extrusive features.** Figure 21.2 shows the Mufumbira Volcanoes and Mountain Elgon as examples of extrusive volcanic features.

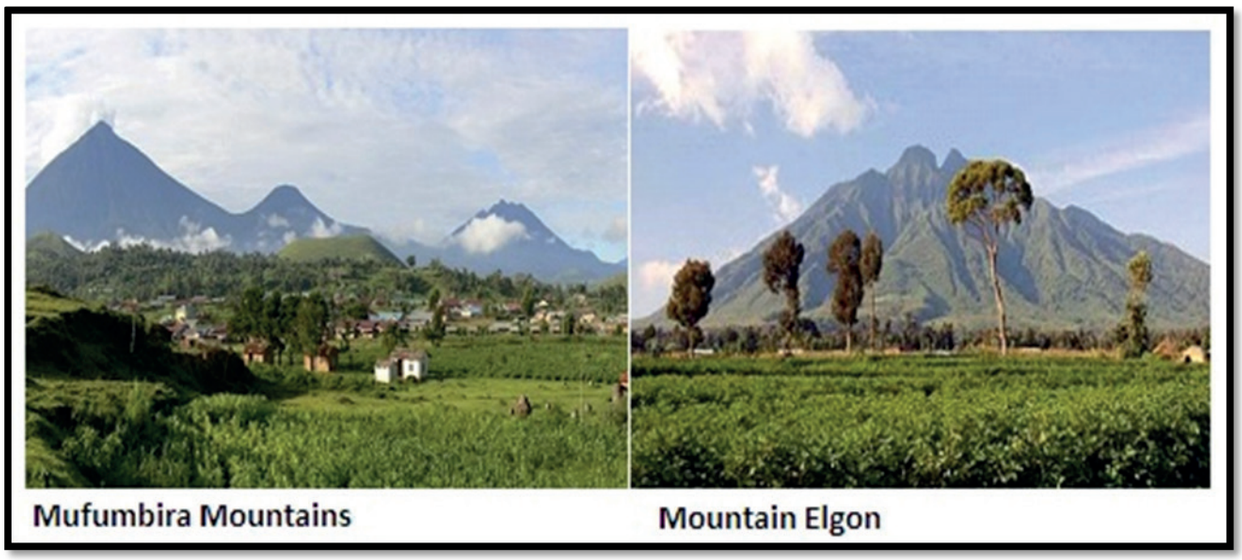


Figure 21.1: Volcanic Mountains

How is a volcano formed?
It is formed when molten rock material erupts through an opening called a **vent** or pipe. When the rock material reaches the earth's surface, it cools and solidifies around the vent to form **lava**. The repeated eruptions of magma over time lead to accumulation and building up of lava and ash to form a volcanic mountain.

If the main vent gets blocked by magma during an earlier eruption, the magma that rises during a later eruption escapes through a side vent and flows out on the slope of the volcano. When such magma cools it forms a smaller hill on the slope of the main volcano. This hill is called a **parasitic cone**.

When the eruption stops, magma solidifies inside the vent and blocks it. This leads to the formation of a depression at the top of the volcanic mountain called a summit **crater**. You can see some of these features on Figure 21.2.

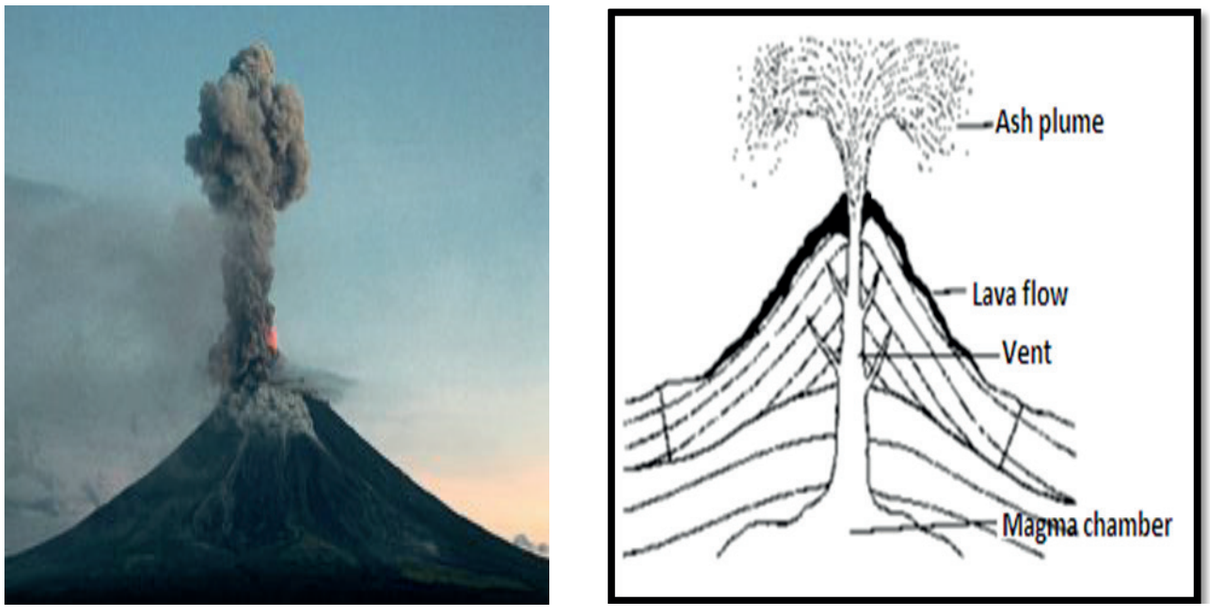


Figure 22.2: Formation of a volcanic mountain

Activity 2

1. Apart from the mountains shown in Figure 21.1, give three examples of volcanic mountain in East Africa.
2. What is the difference between a block mountain and a volcanic mountain?
3. Imagine you live in the area shown in Figure 22.2. Suggest how the formation of the volcanic mountain would affect your community.

Follow-up activity

1. Carry out a textbook or internet research about volcanicity and draw a map showing volcanic landforms in East Africa.
2. Explain the benefits and problems associated with living around volcanic landforms in East Africa.

SUB-TOPIC: VOLCANICITY AND FORMATION OF EXTRUSIVE FEATURES

Lesson 15: Formation of Craters and Calderas

By the end of the lesson you should be able to:

i) define a crater and a caldera.
ii) identify and give examples of craters and calderas in E.A
iii) describe how they were formed.

You will need:

notebook, pen, pencil, rubber

Introduction

In this lesson, you are going to learn more about formation of crater and calderas.

A crater is an extrusive feature formed by volcanicity. A crater is a flat floored circular depression/a shallow circular depression formed on top of a volcanic mountain. It is formed by violent acidic lava eruptions that blows off the upper part of the volcano and forms a depression. When filled with water, it forms a crater lake. Examples of craters, Elgon crater in Uganda, Ngosi crater in Tanzania.

Figure 23.1: Explosion crater

A caldera is a big depression on a big crater. A caldera is formed when violent volcanic eruptions blow off the top of a volcano when this occurs, a wide and big depression is created on top of the volcanic cone. The depression created is called a Caldera. Examples of calderas include Napak in Karamoja, and Ngorongoro in northern Tanzania. When a caldera gets filled with water, it becomes a caldera lake.

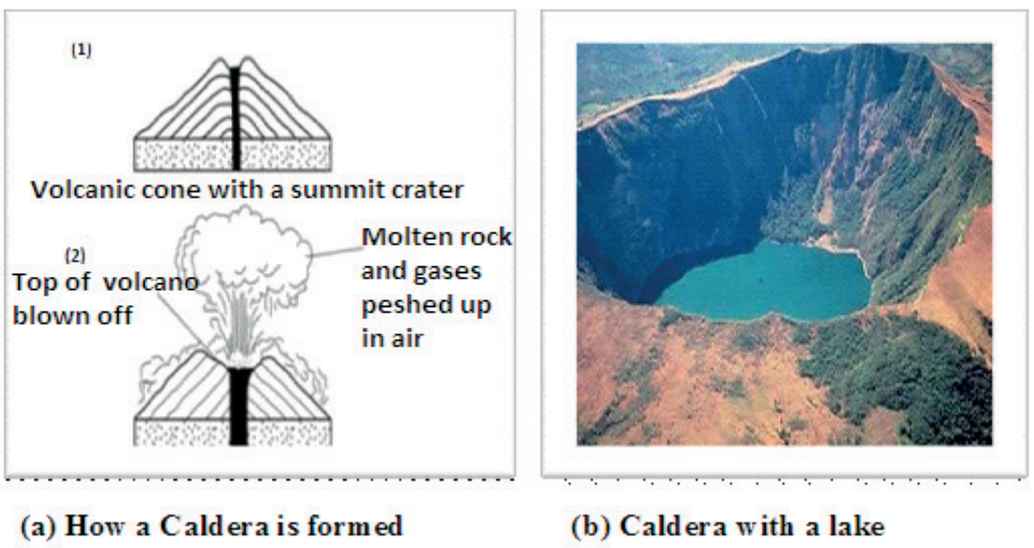


Figure 23.2: Formation of a caldera

Activity 1
In your notebook:

1. Copy **Figure 1** and **Figure 2** and on it mark and name
(i) Crater
(ii) Caldera respectively

2. Define the following:
   (i) Crater
   (ii) caldera
3. Describe how the following features were formed.
   (i) Crater
   (ii) caldera
4. How are calderas and craters important to human beings?
5. Give two examples of craters and calderas found in East Africa.

Summary
In this lesson you have learnt that:

i) a summit crater is a small depression on top of a volcanic cone while a caldera is a larger depression formed from a crater.
ii) when both craters and calderas get filled with water they form lakes on tops of volcanic mountains.
iii) explosion craters are formed at the ground level due to an explosive eruption of fluid magma.

Follow-up activity
Carry out research and in your notebook, write brief notes about the following features:

- Larva dammed lakes
- Volcanic plug
- Geysers
- Lava plateau

Lesson 18: Formation of Intrusive igneous landforms in East Africa

By the end of the lesson you should be able to:

i) explain the meaning of volcanicity.

ii) identify intrusive igneous features.

iii) describe the formation of each intrusive igneous feature.

Introduction
In primary you learnt about volcanicity and the related landforms. In this lesson, you are going to learn formation of intrusive landforms

Intrusive landforms/features are formed when magma is ejected within the earth crust where it cools and solidifies to form features of different sizes and shapes.

These features include **batholith**, **dykes**, **sills**, **laccolith**, and **lapolith**.

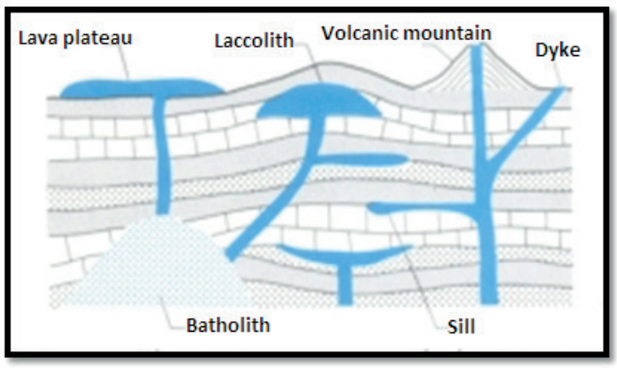


Figure 18.1: Intrusive Igneous features

Activity 1

1. In your notebook copy the diagram showing intrusive features and on it mark and name all the features shown.
2. Describe how each intrusive landform/feature was formed.
3. How are these intrusive features important to us?
4. What are their disadvantages to the people of East Africa?

Summary
In this lesson, you have learnt that:

- intrusive features form underground and are only exposed by erosion.
- batholiths are dome shaped igneous features found deep underground.
- dykes are vertical, sills are horizontal, while laccoliths mushroom-like shaped features. A lapolith is a saucer-shaped underground feature.

Follow-up activity

1. Distinguish between Intrusive and Extrusive igneous features
2. Imagine you live in an area with a volcanic feature. Suggest how you would make use of the feature to earn income.
3. What problems are you most likely to face as a result of the presence of this feature in your home area?

SUB-TOPIC: DOWN WARPING

Lesson 19: Formation of warped basins in East Africa

By the end of lesson, you should be able to:

i) explain up warping and down warping.
ii) describe the formation of warped basins/lakes.

Introduction
Warping is another form of earth movement which involves the sagging in of the land caused by upward and downward movement of the rocks of the earth's crust. It occurs when one extreme ends of a block of land are pushed up by earth movement. This causes the central part of the earth's crust to sag in forming a depression. In this lesson you are going to learn how down warping led to formation of lakes in Uganda.

You will need:
pen, notebook, pencil, rubber, atlas

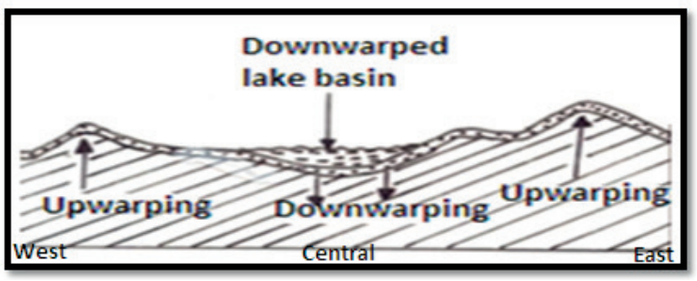


Figure19.1: Formation of a down warped lake

Activity 1
Look at Figure 19.1 and:

1. copy the diagram into your notebook.
2. describe the processes which acted on the earth's crust in the Easter, central, and western parts of Uganda.
3. suggest why the lake basin looks shallow.
4. Where do you think the water that filled the down warped depression to form the lake came from?

The processes which you have described are the ones which led to the formation of Lakes Victoria and Kyoga in Uganda. Up warping took place in Western Uganda and caused the land to rise so that the rivers which used to flow west wards could no longer flow across the region.

Eventually, these rivers changed their course and direction of flow and poured their waters in the down warped basins to form the two lakes. This is called **river or stream reversal**. Examples of those rivers are Kafu, Katonga and Kagera. Other down warped lakes include in East Africa are Nakivali, Kijanebarola, Kachira, and Wamala. Find out the location of these lakes from the Atlas.

Summary
In this lesson you have learnt that:

- warping is the gentle deformation of the earth's crust.
- down warped lakes are shallow because they were formed due to slight sagging of the earth's crust.
- the two largest lakes in Uganda occupy down warped depressions.

Follow-up activity

1. Explain the importance of down warped lakes to the economic development of Uganda.
2. What are the problems likely faced by people living near the down warped lakes of East Africa?
3. Draw the map of East Africa and on it mark and name the down warped lakes.

TOPIC: ROCK WEATHERING AND SOIL FORMATION

Lesson 20: Types of Weathering

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

i) describe the types of weathering
ii) describe processes of physical and biological weathering.
iii) recognize types of rock weathering in the field and from photographs.

You will need:
notebook, pen, pencil, rubber, samples of rock

Introduction
In Lesson 19 you learnt about rocks which make up the earth's crust. You realized that even the loose and fine soil we see was at one time a hard rock. In this lesson you are going to learn about how rocks are broken down into particles including fine sand and clay and the process by which they are broken down.

What is weathering?
Activity 1

1. Move around your home and pick some rock samples of any size.
2. Get a hard tool such as a metal or another rock and hit the rock samples you have picked.
3. Observe what happens to the size and shape of the rock samples.

You have probably realised that when a rock is acted upon by a strong force, it breaks up into smaller pieces. Its shape also gets completely changed. When that happens, we say that the rock has experienced **weathering.**

The rock may also by weathered by rotting or decaying. For example, when you break a rock, especially those which are white or colourless, it looks fresh and clear. After keeping it outside for some months, it turns brown, greyish, or reddish brown. This is because the minerals making up the rock are decaying. Again the rock is experiencing weathering. Through weathering rocks decay and become soil. Others get changed to mineral compounds.

Activity 2

1. In your notebook, write at least two sentences to explain what you understand by weathering.
2. Using ideas from the above text, suggest names which can be given to the two types of weathering described in the text.

Types of Weathering
Rock weathering can be divided into types or categories depending on how the rock gets broken down. There major types are **Physical** or mechanical weathering, **Chemical** weathering, and **Biological** weathering. Each of these types of weathering occurs in different ways known as **weathering processes**.

Physical weathering

When a rock gets broken down as a result of experiencing a strong force, or heating we say that it has broken down physically or mechanically. Such a rock becomes smaller and also loses I original shape. Such breaking down is called physical or mechanical weathering.

Physical weathering involves several processes. As you learnt earlier, a rock can be broken down physically by heat, stress, or by external pressure. To understand this, look at Figure 20.1.

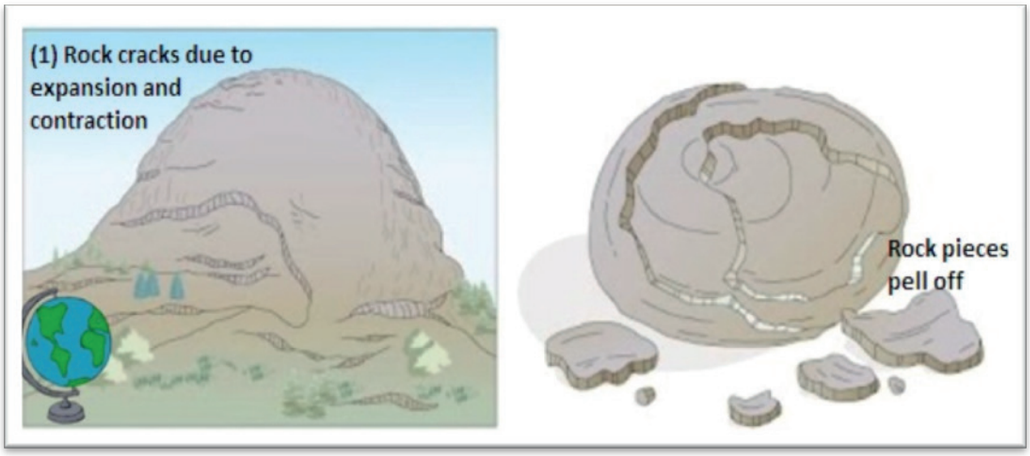


Figure 20.1: Rock broken by Exfoliation

In Figure 20.1 you see that during day time the rock is heated by the sun. When it heats up it expands. At night it cools down. On cooling it contracts. Repeated expansion and contraction of the rock weakens it. It develops cracks. Along the cracks, rock pieces peel off. Eventually, the rock becomes smaller. This process of physical weathering is called **Exfoliation.** It mainly takes place in arid and semi arid areas with hot temperatures. In East Africa exfoliation usually occurs in **Karamoja, Turkana land,** and **Maasai land**.

Weathering by Frost Action

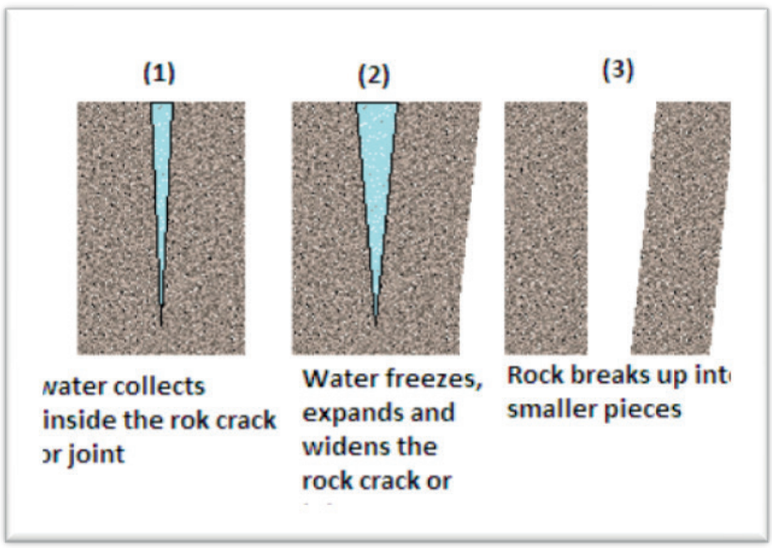


Figure 20.2: Frost action

Activity **2**
Look at Figure 20.1 and:

1. describe the process taking place at each stage.
2. explain under what conditions does this kind of weathering take place.
3. suggest two places in East Africa where this kind of weathering is likely to take place.

In very cold areas which experience snow fall and ice, rocks are broken down by freezing and melting of ice. When rain falls water collects in cracks and joints on the rock. At night when temperatures fall, water in the cracks freezes. During day time temperatures rise again. This leads to melting of ice. The melt water enters deep into the cracks. On freezing water expands, presses against the rock walls leading to expansion of cracks. Continued freezing and melting of water leads to break up of the rock.

This process is called weathering by **frost action**. It is also known as **freeze-thaw** process. It takes place in the very high mountains of East Africa which have glaciers, for example, on Mountain Rwenzori, Kilimanjaro, and Kenya.

What is Biological weathering?
Activity 3

1. Suggest how plants and trees may breakdown rocks.
2. In what ways can human beings break down rocks?

In biological weathering rocks are weathered by agents like human beings, plants and animals.

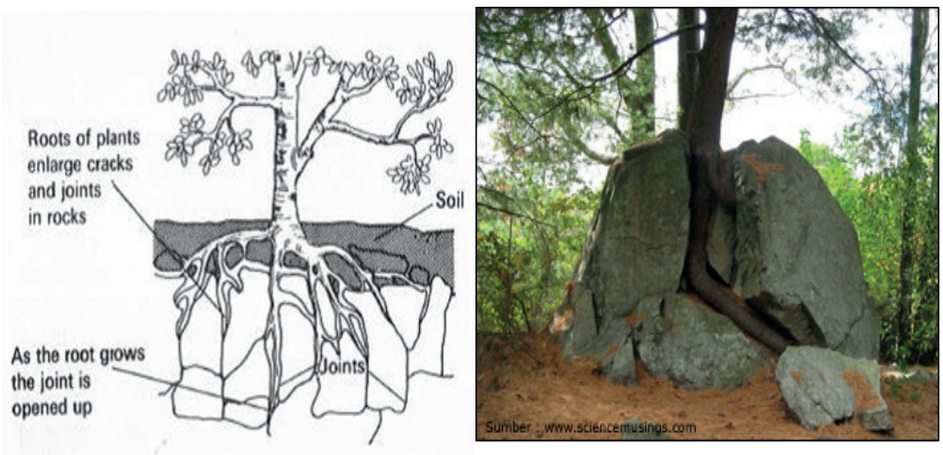


Figure 20.3: Wedging Action by plant roots

As plant roots grow along rock cracks and joints, they exert stress upon the rock. This leads to enlargement of the rocks or joints. When the root grows bigger the rock breaks apart. To understand this better, look at **Figure 20.3**.

Burrowing animals like rabbits, rodents, help to open up joints in rocks and also bring rock pieces to the surface, where they are exposed to further weathering.

Summary
In this lesson, you have learnt that.

- Physical weathering involves break down of rocks without change in chemical compositions.
- Physical weathering also has different processes which include exfoliation, block disintegration, and frost action
- Biological weathering is the breakdown of rocks by plants and animals.

LESSON 21: Chemical Weathering

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

i) explain the meaning of Chemical weathering.
ii) describe the processes of chemical weathering.
iii) recognize the effects of chemical weathering in the field.

Introduction
When you pick a small pinch of soil and feel it with your fingers you will notice that it is soft and fine. This is because the rock from which it was formed decayed to form very small particles. What processes do you think can lead to the decaying of a hard rock? In this lesson, you are going to look at chemical weathering and its processes. You are also going to learn how chemical weathering affects rocks and landscape.

What is Chemical weathering?
Activity 1

1. Define chemical weathering.
2. List processes of chemical weathering you know.
3. Briefly explain how each process of chemical weathering contributes to soil formation.

Chemical weathering breaks down rocks when chemical reactions take place within the rocks between liquids and gases from the air. Water plays a key role in most chemical reactions. Chemical weathering is most dominant in **hot and humid areas** especially in equatorial zones and least effective where there is little rain such as in **semi-arid areas** and **hot deserts.**

You now know that rocks are composed of the minerals. Some rock minerals are soluble in water and are greatly affected by weathering. For example, from your Chemistry you know that water contains oxygen and hydrogen gases. When water comes into contact with rocks, these gases react with rock minerals. When chemical reactions take place, the rock becomes weaker and decays. This is what we call **chemical weathering**.

Processes of Chemical Weathering
Rocks are broken down by chemical weathering in several ways. These ways are called the **processes** of chemical weathering. For example, rain water is a weak carbonic acid which contains some carbon dioxide. When a rock absorbs rain water, the carbon dioxide reacts with minerals within the rock. This weakens the rock and it decays. This is process is called **carbonation** and it affects areas with limestone and chalk rocks.

In limestone areas like Nyakasura, in Kaborole district, chemical weathering has led to formation of limestone **caves**, **stalactites**, **pillars**, and **stalagmites**. These features are locally known as ***Amabeere ga Nyinamwiru.*** To help you understand these features,

Look at **Figure 21.1.**

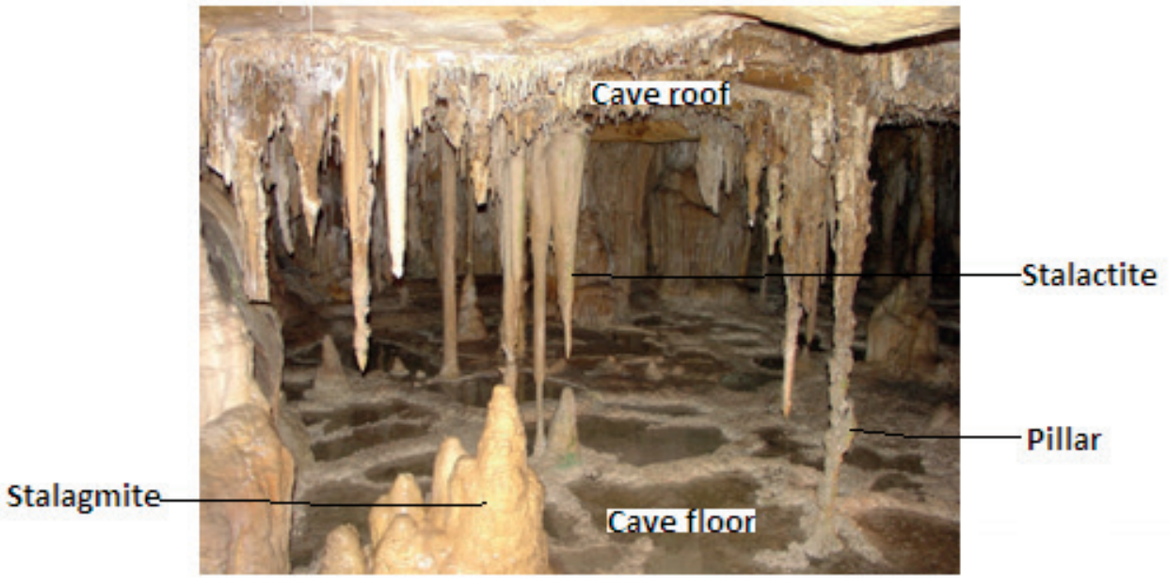


Figure 21.1: Limestone cave

Activity 2

1. Draw a sketch diagram of Figure 21.1 and label all its features.
2. Write about two sentences to explain each of the following features:
   (i) Limestone cave,
   (ii) Stalactite,
   (iii) Stalagmite, and
   (iv) Limestone pillar
3. Suggest the likely benefits associated with features formed due to weathering.

Water also contains hydrogen gas. When water enters a rock the hydrogen atoms in it lose or gain some electrons and change to ions. Remember what an *ion* is in Chemistry. When hydrogen ions react with rock minerals, the rock becomes weaker and decays. This process is called **hydrolysis.** The fine clay you see in many places was formed by this process.

Rocks are also weathered chemically when their minerals get dissolved in water. To understand this, get some salt crystals, mix them with water and stir for some minutes. Observe what happens to the salt crystals. If you taste the water with your tongue it is salty. In the same way some rocks can break down by dissolving in water. This process is called **weathering by solution**.

Rain water contains oxygen which combines with the rock minerals when in contact. Oxygen reacts with rock minerals weakening the rock structure leading to decomposition of the rock a process called **oxidation**.

In **hydration** as a process, rocks absorb water and expand. This causes stress within the rock and leads to break down. This process is common in areas with heavy rainfall and along valleys.

Activity 3

1. List all the gases which react with rocks during chemical weathering process.
2. For each gas, explain what happens when it gets into contact with rocks.
3. What role does water play in most chemical weathering processes?
4. Summarise the processes of chemical weathering.

Summary
In this lesson, you have learnt that:

- In chemical weathering rocks decompose and form new substances.
- Chemical weathering takes place through different processes like carbonation, oxidation, hydrogen and solution.
- Chemical weathering mostly occurs in areas with heavy rainfall and hot temperatures.
- Chemical weathering leads to formation of useful earth materials such as clay, and attractive features such as limestone caves, stalactites, stalagmites and pillars.

Follow-up Activity
Carry out a field work study of your home area to find out the:

1. Types of weathering taking place in the area.
2. Processes of weathering taking place in each type of weathering.
3. Effects of weathering on rocks and landscape.
4. Benefits the local community gets from the effects of weathering in the area.

National Curriculum
Development Centre,
P.O. Box 7002,
Kampala.

www.ncdc.go.ug