SOCIAL STUDIES
FOR TTC

STUDENT-TEACHER'S BOOK

YEAR 2

OPTION: LE & SME

FOREWORD

Rwandan education philosophy intends to ensure that young people at every level of education achieve their full potential in terms of relevant knowledge, competences, skills and appropriate attitudes that prepare them to be well integrated in world society and exploit employment opportunities.

In view of that philosophy, The Rwanda Education Board is honoured to avail the Social Studies student teacher's book for Teacher Training Colleges (TTCs) in Science and Mathematics Education & Languages Educationwhich serves as official guide to teaching, learning and assessing Social Studies.

The ambition to develop a knowledge-based society and the growth of regional and global competition in the job market has necessitated the shift to a competence-based curriculum. After such a curriculum successful shift, in general education, TTC curriculum also was revised to align it to the Competence Based Curriculum prepare teachers who are competent and confident to implement in pre-primary and primary education. The rationale of the changes is to ensure that TTC leavers are qualified for job opportunities and further studies in higher education in different programs under education career advancement.

I wish to sincerely express my appreciation to the people who contributed towards the development of this document, particularly, Consultants, REB staff, UR-CE lecturers, TTC Tutors, Teachers from general education and experts from Local and international Organizations for their technical and scientific support. Special appreciation goes to the Development Partners such as UNICEF, IEE, USAID/Soma Umenye, Save the Children and Right To Play for their financial support.

I take this opportunity to call upon all educational stakeholders to bring in their contribution for successful implementation of this syllabus.

Dr NDAYAMBAJE Irénée
Director General REB

ACKNOWLEDGEMENT

I wish to sincerely express my special appreciation to the people who played a major role in development of Science and Mathematics Education & Languages Education. It would not have been successful without the support from different education stakeholders. My thanks first go to the leadership of UR-CE who started the review of the TTC curriculum in 2015.

I wish also to thank Rwanda Education Board (REB) leadership who took over and supervised the curriculum review process. I wish to extend my appreciation to Consultants, REB staff, Lecturers from UR-CE, TTC Principals, TTC Directors of Studies, Deputy Principals, Tutors and Teachers from General Education for their effort during the revision process of book production.

I owe gratitude to different education partners more especially UNICEF, IEE, USAID-Soma Umenye, Flemish Association for Development Cooperation and Technical Assistance (VVOB), Right To Play, Help a Child, Save the Children, Aegis Trust, Humanity and Inclusion, Teach Rwanda, Educate! and IEE for their technical support.

MURUNGI Joan,

Head of Curriculum Teaching and Learning Resources Department/REB

Introduction

This text book is part of the reform of the school curriculum in Rwanda: that is changes in what is taught in schools and how it is taught. It is hoped this will make what you learn in school useful to you when you leave school, whatever you do then.

In the past, the main thing in schooling has been to learn knowledge – That is facts and ideas about each subject. Now the main idea is that you should be able to use the knowledge you learn by developing competencies. These competencies include the ability to think for yourself, to be able to communicate with others and explain what you have learnt, and to be creative that is developing your own ideas, not just following those of the tutor and the text book. You should also be able to find out information and ideas for yourself, rather than just relying on what the tutor or text book tells you.

Activity-based learning

This means that this book has a variety of activities for you to do, as well as information for you to read. These activities present you with material or things to do which will help you to learn things and find out things for yourself. You already have a lot of knowledge and ideas based on the experiences you have had and your life within your own community. Some of the activities, therefore, ask you to think about the knowledge and ideas you already have.

In using this book, therefore, it is essential that you do all the activities. You will not learn properly unless you do these activities. They are the most important part of the book.

In some ways this makes learning more of a challenge. It is more difficult to think for yourself than to copy what the tutor tells you. But if you take up this challenge you will become a better person and become more successful in your life.

Group work

You can also learn a lot from other people in your class. If you have a problem, it can often be solved by discussing it with others. Many of the activities in this book, therefore, involve discussion. Your tutor will help to organize these groups and may arrange the classroom so you are always sitting in groups facing each other.

Research

One of the objectives of the new curriculum is to help you find things out for yourself. Some activities, therefore, ask you to do research using books in the library, the internet if your school has it. This, or other sources such as newspapers and magazines. This means you will develop the skills of learning for yourself when you leave school.

Skills lab

Social Studies subject is practical than being theoretical only that is why it requires time of skills lab which is a regular time on normal time table when student-teacher are required to complete learning activities working in manageable groups.

During skills lab activity student-teachers are given an opportunity to talk more and get more involved in the lesson than tutors. Student-teachers receive constructive feedback on work done (Tutor gives quality feedback on student presentations).

The Skills Lab prepares student-teacher to complete portfolio assignments on their own after classes. So the classroom activity should connect directly to the portfolio assignment and the tutor during the skills lab makes sure that he/she links the unit with the students.

Icons

To guide you, each activity in the book is marked by a symbol or icon to show you what kind of activity it is. The icons are as follows:

	***Thinking icon/Introductory activity*** This indicates thinking for yourself or groups discussion. You are expected to use your own knowledge or experience, or think about what you read in the book, and answer questions individually or as group activity.
	***Thinking icon/Learning activity*** This icon reminds you link your previous knowledge with the topic you are going to learn. As a student, feel free to express what you already know about the topic. What is most important is not giving the right answer but the contribution you are making towards what you are going to learn.
	***Application activity*** Some activities require you to complete them in your exercise books or any other book. It is time for you show if you have understood the lesson by answering the questions provided.

	***Skills lab*** This icon indicates a practical activity, such as a role play to resolve a conflict, participating in a debate and following instructions provided by the teacher. These activities will help you to obtain practical skills which you can use even after school.
	***End unit Assessment icon*** This icon invites you to write down the results from activities including experiments, case studies and other activities which assess the attainment of the competences. Tutors are expected to observe the changes in you as student teacher.

TABLE OF CONTENT

UNIT 1

EXPLORATION OF AFRICA

Key Unit competence: Student teacher should be able to explain the causes and consequences of exploration of Africa.

1.0. INTRODUCTORY ACTIVITY

Kamali is an old man who always narrates to young people about his early age. One day the children asked him why he speaks Kinyarwanda mixed with little French words. He responded by saying that it is because of the influence of Europeans in Africa around the 19th century.

a) Identify the first group of Europeans who reached Africa in 19th century.

b) What were the reasons for their movement towards Africa?

c) Assess the impact of the first group of Europeans who came to Africa.

1.1. Different European explorers and their routes

LEARNING ACTIVITY 1.1

Using different History books and Internet, find out explorers who traveled to Africa in the 19th Centuries. Draw a map of Africa showing the routes each explorer took.

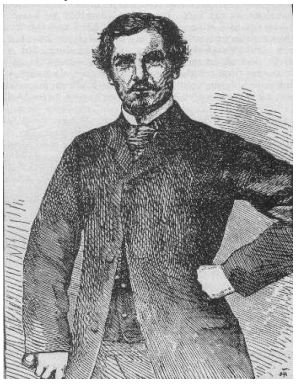
The verb to explore means to discover, to move far with a purpose of discovery. Therefore, explorers were people who came from Europe to discover more about man and universe in which man lived.

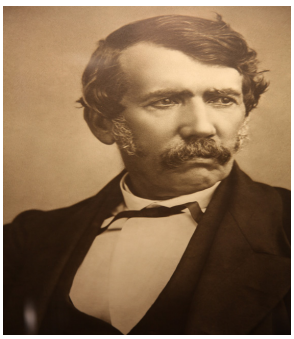
In the contemporary epoch, notably at the beginning of the 16th century, Europe was not interested in Africa. However, it had some trading posts on the African coasts (the Gold Coast, Gambia, Sierra Leone and so on) and rare population colonies in Algeria from 1830, in Senegal and in Cape Town.

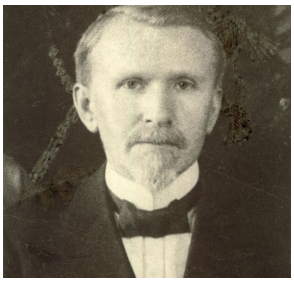
The end of the 16th Century knew one of the most significant historical mutations of Black Africa. Whereas in 1879, more than 90% of the continent

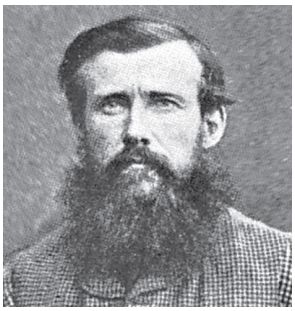
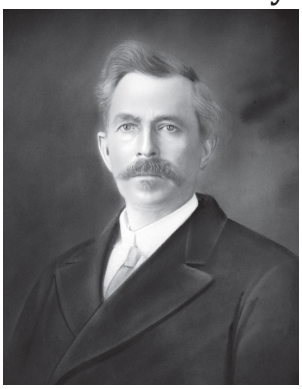
was still controlled by Africans, but in 1900 it was completely under European powers.

To penetrate inside the African continent, the explorers used large waterways of which the most significant are Senegal and Niger Rivers in Western Africa, the Nile and the Congo Rivers in Eastern and central Africa respectively and the Zambezi River in Southern Africa. The following are main explorers and their itinerary.

Explorers	Routes and areas explored
1. Mungo Park  *Mungo Park (1771 - 1806)*	Mungo Park (1771-1806) was a Scottish explorer, born in Foulshiels, Selkirkshire, United Kingdom. In 1795 he traveled to Africa to explore the Niger River. Upon arriving in present-day Gambia, he went 322 km (200 mi) up the Gambia to the trading station of Pisania (now Karantaba) and then traveled East into unexplored territory. He was captured by a local chief but escaped and in 1796 reached the Niger River at the town of Ségou. He traveled 129 km (80 miles) downstream as far as Silla before his supplies were exhausted. After his return to Great Britain in 1797, Park published an account of his trip in ***Travels in the Interior of Africa*** **(1799).** In 1805 he returned to Africa to explore the Niger, from Ségou to the mouth of the river, by canoe. Unfortunately, his expedition was attacked at Bussa, and Park was drowned. Mungo Park died in 1806 in Bussa, Nigeria. An account of Park's second journey, taken from his journals, was published posthumously in London in 1815.
2. James Grant  *James Grant (1827- 1892)*	James Augustus Grant: **(April 11th, 1827- February 11th, 1892)** Grant was born at Nairn in the Scottish Highlands, where his father was the parish minister, and educated at Nairn Academy, Aberdeen Grammar School and Marischal College. In 1846 he joined the Indian army. He saw active service in the Sikh War (1848–49), served throughout the Indian Mutiny of 1857, and was wounded in the operations for the relief of Lucknow. He returned to England in 1858, and in 1860 joined John Hanning Speke in the memorable expedition which solved the problem of the Nile sources. The expedition left Zanzibar in October 1860 and reached Gondokoro, where the travelers were again in touch with what they regarded as civilization, in February 1863. Speke was the leader, but Grant carried out several investigations

	independently and made valuable botanical collections. He acted throughout in absolute loyalty to his comrade….....
3. Dr. David Livingstone  *Dr. David Livingstone (1813 - 1873)*	Dr. David Livingstone was born on 19th March 1813 in Blantyre, Scotland. He was a Scottish medical doctor, missionary and a remarkable explorer. He was the first European to see the Victoria Falls on River Zambezi which he later named Victoria. He named it Victoria in honour of queen Victoria of England. He discovered numerous geographical features such as Lake Ngami, Lake Malawi, Lake Bangweulu and Victoria Falls. Livingstone's last journey began in 1866. However, he was deserted by his followers. This did not discourage him. He travelled to Ujiji, on the Eastern shore of Lake Tanganyika where he established a base for his expedition. During this time, he lost touch with Europe. Fearing that he might have died, Henry Morton Stanley was sent to find him, dead or alive. Stanley met Livingstone at Ujiji. Livingstone's meeting with H.M Stanley on 10th November 1871 gave rise to the popular quotation "Dr. Livingstone, I presume?" They stayed together and even explored Lake Tanganyika. However, Stanley failed to convince Livingstone to return to Europe. They parted ways on 14th March 1872. In August 1872, Livingstone resumed his search for the source of River Nile. Livingstone died on May 1, 1873 at the age of 60 in Chief Chitambos village at Ilala, south East of Lake Bangweulu, in present-day Zambia, from malaria and internal bleeding due to dysentery. His loyal attendants Chuma and Susi removed his heart and buried it under a tree near the spot where he died, which has been identified variously as Mvule tree or a Baobab tree. The rest of his remains were carried, together with his journal, over 1,000 miles (1,600 km), a journey that took 63 days, by Chuma and Susi to the coastal town of Bagamoyo, where they were returned by ship to Britain for burial. In London, his body lay in repose at No.1 Savile Row, then the headquarters of the Royal Geographical Society, prior to interment at Westminster Abbey. He was one of the most popular heroes of the late 19th Century explorers in Great Britain.

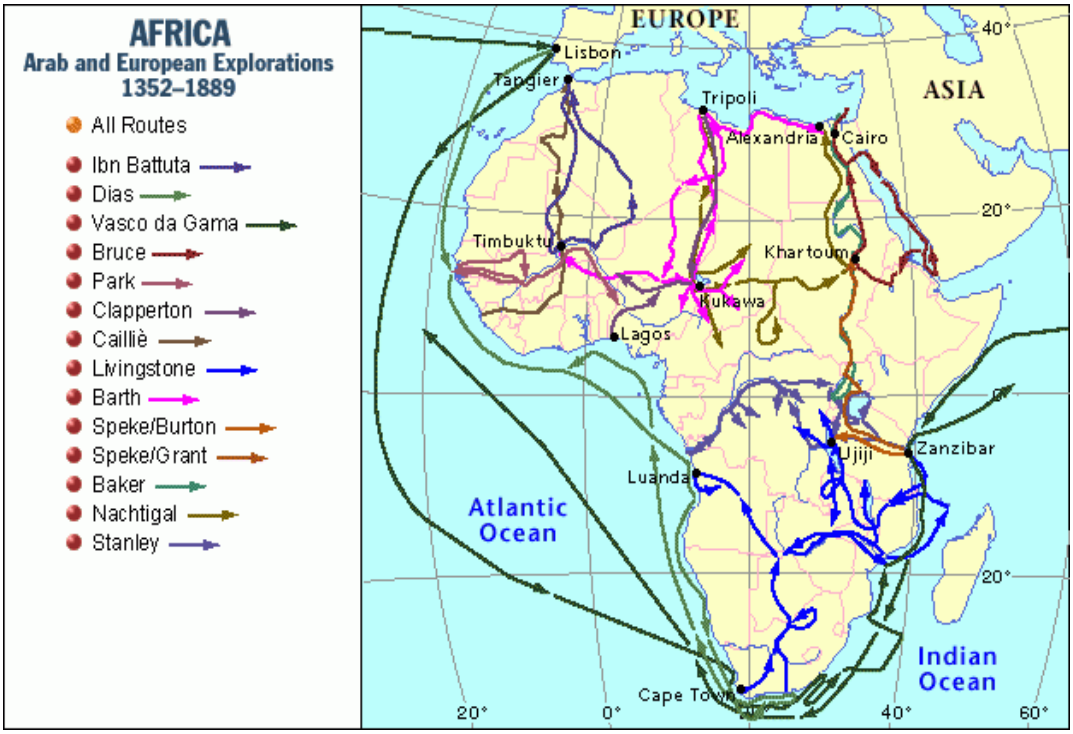
4. Johannes Rebmann  *Johannes Rebmann (1820 - 1876)*	Johannes Rebmann was born on 16th January 1820 in Gerlingen, Germany. He was a German missionary and explorer. He was the first European along with Johann Ludwig Kraft to enter Africa from the Indian Ocean coast. Additionally, he was the first European to find Mount Kilimanjaro in 1848. The following year, he saw Mount Kenya together with his colleague Krapf.
5. Sir Richard Francis Burton  *Sir Richard Francis Burton (1821 - 1890)*	Sir Richard Francis Burton was born on 19th March 1821. He was a British explorer, geographer, translator, writer, soldier, cartographer, spy, linguist, poet, fencer and a diplomat. He was known for his travels and explorations in Asia, Africa and America. He was also known for his extraordinary knowledge of languages and cultures. He spoke 29 languages from Europe, Asia and Africa. Burton and John Hanning Speke were the first Europeans to visit the great lakes region of Africa. They were in search of the source of River Nile. Burton was engaged by the Royal Geographical Society to explore the East coast of Africa. He was guided by the locals during his expedition. He was the first European to see Lake Tanganyika. He died on 20th October 1890 in Trieste, Austria-Hungary.
6. Sir Samuel Baker  *Sir Samuel Baker (1821 - 1893)*	Sir Samuel Baker was born on 8th June 1821 in London, England. He was a British explorer, officer, naturalist, big game hunter, engineer, writer and abolitionist. He also held titles of Pasha and Major General in the Ottoman Empire and Egypt. Between April 1869 and August 1873, he served as a governor General of the Equatorial Nile Basin (Today's northern Uganda and South Sudan). He was the first European to discover Lake Albert. He named it Lake Albert, in honor of Prince Albert the husband of Queen Victoria of the United Kingdom of Great Britain. He was an explorer of the Nile and interior of Central Africa. He was also a big game hunter in Asia, Africa, Europe and North America. Baker and his wife became the first Europeans to see a substantial water fall on the Victoria Nile. Baker named it Murchison Falls after the then president of the Royal

	Geographical Society, Sir Roderick Murchison. He died on 30th December 1893 in Newton Abbot, England. From 1869 to 1873 Samuel Baker commanded an expedition to suppress slavery and open trade in the equatorial lake region. He explored in Cyprus, Syria, India, Japan, and the United States. He wrote *Eight Years Wandering in Ceylon* (1855), *The Albert Nyanza* (1866), *The Nile Tributaries of Abyssinia* (1867), and *Wild Beasts and Their Ways* (1890).
7. John Henning Speke  *John Hanning Speke (1827 - 1864)*	John Hanning Speke was born on 4th May 1827 in Buckland Brewer, United Kingdom. He was an officer in the British-Indian army who made three voyages of exploration to Africa. He is the one most associated with the search for the source of River Nile. In 1856, Speke and Burton came to East Africa to find the great lakes. The great lakes were rumored to exist at the center of Africa. This happened in February 1858. The two were the first Europeans to reach Lake Tanganyika. It was hoped that the expedition would locate the source of River Nile. John Hanning Speke was the first European to discover the Lake which he named Victoria Nyanza (Lake Victoria) after the queen of Britain. He also discovered that Lake Victoria was the source of River Nile. This was on 30th July 1858. John Hanning Speke died on 15th September 1864 in Corsham, United Kingdom.
8. Sir. Henry Morton Stanley  *Henry M. Stanley (1841 - 1904)*	Sir Henry Morton Stanley was born on 28th January 1841 in Denbigh, Wales, and United Kingdom. His original name was John Rowlands. He also had a Congolese name *Bula Matari* meaning, 'breaker of rocks'. Stanley was a Welsh journalist and explorer. He was famous for his explorations in Africa as well as his search for Dr. David Livingstone. He was one of the first Europeans to make a transcontinental journey across Africa. When Livingstone died in 1783, Sir H.M Stanley resolved to take up the exploration of Africa. He had to begin from where Dr. Livingstone had left off. His visit to Mutesa I of Buganda led to the admission of missionaries in the area in 1877. It also led to the eventual establishment of a British protectorate in Uganda. He also confirmed that

	Lake Tanganyika had no connection with the Nile River. Sir Henry Morton Stanley died on 10th May 1904 in London, United Kingdom.
9. Carl Peters ***(1856 - 1918)*** 	Karl Peters was born on 27th September 1856 in Neuhaus, Germany. He was a German explorer, colonial ruler, politician and an author. He was the major reason for the foundation of German colony of East Africa in today's Tanzania. Carl Peters was a strong supporter of Social Darwinism and *Volkisch* movement. He died on 10th September 1918 in Bad Herzberg, Germany.
10. Joseph Thomson  *Joseph Thomson* *(1858 - 1895)*	Joseph Thomson was born on 14th February 1858 in Penpont, United Kingdom. He was a Scottish geologist and explorer who played an important part in the scramble for Africa. In 1883, he embarked on another Royal Geographical Society expedition. This time, his mission was to explore a route from the Eastern coast of Africa to the northern shores of Lake Victoria. British Empire traders wanted a route that would avoid potentially hostile Maasai and German traders who were competing in the area. He died on 2nd August 1895 in London, United Kingdom.
11. Mary Henrietta Kingsley  *Mary Henrietta Kingsley* *(1862 - 1900)*	Mary Henrietta Kingsley was born on 13th October 1862 in Islington, London. She was the first female explorer on the African continent. She was also an English ethnographic writer and explorer. Her travels throughout West Africa and resulting work helped to shape European perceptions of African cultures and British imperialism. Mary landed in Sierra Leon on 17th August 1893 and passed into Luanda, Angola. She lived with local people who taught her necessary life skills for surviving in the African jungles. She often went into dangerous areas alone. Her earlier training as a nurse prepared her for slight injuries and jungle malaria that she would later encounter. Mary later returned to England in December 1893. She died on 3rd June 1900 in Simon's Town, South Africa.

12. Oscar Baumann  *Oscar Baumann (1864 -1899)*	Oscar Baumann was born on 25th June 1864 in Vienna, Austria. He was both an explorer and a cartographer. He is well known for his exploration of the interior of German East Africa; present day Rwanda, Burundi and Tanzania. He is also known for producing maps of the region. He was the first explorer to enter Rwanda in 1892. He was also the first European to visit Lake Eyasi, Manyara and Ngorongoro crater. In 1885, Baumann was part of an Austrian exploratory expedition of the Congo basin. Unfortunately, he never completed his mission. He had to leave for his home country, Austria, at an early date due to illness. In 1896, Bauman was appointed consul to Zanzibar by the Austro-Hungary government. Unfortunately, Baumann later died at an early age of 35 years.
13. Count Gustav Adolf von Gotzen  *Count Gustav Adolf von Gotzen (1866 - 1910)*	Count Gustav Adolf von Gotzen was born on 12th May 1866 in the Kingdom of Prussia, German Confederation. He was a German explorer and a governor of German East Africa. He was also the second explorer to reach in Rwanda after Dr. Baumann. He made his first trip to Africa in a hunting expedition to Mount Kilimanjaro. Gotzen also led an expedition to claim these hinterlands. He took with him George von Prittwitz and Herman Kersting. The party set off from Pangani on the Tanganyika coast on 21st December 1893. After travelling through Maasai areas, they eventually arrived at Rusumo Falls on the Akagera River on 2nd May 1894. He went on to meet King Rwabugiri at his palace in Nyanza. He died on 2nd December 1910 in Hamburg, German Empire.

Map of Africa showing Routes taken by explorers



Source: https://www.google.com/url?sa=i&source=images&cd=&ved=2ahUKEwj8hLCsl7rlAhW

APPLICATION ACTIVITY 1.1

Consider five explorers and describe their routes of exploration in Africa.

1.2. Different causes of exploration

LEARNING ACTIVITY 1.2

Using different history books and internet explain the causes of exploration of Africa by Europeans in the 19th century.

Many reasons were advanced to explain the causes of exploration of the African continent by the Europeans during the 19th century. “Humane” reasons are

mixed up with economic and diplomatic causes, without forgetting scientific curiosities and the spirit of adventure.

a) Reasons of a "human" nature

Some of the explorers had humanitarian reasons and feelings. They wanted to stop slave trade and cure various diseases such as malaria that were affecting lives of Africans. The best example in this case was Dr. David Livingstone.

Some explorers such as Rebmann were Christian missionaries. They came partly to spread Christianity to Africa. They believed that Africans were primitive. They also wanted to counter the influence of Islam in Africa.

Two works influenced the Western opinion to a great extent in the second half of the 16th Century also caused the exploration of Africa. This is initially Charles Darwin's book written in 1859 and entitled *of the origin of the species by way of natural selection*. For his followers who are known as Post-Darwinians, this thesis justifies the conquests of white race on "non-advanced races" by the "superior race". As the reason of the strongest one is always the best, the sharing-up of Africa by Europeans was the result of a natural and inevitable process.

b) The Economic reasons

The industrial revolution operated in Western Europe from the beginning of the 16th century caused the industrialized countries to go to seek raw materials in Africa (agricultural produce, like cotton, coffee, sugar cane, cocoa, palm oil; ores like gold, diamond, silver, iron, etc.).

Rather than a trade balanced in the two directions, Africa, obligated to give its richness away, was also forced to consume the finished products manufactured in the West. This means that, the explorers came in Africa in search of market of their finished products.

The explorers were looking for an alternative safe trade route this was due to political tensions and frequent fights on the way from European countries to India (in Asia). Usual path passing through Suez Canal was clouded with political instabilities and frequent fights. It was also becoming less and less safe for trade purposes.

c) Politico-diplomatic reasons

The competitions in the Balkans and the Ottoman Empire were likely to lead the European countries towards the war. To avoid the confrontation, they launched out in an unrestrained race towards the colonial conquests.

National prestige and the balance of the forces of the European States thus explain this greed for the African continent. The desire for respect and prestige attracted many European explorers to Africa. This was because those who would discover new things were given titles such as sir and many other rewards. A country with many colonies was also highly respected hence the exploration of Africa.

Some explorers are believed to have been sent by their home countries to prepare Africa for colonization. This explains why they did the mapping and tracing minerals and fertile soils.

The technological improvement also encouraged Europeans to explorer Africa. Europeans began to build stronger and faster sailing ships such as a caravel. This was required for running with the wind and for sailing into the wind. The Europeans also came up with better navigational instruments which could tell north and south of the equator by the position of the stars. An example was the magnetic compass.

d) Scientific curiosities and the spirit of adventure

Until the beginning of the 16th century, Africa was a *terra incognita*, which pushed many explorers and scientists to going there to collect interesting ethnographic, sociological, linguistic and historic data. Unfortunately, a certain number of them gave this continent a black image which seemed to justify colonization.

Many explorers were pushed by the spirit of adventure. Some of them were full of excitement to travel to new places beyond their continent, especially Africa. They believed that Africa was dark and uninhabited. Some spent several years without the news of their families or their regions and countries of origin.

They also came to discover the sources of African rivers. The source of River Nile, the longest river in African and the world at large was unknown to all. This created the need to come and find its source. It influenced the coming of explorers such as Richard Burton and Speke. Other sources of rivers discovered by explorers are Niger River and River Zambezi.

Most of the explorers were scientists and geographers who desired to research about African societies and their organization, for example, Thomas Fowell Buxton.

APPLICATION ACTIVITY 1.2

To what extent were the economic reasons responsible for the exploration of Africa by the Europeans by 19th century?

1.3. Consequences of exploration of Africa

LEARNING ACTIVITY 1.3

Using different history books and internet explain the impact of exploration of Africa by Europeans by 19th century.

- They discovered physical features in Africa: e.g. the source of river Nile, mountain Kenya, among others and they gave new name to some physical features: Mount Kirinyanga was renamed Mount Kenya, lake Nalubaale or Ukerewe to Arabs was named lake Victory by Speke after Victoria the Queen of England.
- Exploration of Africa led to the introduction of Christianity. Some explorers were missionaries. For example, Livingstone and Rebmann. This ushered in European missionary activity in Africa and the final spread of the gospel.
- The exploration led to the drawing of the map of Africa. Explorers drew more accurate maps of Africa on paper which eased the coming of many more Europeans in Africa due to the geographical discoveries made by their predecessors.
- It led to the discovery of the sea route to India by Vasco da Gama (1497-1499). This increased trade links between Europe and the East.
- It contributed to the stopping of slave trade. The explorers reported evils of slave trade in Europe and campaigned against this inhuman trade. They insisted that slave trade be replaced with legitimate trade which was more profitable and acceptable in Africa.
- Exploration opened the interior of Africa to the Europeans. Many feared to come due to the belief in the Dark Continent theory. However, with exploration, many got information about the interior which enticed them to come.
- Africans adopted a new culture. Aspects of this culture included

language, dressing, feeding and religion. This was responsible for the weakening and subsequent disappearing of the traditions among the communities that interacted with the Europeans.

- Explorers led to the colonisation of Africa. This was through a number of activities such as signing misleading treaties with local African chiefs and cooperating with other colonial agents like missionaries. Africa was finally colonised by Europe.
- It made Europeans to increase their political ambitions to create colonial empires for prestige. For example, Britain was able to expand her wealth and power.
- It turned Africa to be a source of raw materials and market for European manufactured goods such as clothes and guns.
- Exploration led to the production of a new race of people known as the *Mulattos (somebody who has one black and one white parent)*. These came as a result of intermarriages between Africans and European explorers.
- It led to introduction of plantation agriculture and keeping of exotic breeds of livestock. The Portuguese introduced maize which was grown in large plantations. Other crops that were introduced by Europeans were sugarcane, tea, cocoa and tobacco. Livestock breeds that were introduced were, pigs, horses, sheep and cattle.
- Many trading posts in West Africa and in many other parts of Africa developed. For example, Timbuktu in Mali, South of the Sahara. Today these are big cities.
- Exploration led to the rise of capitalism i.e. an *economic system in which private individuals and business firms carry on the production and exchange of goods and services through a complex network of prices and markets*). Rise of capitalism resulted from the growth of town and city life and the expansion of trade.
- It led to the rise of mercantilism ***(****Mercantilism was the economic policy prevailing in Europe during the 16th, 17th, and 18th centuries, under which governmental control was exercised over industry and trade in accordance with the theory that national strength is increased by a preponderance of exports over imports).*This rose from economic growth and expanding royal power. Joint stock companies such as the British East India Company and Dutch East India Company were formed which also led to rivalries at sea.
- Exploration led to introduction of commercial revolution because it ushered in trade involving Asia, America and Europe. Europe became the center of world trade.

- Negatively, the exploration also registered some negative consequences as seen below;
- It led to imposition of European cultures in Africa, these included languages, dressing, feeding and religion. This rendered the African culture useless of the expense of the white man.
- Explorers led to the colonization of Africa. Through a number of activities like signing misleading treaties with local African chiefs hence loss of independence
- Loss of property such as land to the white man which deprived the Africans of their wealth hence remain in total poverty until now.
- During skirmishes many people died. Many people had embraced Islam yet missionary explorers wanted to stop it. They wanted to replace it with Christianity. This led to wars where many perished, consequently slowing down the work of explorers.

APPLICATION ACTIVITY 1.3

"The exploration of Africa by Europeans had both positive and negative impacts." Discuss.

1.4. Problems faced by explorers in Africa

LEARNING ACTIVITY 1.4

By the time of exploration, Africa was less populated with many forests. Roads were not yet built and the means of transport were not yet developed as we know them today. Carry out a research on African exploration and explain the problems faced by European explorers.

The explorers faced a number of challenges during the exploration. Some of them have been discussed below:

Poor communication and transport: Generally, the whole of pre-colonial Africa had no established railways and water canals. Most rivers and lakes were not navigable. There were also physical barriers such as forests, mountains and rift valleys. The European explorers were not familiar with such. They could get lost in forests. This slowed their work for some time.

Harsh climatic conditions: Africa had different climatic conditions as compared to what the explorers were used to in Europe. It was sometimes too hot or too cold. Tropical diseases such as malaria and yellow fever killed a large number of European explorers. Due to such conditions, West Africa was regarded as a white man's grave yard.

Hostility from slave dealers: Most Europeans explorers claimed to have come to stop slave trade on African soil. This drew them into hostility with Arab slave dealers who disliked missionary explorers for attacking their business. This led to constant attacks and alliances with resistors to frustrate Europeans.

Limited manpower: The explorers lacked enough manpower. This was due to coming in of few professionals compared to the big tasks they had. Some also died or were sick and unable to work. Africans were ignorant and had no required skills. This led to overworking leaving many places unattended.

The problem of language barrier: This was another challenge that was faced by the European explores. They spoke European languages that were not known in Africa. Europeans spoke languages such as English, German and French. In Africa, there was no uniform language because even Swahili was not known to all. This hampered communication as there were no even interpreters.

The threat of Islam: Islam had long been introduced in most places of Africa. It spread especially at the coast of West Africa and East Africa where Arab traders lived. Many people had embraced Islam yet missionary explorers wanted to stop it. They wanted to replace it with Christianity. This led to wars where many perished, consequently slowing down the work of explorers.

Hostile tribes: This was another challenge that was faced by European explorers in Africa. Most tribes stopped explorers from passing through their land. The Turkana, Nandi and Maasai from Kenya were among the hostile communities that attacked and killed explorers. This was in addition to tribal wars that affected the work of European explorers in Africa.

Presence of wild animals: These included animals such as lions, reptiles and wild beast in the tropics. Most explorers passed through forests and national parks due to lack of Geographical maps and compasses. They were later eaten up by lions (man-eaters), for example, in Tsavo National Park in Kenya. This threatened their mission in Africa.

Lack of home support: Most explorers lacked enough support from home. This was due to long geographical separation between Europe and Africa. This led to limited supplies in form of food, medicine and clothes. It crippled their

work alongside registering a lot of failures. For example, Dr. David Livingstone died before completing his work.

Getting lost: One big problem faced by explores was that they were lost in Africa due to lack of geographical maps and compasses. They either relied on local guides or just guess work. This was catastrophic in the sense that if they got lost nobody could help them.

Diseases: Diseases such as malaria, dysentery and yellow fever caused many deaths among ship crews. Some of these, especially yellow fever, were spread to the ports that the sailors visited. This left most of them sickly and unable to do the work effectively.

APPLICATION ACTIVITY 1.4

Discuss the main problems the explorers faced during their journey in Africa.

END UNIT ASSESSMENT 1

1. Identify different European explorers who came to the African continent and the areas they explored.
2. Account for the European exploration of the African continent.
3. Discuss the challenges faced by European explorers in Africa.
4. Assess the impact of the European exploration of Africa.

UNIT 2

EUROPEAN DOMINATION AND THE EXPLOITATION OF AFRICA IN THE19TH CENTURY

Key Unit competence: The student teacher should be able to describe the European domination, exploitation in Africa and its consequences in the 19th century.

2.0. INTRODUCTORY ACTIVITY

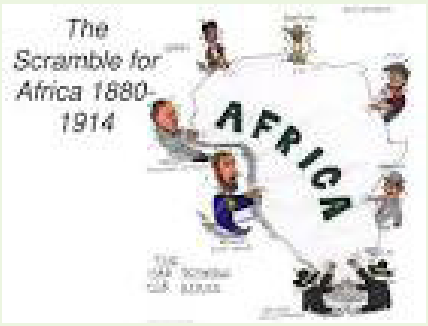
In the 19th century, due to a number of factors many European countries conquered and controlled the African continent. After the occupation of the so-called "dark continent", European countries used different methods to exploit their colonies. Use internet, textbooks and media to answer to the questions below:

1. Discuss the reasons for the European Scramble and Partition of Africa in the 19th Century.
2. Analyse the methods used by colonialists to acquire land in Africa.
3. Discuss colonial administrative policies.
4. Analyse the methods of colonial exploitation of Africa.
5. Assess the impact of European domination and exploitation of Africa.

2.1. The Scramble for Africa

LEARNING ACTIVITY 2.1

Observe the following image and answer the questions that follow:



1. Describe the event shown on this image.
2. Explain the causes of the European Scramble and Partition of Africa in the 19th Century.

Between the 1870s and 1900s, Africa faced European imperialist aggression, diplomatic pressures, military invasions, and eventual conquest and colonisation. At the same time, African societies put up various forms of resistance against the attempt to colonise their countries and impose foreign domination.

By the early twentieth century, however, much of Africa, except Ethiopia and Liberia, had been colonised by European powers. European imperialists push into Africa was motivated by three main factors: economic, political, and social.

Colonisation developed in the nineteenth century following the collapse of the profitability of the slave trade, its abolition and suppression, as well as the expansion of the European capitalist industrial revolution.

The imperatives of capitalist industrialization including the demand for assured sources of raw materials, the search for guaranteed markets and profitable investment outlets spurred the European scramble and the partition and eventual conquest of Africa.

The word "**Scramble**" means the rush and the struggle for, while "**Partition**" means dividing up or sharing.

Therefore, in early 19th century, Africa was divided and shared by the scrambling powers of Europe which were mainly Britain, France, Germany, Belgium, Italy, Portugal, and Spain were competing for power within European power politics. One way to demonstrate a country's power was through the acquisition of territories around the world, including Africa.

It was the economic, political, and social factors and forces that led to the scramble for Africa and the attempts by European commercial, military, and political agents to declare and establish control in different parts of Africa through commercial competition, the declaration of exclusive claims to particular territories for trade, the imposition of tariffs against other European traders, and claims to exclusive control of waterways and commercial routes in different parts of Africa.

This scramble was so intense that there were fears that it could lead to inter-imperialist conflicts and even wars. To prevent this, the German chancellor Otto von Bismarck convened a diplomatic summit of European powers in the

late nineteenth century. This was the **Berlin Conference**, held from November 1884 to February 1885. The conference produced a treaty known as the Berlin Act; with provisions to guide the conduct of the European inter imperialist competition in Africa.

Otto Von Bismarck

COLONIAL AFRICA

Africa: *Different European colonial empires. (Source: Google/image)*

Causes for the Scramble and Partition of Africa

- **Need/ desire for raw materials for European industries**

  There was need for raw materials to supply European industries which had grown as a result of industrial revolution. The raw materials included gold, diamonds, copper, iron ore, cotton, coffee, cocoa, tea and palm oil.

- **Need for markets for the manufactured goods**

  There was mass production of goods by European industries and European countries could not provide market to all the commodities. European countries were also practicing protectionism in order to protect their markets. They thus came to Africa to get markets; e.g. the occupation of Senegal by the French.

- **Need for areas where to invest their surplus capital**

  European countries had accumulated a lot of capital from their industrial products; they had to look for areas outside Europe where they could invest their surplus capital.

- **Need to control economically strategic areas to improve trade**

  In order to be sure of their improvement of trade, the European countries were ambitious to control the economically strategic areas. For example, the occupation of Egypt by the British was for such reasons.

- **Discovery of minerals in some parts of Africa**

  This encouraged the Europeans to come and control some parts of Africa in order to be the masters of those areas rich in minerals. There was gold in Ghana, diamonds and gold in South Africa, copper and diamonds in Congo.

- **To give protection to European traders and trading companies**

  European traders asked their home governments to come and occupy areas in Africa where they operated in order to protect them from hostile tribes and chiefs who had created insecurity to their business. Examples of such trading companies include the Imperial British East Africa Company, Dutch East Indian Company, etc.

- **To resettle high population from Europe and provide them with jobs**

  The need to settle the unemployed, criminals and people who were suffering from chronic diseases and undesirable in Europe forced European countries to get land to settle them in Africa. E.g. Occupation of Algeria, Tunisia, Morocco and South Africa respectively by the French and the British. Over population in Europe had its negative consequences which forced the European governments to settle this excess population elsewhere.

- **The strategic location of some areas**

  Britain got interested in controlling the Suez Canal in 1882 after pushing France out. The French decided to avenge against the British by occupying the Upper Nile and the land from Senegal to Djibouti in the East. To pre-empt this plan, the British took over Kenya, Uganda and Sudan before the French could come in. European countries got involved in occupying strategic areas for their defense; for example, the occupation of the Suez Canal and the strait of Gibraltar by Britain. All this caused the Scramble and Partition of Africa. The French occupation of Tunisia and Morocco due to their proximity to Europe, astride the Mediterranean Sea and the strait of Gibraltar encouraged other powers to join the race for colonies.

- **Growth of Nationalism and jingoism**

  Colonisation was a sign of prestige and glory for the Europeans and in order to show their power, Europeans had to occupy large areas as colonies. This was why the great European powers got big land in Africa.

- **Compensation for major losses**

  Britain had lost America after the American war of independence in 1776. Their pride, prestige and major source of their raw materials and wealth was lost. France lost Alsace and Lorraine to Prussia after the 1870 – 1871 Franco-Prussian war. After achieving some degree of stability, the French Prime Minister Jules Ferry began to look for colonies in Africa as compensation.

- **Activities of King Leopold II of Belgium in Congo**

  He took over Congo for himself and not for Belgium his country. As a means of counteracting Leopold's activities, the French took over Gabon and Congo (Brazzaville) while British also declared the lower Niger regions as their protectorate.

- **The activities of Pierre Savrogna de Brazza in Congo and Ivory Coast**

  He was a French explorer who signed colonial treaties with African local leaders. This forced other European powers to also look for colonies in Africa.

- **The influence of the 1884–1885 Berlin Conference**

  It had given a green light to colonisation by outlining procedures for the partition of African

  N: B: The Berlin Conference just accelerated the Partition process leading to fully occupation of African countries.

- **Humanitarian factors**

  Humanitarians in Europe urged their countries to occupy territories in Africa so as to stop slave trade and improve the way of living for Africans. Note that slave trade had outlived its usefulness since it was a period of Industrial revolution.

  The need to spread Christianity. The Europeans considered African small gods as evil and that is why they wanted to spread the word of God hence the Scramble and Partition of Africa.

In the final analysis therefore, one can assert/say that the major motive for the European Scramble and Partition of Africa was the Economic factors which pushed Europeans to partition Africa among themselves lives like a wedding cake.

The Scramble, Partition and conquest of Africa by the Europeans was followed by the introduction of colonial economic policies which helped them to effectively exploit Africa. The Europeans adopted new methods of exploitation which were similar in different areas of Africa.

APPLICATION ACTIVITY 2.1

1. Explain the term Scramble
2. Identify the European countries that Scrambled and Partitioned Africa.
3. Briefly explain how conflicts during Scramble for Africa were resolved.
4. Discuss the causes for the European Scramble and partition of Africa in the 19th Century.

2.2. Methods of colonial conquest in Africa

LEARNING ACTIVITY 2.2

Use internet, textbooks and media to research on colonization of Africa and analyze various methods used by colonial masters for acquiring land in Africa.

European colonialists used various methods to acquire lands in Africa as they are discussed below.

a) Use of explorers

Explorers were people who came from Europe to discover more about the interior of Africa. Explorers drew maps showing fertile areas and rich mineral areas of Africa. They shared information about how rich Africa was. This attracted their home governments to come and take over Africa.

b) Use of missionaries

Missionaries can be defined as a group of people who left their home countries in order to spread the word of God (Christianity). European missionaries encouraged their governments to establish colonial rule in Africa so that they could put an end to the wars between African states, stop the slave trade and protect them from attacks by the locals and Muslims. They also softened African hearts by preaching to them and persuading them to accept Europeans and support their interests.

c) Use of traders (chartered companies) Companies

Chartered companies were trading companies which were sent by European countries to come and trade in Africa. They started signing treaties, occupying areas of influence, laying down the initial infrastructure that facilitated colonial administrative policies, they abolished slave trade and identified economic viable areas for economic exploitation, from their home government which led to European colonization.

d) Use of force

Africans did not willingly accept the imposition of foreign rule. Many communities resisted this. In the face of such resistance, the European powers resorted to military conquest. They used force to subdue the Africans. This method was mainly used by the French, British and Germans.

e) Treaty signing

These were treaties of "protection" against their local and foreign rivals. E.g. in Malawi the Portuguese agents signed treaties with local chiefs, which attracted the British to send Sir Harry Johnston to negotiate with the chief of Malawi hence being declared a British protectorate.

f) Use of gifts and presents

Some African rulers were lured into accepting Europeans through presents such as beads, clothes, weapons and intoxicating drinks. Others were made chiefs while some were promised western education, for example, Semei Kakungulu of Uganda.

g) Collaboration

Collaborators were some African people who cooperated with colonial rulers. For example, Kabaka Mutesa of Buganda, Noah Mbaguta the Prime Minister of Ankole Kingdom, Sir Apollo Kagwa of Buganda, Lenana Mumia of the Wanga kingdom, Sultan Hammed Mohammed in Zanzibar etc. Collaboration with Africans was also common and this helped the colonial masters to achieve their objectives to grab large lands in Africa.

The role of European Missionaries in the acquisition of land in Africa

In some instances, colonial masters employed missionaries paving way for establishment of colonial rule: missionaries came in Africa disguising that they are spreading Christianity and stopping slave trade, but in their mission they came to soften the minds of Africans thus preparing Africans for easy introduction for colonial rule.

- Reports by European missionaries such as Johann Ludwig Krapf and Rebmann who were missionary explores, enabled people in Britain to know about Africa' snow caped mountains, and the cool areas of Africa which attracted the British colonialists to Africa.
- Dr. David Livingston's reports about the horrors of slave trade influenced the humanitarians to pressurise the British to colonise Africa so as to eliminate slave trade.
- The also influenced the local chiefs to accept the white man. So by the time the colonial administrators came, they were looked at as European missionaries hence the colonisation of Africa.
- The missionaries and their followers supported the use of military force against resisters such as Mwanga who threatened to expel them. They formed armed political groups and fought such leaders who were not in support of the colonial masters.
- The European missionaries also signed treaties of conquest with the local chiefs and kings. The British and the Germans signed a number of treaties. For example, the divided Africans as Protestants and others Catholics with an aim of weakening them and making it difficult to unite because they had signed agreements with specific groups of Europeans.
- Some missionary followers served as collaborators and helped to extend colonial conquests to different parts of Africa. For example, Noah Mbaguta the Prime Minister of Ankole Kingdom, Sir Apollo Kagwa of Buganda, Wanga Mumia of the Wanga kingdom, Sultan Hammed Mohammed in Zanzibar etc. Collaboration with Africans was also common and this helped the colonial masters to achieve their objectives to grab large lands in Africa.

- Some European missionaries influenced public opinion in favour of imperial intervention in Africa. When the chattered companies became bankrupt, they requested for support from the colonial powers in terms of funding and they were later called to take over.
- European missionaries encouraged white settlements in Africa. Through the biblical teachings about love, forgiveness, sharing, etc. the Africans were encouraged to give land to the visitors who ended up colonising the continent.
- European missionaries built schools in which they taught writing and reading. Through this Africans were prepared to communicate very well in English, French, German, etc. By the time the colonialists came, they found it easy to administer with limited resistance.
- The missionaries also encouraged the Africans to produce cash crops such as cotton, tea, coffee, etc. which made local people to highly welcome more colonialists as they would provide market for the produce.

APPLICATION ACTIVITY 2.2

1. Analyse the role played by explorers and missionaries in facilitating colonialists to acquire land in Africa.
2. Explain the role of European gifts in the process of acquisition of land by colonialists in Africa.

2.3. Colonial systems of administration

LEARNING ACTIVITY 2.3

Use internet, textbooks and media to research on colonization of Africa and describe various colonial systems of administration applied in Africa by 19th century.

There were several systems of administration used by colonialists after successfully colonising Africans. The main ones are discussed below:

i). Indirect rule by the British.
ii). Assimilation by the French.
iii). Direct rule by the Germans.

i). The indirect rule

It was a system under which the Europeans recognised the existing African political system and used it to rule over their colonies. In this system of administration, African local kings and chiefs were allowed to maintain their positions as administrators. However, they were under the supervision of the British.

The British made new policies and decisions which were implemented by African local leaders. It should be noted that under indirect rule, African political and social institutions were retained by the colonial masters. It should be noted that where the British met African resistance, they applied direct rule like in Bunyoro Kingdom.

Reasons why the British used indirect rule

- It was economically cheap. The British wanted to avoid payment of high salaries to white staff and administrators in their colonies. In addition to that, the staff and administrators required good accommodation, troops to provide security.
- The British lacked enough manpower to administer all their colonies in Africa. The number of British citizens in Africa was small compared to their colonies. The British had no alternative but to use African chiefs.
- The British feared resistance and hostilities from Africans. The British wanted to avoid resistances and rebellions that would come after overthrowing the local African kings from power.
- There was language barrier. The British did not understand the languages and customs of Africans. Letting African leaders to rule was a better choice to solve the language problem.
- The African kings and chiefs would act as 'shock absorbers' in case of any conflicts and wars. The African kings and chiefs would be blamed in case the British policies became unpopular among Africans.
- There was existence of well-established Centralised system of administration in some parts of Africa. This encouraged the British to rely on such existing systems of administration to implement their policies. Indirect system was applied successfully in Buganda, Rwanda and Northern Nigeria.
- It was a way of deliberately preparing Africans for self-government. The British wanted to train future African leaders for their colonies in Africa.
- The success of indirect rule in other parts of the world such as India also encouraged the British to apply it in Africa. This was because they had seen its good results. This forced the British officers to adopt it in Northern Nigeria and Uganda.

- The British used indirect rule because they expected African loyalty. They expected African leaders to work hard in order to please their masters. This would bring good results to the British government.
- Indirect rule was favourable for the exploitation of African resources. It would create peaceful conditions and give the colonialists enough time to engage in activities such as mining and trade.

ii). The French assimilation policy

The word 'assimilation' is derived from the French word 'assimiler' which means cause to resemble or to look alike. Assimilation was a system of administration in which French colonies were given a culture and civilisation similar to that of France. It was intended to make Africans look like the French citizens. That is to say, the Africans were to substitute their indigenous culture, religion and customs with French culture, language, laws, religion and civilisation.

NOTE: The Africans were to resemble the French citizens in all spheres/ aspects of life except the skin colour. African colonies were to resemble provinces of France. It should also be noted that the French policy of assimilation was only successful in the four Senegalese communes of St, Louise, Dakar, Gore and Rufisque. Other than these four, the rest of French West- Africa was scarcely assimilated.

Reasons why the French adopted assimilation policy

- The French believed in superiority of their culture and civilisation. They considered it to be more developed. Therefore, they felt it was their duty to spread it among people with backward cultures through assimilation policy.
- The influence of the French revolutionary ideas of liberty, equality and fraternity also made the French to use assimilation policy. They had a feeling that all people are equal.
- The French wanted to create a policy that would support France in future conflicts and international issues. This policy would create friendship between France and her African colonies. They wanted to create African allies because France expected to organize a war with Germany which had defeated them in the Franco- Prussian war of 1870-1871.
- The French expected this policy to be economically cheap because the process of assimilating Africans was simple and easy.
- The French regarded their colonies as overseas French territories. Therefore, assimilation policy was the best alternative system for changing territories to resemble the French provinces in Europe.

- The French wanted to create a class of African French men who would help in the administration of their colonies.
- The early contacts between the French coastal areas of West Africa especially Senegal made it easy for assimilation. This is because Africans had already adopted French cultures and language.
- The French used assimilation because the British had used indirect rule system. Therefore, since these two were traditional enemies, they wanted to look different hence the use of assimilation system.

iii). The Germany direct rule system

In this system, indigenous and political administrative institutions were replaced with those of colonialists. The Germans used direct rule to administer some of their colonies in Africa like German South-West Africa (Namibia) and German East Africa (Tanzania). It involved use of soldiers to directly control their colonies. They would bring in new chiefs where they had no chiefs. They replaced the old chiefs with new ones.

Why the Germans applied direct rule system?

- It was used because the Germans believed that it was the only system through which they could effectively administer their colonies.
- They also believed the system would enable them to exploit and benefit from African resources. For example, they believed that they could raise enough revenue through taxation.
- With direct rule, the Germans would ensure that the Africans grow enough cash crops to feed their home industries.
- The Germans had used force to take over many parts of Tanganyika. Soldiers had to be used; otherwise Africans could revolt at the slightest opportunity.
- The Germans had suffered early revolts and therefore had to bring in the harsh leaders to avoid more riots.
- The Germans wanted to promote their superior culture over Africans. This would involve imposing their culture on them.
- In many societies, there were no chiefs. Where the chiefs existed, they were not faithful or powerful enough. The Germans therefore had no one to entrust authority with.
- They opted for this system because they had enough manpower to man all departments. There was no need of recruiting or using Africans.
- They feared the expense of training Africans before they could take over administration. They thought that it could strain their budget.

- Like other powers, the Germans did not want to use a system that was used by their rivals (British). This would intensify competition and rivalry among them.

APPLICATION ACTIVITY 2.3

1. Distinguish between the British Indirect Rule from the French policy of Assimilation as policies of Colonial administration used in Africa.
2. Account for the British use of indirect rule system in their Colonies of Africa.
3. Discuss the reasons why Germany used direct rule system of administration in her African colonies.

2.4. Methods of African exploitation

LEARNING ACTIVITY 2.4

Carry out research on the colonial conquest and domination of Africa and explain the European colonial methods of exploitation in the process of colonization of Africa.

Colonial Methods of African Exploitation also known as Colonial economic policies were mechanisms introduced by European colonial masters in Africa in order to ensure effective exploitation of Africa's natural resources for their economic gains.

Taxation

It was the main method of generating revenue for supporting colonial administration. The commonest were the hut and gun taxes. The method of collection was brutal and harsh, and often caused resistance wars. For instance, the Hut Tax War of 1898 in Sierra Leone.

Taxation was also important to force Africans either to grow cash crops or to work on European farms. This was because in order to get money for paying taxes these were the only possible alternatives. In some areas like the Congo Free State and Angola, taxes were paid in form of natural products and animals. Failure to pay taxes in these areas would lead to confiscation of property and sometimes mutilation.

Forced cash crop growing

To meet the primary demand for colonisation of Africa, cash crop growing had to be boosted. Some crops like rubber were grown traditionally; some were grown such as pyrethrum by Europeans while others like coffee and cotton were grown by Africans under the supervision of Europeans. These cash crops were needed to supply raw material to industries in Europe.

Europeans did not encourage the production of food. Forced labour undermined the production of food crops. This led to famine in African societies which had been traditionally self-sufficient in food. The African economies were developed as producers of raw materials in form of cash crops and minerals, and as consumers of European manufactured goods.

Forced labour

Africans were forced to work on European farms, mines and construction sites of colonial offices and roads. Their labour was either paid cheaply or not paid at all. In the Portuguese colonies of Angola and Mozambique there was a unique form of forced labour called contract labour. Africans were rounded up and taken to Principle and Sao Tome to work in sugar cane plantations.

Due to this forced labor, African societies experienced famine. A lot of time was spent on work for Europeans.

Land alienation

This was the most evil form of exploitation of natural resources. Africans in settler colonies were hit hardest by this practice, for example in Kenya, South Africa, Rhodesia, Algeria, Angola and Mozambique. In some areas of Africa, Africans were forced to settle in reserve camps leaving fertile and mineralized plots of lands to Europeans. This policy caused resistance in many areas of Africa.

In Rwanda, the church alienated huge chunks of land to build churches, schools and people were forced out of their land.

Development of legitimate trade

After realizing the benefits of slave trade and its abolition, they introduced legitimate trade. This form of trade is said to have brought peace and stability as it eliminated the raids and suffering caused by slave trade.

Legitimate trade was monopolized by Europeans who transferred all the profits to their countries. They paid low prices for African products and highly priced their exports to Africa. Worse still, the legitimate trade involved the exchange of

high valued African products like gold, copper, diamonds, cotton, coffee, rubber, and palm oil among others. Exports to Africa included beads, used clothes, bangles, spices and glassware.

Discouraged industrialization

To control the monopoly for trade in raw materials and market for their manufactured goods in Africa, Europeans extremely discouraged manufacturing industries. In Egypt, Lord Cromer established processing plants for cotton lint while cotton cloth production was done in Britain.

In Senegal, the French never set up any industries to the extent that even groundnuts were exported in the shells. Only primary processing industries were set up to reduce the volume of raw materials. The prices for raw materials were very low while the manufactured goods from Europe were sold at high prices. This was a clear indication of colonial exploitation.

Development of road and railway transport

To support legitimate trade, road and railway transport networks were established. These networks connected the interior of African colonies to the coast.

Roads were mainly established in areas rich in resources where colonialists had direct gains. The main purpose was to facilitate the effective exploitation of raw materials.

In Togo, Germany constructed railway lines and named them according to the produce they were meant to carry such as Cotton line, Palm oil line and Iron line.

In Rwanda, the railway project planned by the Germans from Dares-Salaam via Tabora to Rusumo stopped because of World War I.

Education system

The colonial education system was controlled by Christian missionaries. In the colonial schools, Africans were trained to serve as lower cadres, known as "colonial auxiliaries". The main products of these schools best suited the posts of houseboys, house girls and clerks. They could not make engineers, doctors and other professional careers. The colonial education system produced people who liked European ways of life. As a result, they exploited fellow Africans. In Rwanda, education was exclusively given to the sons of chiefs. In French, Portuguese and Italian colonies education was used for assimilation purposes. Liberal subjects such as, political science, literature and history were neglected

in order to keep Africans away from forming revolutionary movements against colonialists. To colonialists, the best subjects fit for Africans were bible study, reading and writing of languages.

APPLICATION ACTIVITY 2.4

Examine the methods used by the Europeans in the economic exploitation of African countries.

2.5. Impact of European domination and exploitation of Africa in the 19th century

LEARNING ACTIVITY 2.5

Carry out research on the colonial conquest and domination of Africa and examine the impacts of European domination and exploitation of Africa.

European domination and exploitation impacted Africa both positively and negatively in economic, social and economic domains as shown below.

2.5.1. Economic impact/effects

i). Positive effects

- The colonial government improved the colony infrastructure: roads, bridges, ports, etc.
- They introduced cash crops: tea, coffee, and sisal, cocoa.
- Colonization increased the value of land, because it could be sold a lot of money.
- Colonization increased purchasing power of Africans.
- Colonization introduced money which facilitated the exchange.
- Colonization introduced modern technology where people started using machines in their activities.

ii). Negative effects

- Roads built helped colonialists to exploit African resources not to develop Africa.
- Regions which had no resources were ignored.

- To avoid competition, colonialists discouraged the development of industries in Africa.
- African artisans stopped pottery, basketry etc.
- Colonial rule neglected food crops and emphasized on cash crops which caused famine in some part of Africa.
- The commercialization of land led to illegal sell of communal lands which led to poverty and social conflict.
- Colonialists monopolized external trade.
- Economic exploitation of Africa: minerals (gold, diamond, etc.), land and labour.
- The death of many people working in mining and plantations of Europeans in Africa.

2.5.2. Social effects

i). Positive effects

- Urbanization was accelerated: Cairo, Enugu, Abidjan, etc.
- Introduction of modern medicine to fight tropical diseases: malaria, typhoid, etc.
- Improvement of the quality of life by introducing hospitals, clinics, safe ware, sanitary equipment, etc.
- The spread of Christianity and western education in Africa. They trained the first African elite.
- They introduced new languages: French, English, Latin, Portuguese etc.
- Abolition of slave trade and introduction of legitimate trade.
- Introduction of western culture: cloths, buildings, houses, etc.

ii). Negative effects

- Rural-urban migration and associated problems like prostitution.
- Hostility between Africans and Europeans because these foreigners had occupied fertile lands of the natives.
- Africans identity and civilization disappeared with colonisation.
- Division of Africans due to divide and rule policy.
- Uneven distribution of social services: they were established only for white minority.
- In education the curricula did not meet the need of Africans.
- Neglect women social status: women were excluded in some jobs like mining.
- Racial discrimination promoted by the white settlers.

- Land alienation: fertile land was occupied by European settlers.
- Colonization created a new class of intellectual which conflicted with illiterate people.
- Many people were killed during the war of conquest.

2.5.3. Political impacts

i). Positive impact

- The colonialism created peace and stability in some areas because expansionist wars ended.
- It created independent states in Africa: there are more than 50 states in Africa.
- Colonialism introduced new institutions like high courts in judiciary system.
- Europeans introduced new administrative structure. E.g. province, district, sector, cell.
- Colonialism gave birth to African nationalism and Pan Africanism.

ii). Negative impact

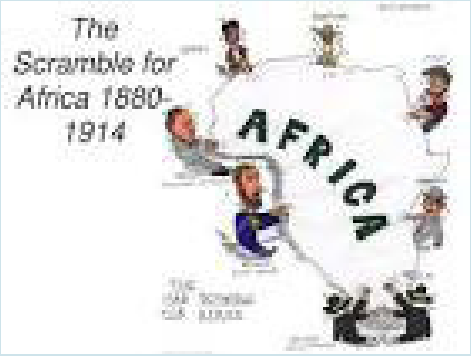
- Colonization was oppressive, discriminative and exploitative.
- Colonialists divided up Africa without considering tribal boundaries. The Bakongo are in Angola, DRC, Gabon and Congo.
- It weakened indigenous system of government where African chiefs were replaced by Europeans.
- The colonization created the idea that public property belongs to the colonialists not the people and that idea is still there.
- The Europeans created a permanent army which caused insecurity after decolonization of Africa.
- Loss of independence; Africa lost the sovereignty and freedom. They lost control of their own affairs.

APPLICATION ACTIVITY 2.5

Examine the Social, economic and political impacts of European domination in Africa.

Skills lab

Using the following illustration, role play how the European powers Scrambled and Partitioned Africa. In your role play make sure you include the effects of colonization.



END UNIT ASSESSMENT 2

1. Explain the term Scramble in the context of African colonisation.
2. Identify the causes of the Scramble and Partition of Africa by European powers.
3. Examine the role of European missionaries in the acquisition of land in Africa.
4. Discuss the colonial administrative policies used in Africa.
5. Examine the methods used by the Europeans in the economic exploitation of African countries.
6. Assess the impact of European domination in Africa.

UNIT 3

UNIVERSE AND THE SOLAR SYSTEM

Key Unit competences: By the end of this unit, the student teacher should be able to differentiate the components of the universe and solar system, and explain the effects of the earth movements.

3.0. INTRODUCTORY ACTIVITY

One night, Keza a student in Year 2 was standing in their compound at home. The moon was fading and the heaven was almost dark. All of a sudden, she saw an object in the sky which was moving at a terrific speed with a flashy tail. When she shouted to call her friends to come and see it, it suddenly disappeared.

The next day, when the sun rose, she walked to school. She was still confused about what had happened the previous night. She explained to her tutor about the object who later confirmed that it was meteor.

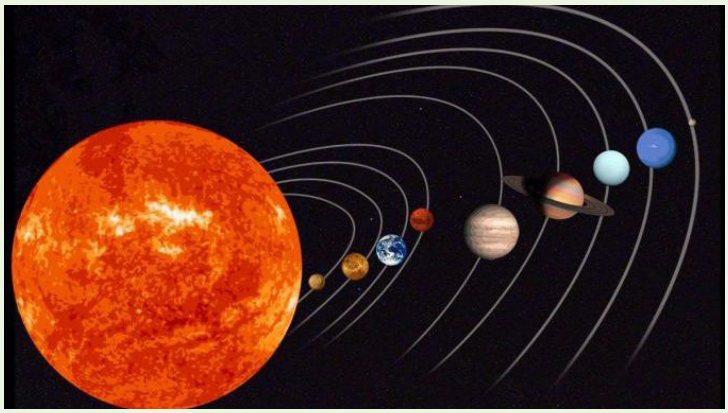
1. What is a meteor?
2. What other heavenly bodies are mentioned in this text?

3.1. The universe

3.1.1. Definition of the universe and components of the universe

LEARNING ACTIVITY 3.1.1

Observe the diagram below and answer the questions that follow.



1. What does the above diagram represent?
2. Using the explanation above, explain the meaning of universe.
3. Identify other components of the universe.

Universe is the name that we use to describe the collection of all the things that exist in space. It is made of many millions of stars and planets and enormous clouds of gas separated by a gigantic empty space which is called the universe. The exact size of the universe is not known. Astronomers estimate that it contains about 100 billion galaxies. Astronomers are experts who study bodies in the sky or outer space. A galaxy is a system of billions of stars, together with gas and dust held together by forces of gravity. Each of the galaxies has an average of 100 billion stars.

3.1.2. The components of the universe

The Universe contains many components, which vary considerably in size. The smallest components are atomic particles followed by atoms (mostly free hydrogen and helium), molecules, dust, space rocks, comets, asteroids, moons, dwarf planets, planets, solar systems, stars, black holes, nebulae, and galaxies. Among these components the solar system is the most known with certainty.

The following are the components of the universe.

Galaxy

Galaxy is a group of billions of stars, with Cluster gas and dust held together by the same gravitational force. The planet Earth is in the Milky Way Galaxy; that displays a spiral arrangement therefore, named spiral galaxy. There are three types of Galaxy Namely;

Spiral galaxy (e.g. Milky Way), irregular galaxy and elliptical galaxy.

The Milky Way galaxy.

Cluster. This is a group of stars which are bound together due to gravity.

A star is luminous (gives out light) heavenly body. Stars have high temperature.

Cluster of stars

Stars and the sun

The sun is also a star. The sun is the luminous heavenly body that emits its own light and it is at the Centre of the solar system

Planets

A planet is a heavenly body that revolves around the Earth is one of the eight planets of the solar system. It is the only planet where life is possible.

APPLICATION ACTIVITY 3.1.1

The solar system has many components. One of them is the galaxy.

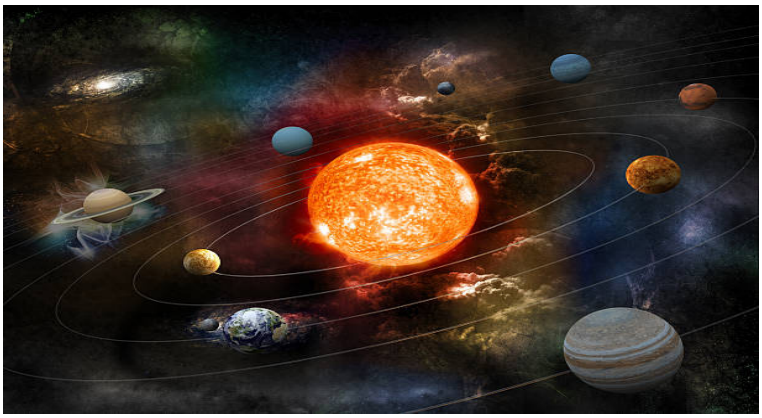
1. Identify three types of galaxies found in the universe.
2. In which galaxy do we find planet Earth?

3.1.2. The solar system: The sun and the planets

LEARNING ACTIVITY 3.1.2

1. Using the knowledge and experience acquired in Geography, explain the meaning of the solar system and identify its components.
2. Using internet, text books and other resources explain the characteristics of the sun and other planets.

The term solar system contains the sun and planets that revolve around it (Sun). The solar system is therefore made up of the following: the sun, planets including the earth, the moon and other heavenly bodies such as asteroids, comets, meteorites, meteors, etc.

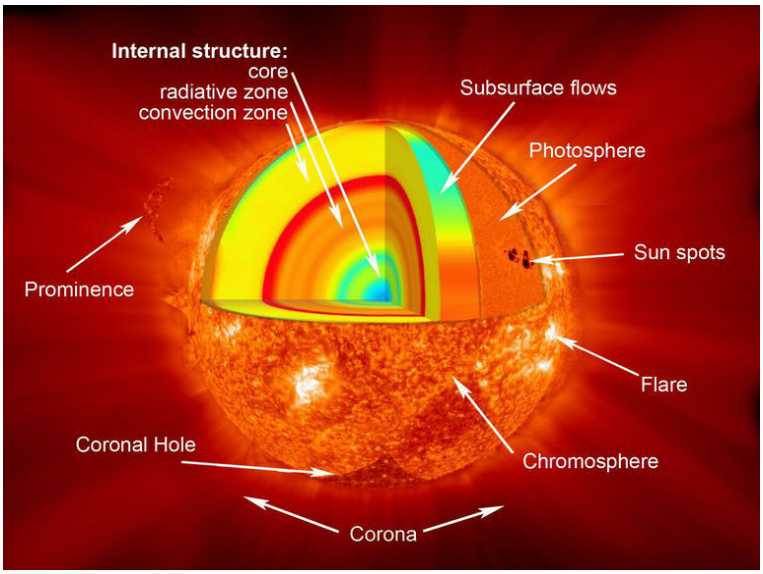


The solar system

The sun. The sun is one of the billions of stars that make up the Milky Way galaxy. It is one of the smallest stars in our universe. However, it is 109 times

bigger than Planet earth. It forms the center of the solar system. Its gravitational force keeps planets in their orbital position. All the 8 planets revolve around. All the energy of the solar system is derived from the sun whose surface is covered with burning gases and whose temperature is about 6000°c.

The structure of the Sun



The Sun

Mercury

It is the smallest and nearest planet from the sun completes its revolution in only 88 days. Its diameter is 4,880km. Its total mass is estimated to be 3.30e23kg (3.3 x 1026grams. It does not have a moon.

Venus

It is the second planet from the Sun. It shares some characteristics with the earth especially in terms of chemical composition and gravity. This explains why it is referred to as the twin planet of our planet. It experiences hot temperatures of reaches 462 degrees Celsius. It orbits an average distance of 108million km around the sun and it takes 225 days to complete its revolution around the sun.

It is named after the Roman goddess of love and beauty. As the second-brightest natural object in the night sky after the Moon, Venus can cast shadows and, rarely, is visible to the naked eye in broad daylight.

Venus

The earth

It orbits an average distance of 108,208,000 km. It is the third planet from the sun. The only planet known to support life. It is 93 million miles from the sun. The earth has one natural satellite called moon and has the diameter of 7,926 miles. It is the fifth largest planet in the solar system whereby its greatest part is covered by water which accounts for 71% of its surface. It completes its revolution in $365^{1}/_{4}$ days and completes its rotation on its axis within 24 hours.

Mars

It is the 7th largest planet in the solar system and slightly cooler. It has the diameter of 4,222 miles. This planet takes 686.98 earth days to complete its revolution around the sun and it takes 24.6 earth hours to rotate on its axis. It has hard, rock with a completely dry surface. In English, Mars carries a name of the Roman god of war and is often referred to as the 'Red Planet'.

Mars

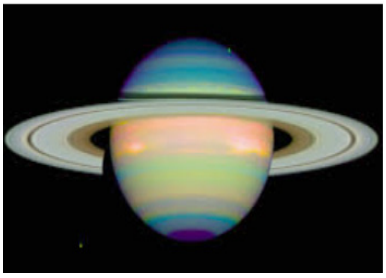
Jupiter

It is the largest planet in the solar system and has 63 satellites. It is composed of hydrogen and helium hence being called a gas giant. This planet has a diameter of 88,729 miles. Jupiter takes 9.84 earth hours to complete its rotation on its axis. Its revolution around the sun takes 11.862 earth years.

Jupiter

Saturn

It is composed of liquid and it has rings composed of billions of ice particles. It covers a distance of 550.9 million miles from planet earth and takes 10.2 earth hours to complete its rotation. It is the second largest planet in the solar system. Jupiter has a diameter of 74,600 miles and it takes 29.456 earth years to complete its revolution around the sun.



Saturn

Uranus

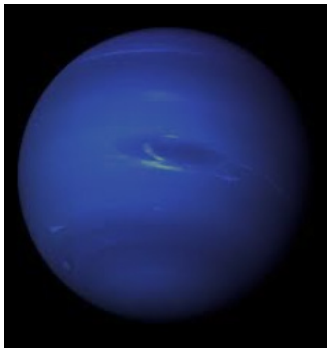
This is the 3rd largest planet in our solar system with a diameter of 36,600 miles.

It is composed of hydrogen, helium and methane that is why it is not in solid form. It takes 84.02 earth years to complete its revolution around the sun.

Uranus

Neptune

It is the farthest planet in our solar system. It is 1.14 times the surface of the earth and it completes its revolution around the sun within 164.8 earth years.



Neptune

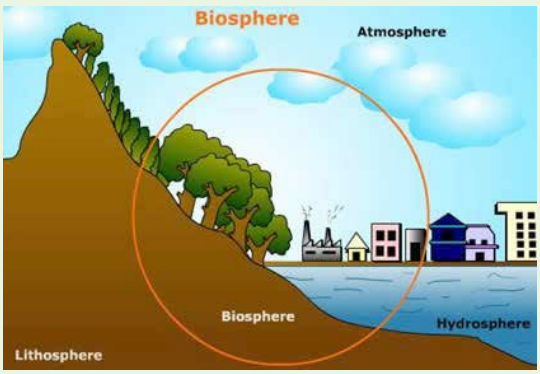
APPLICATION ACTIVITY 3.1.2

Distinguish between inner planets and outer planets and mention planets that fall in each category.

3.2. The earth: Peculiar elements of the earth

LEARNING ACTIVITY 3.2

Observe the illustration below and answer the questions that follow.



Use internet and text books and explain the elements identified in the illustration.

The term peculiar elements of the earth refer to the outer parts of the earth which include the following.

- Hydrosphere (composed of water bodies).
- Lithosphere (the earth crust).
- Atmosphere (composed of gasses).
- Biosphere (Plants and animals).

Biosphere

This biosphere is made up of the part of the earth where life exists. It is also called ecosphere.

Lithosphere

On earth, it is composed of the crust and part of the mantle. It is comprised of rocks, soils and minerals.

Hydrosphere

This is the community of water. The hydrosphere includes water that is on the surface of the planet, underground and in the air. Hydrosphere can be liquid, vapour or ice.

Atmosphere

This is a layer of gases surrounding a planet held in space by gravitational attraction. This zone is composed of gasses such as: Nitrogen, Oxygen, Argon, Water vapour, Carbon dioxide, Helium and Methane.

APPLICATION ACTIVITY 3.2

Draw a well labeled diagram illustrating the peculiar elements of the earth.

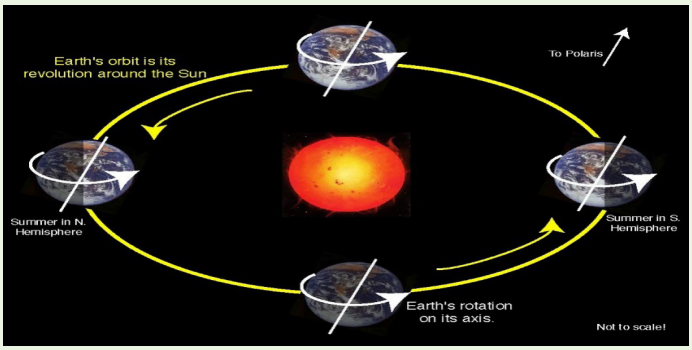
3.3. The Earth's movements

3.3.1. The Earth's movements

LEARNING ACTIVITY 3.3.1

The earth is in constant motion and it performs two different movements.

1. From the photograph below, observe and explain the two types of earth movements.
2. From your experience and Geographical knowledge gained, discuss the effects of each of the movements mentioned above.



Imagine a line passing through the center of Earth that goes through both the North Pole and the South Pole. This imaginary line is called an **axis**. The Earth spins around its axis, just as a top spins around its spindle. This spinning movement is called Earth's rotation. At the same time that the Earth spins on its axis, it also orbits, or revolves around the Sun. This movement is called revolution.

3.3.2 Rotation of the earth

Rotation of the Earth is defined as the movement of the Earth spinning on its own axis. This movement of the Earth on its own axis is in an anticlockwise direction. The earth takes 24 hours to complete 360°. At the equator the earth rotates at a speed of1676 km and zero km at the poles per hour.

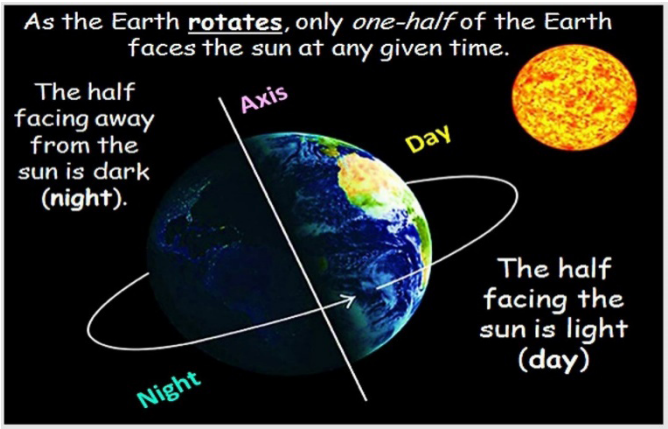


Fig. showing rotation of the earth on its axis.

The effects of rotation of the earth on its axis.

The earth rotates on its axis taking approximately 24 hours to complete one rotation. This has important environmental effects.

i). Rotation causes day and night

Earth's rotation on its axis creates day and night. The one half of the Earth that faces the sun has day time, while the opposite half facing away from the Sun has nighttime

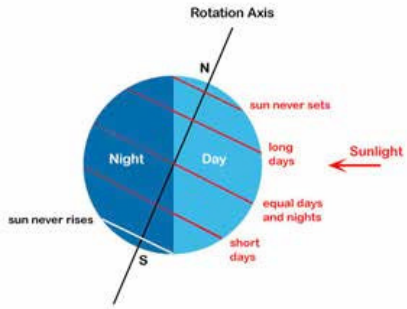


Fig. showing how rotation causes day and night.

ii). Rotation causes the tides

The twice daily rise and fall of sea level. Tides are as a result of both the gravity of the moon and the gravity of the sun. Sometimes the sun and the moon are lined up with the earth, but most of the time they are not. Tides are highest when the earth, sun and moon are in a straight line.

iii). Deflection of wind and ocean current (Coriolis Effect)

Rotation causes a deflection of ocean and air currents. The earth rotates much faster than the winds or currents. This causes a large deflection in the direction that winds move and ultimately results in rotation around low pressure cells and high pressure cells. It also causes large rotating pools of water in the oceans called gyres. The Coriolis force only operates on large features.

iv). Time difference between longitudes

Rotation leads to the creation of standardized time zones. There are 24 hours for each of the earth's rotation. One round of the Earth is completed after turning 360°.This means that the earth takes 24 hours to complete rotation. Therefore, for the earth to cover one hour, it is calculated by dividing 360° by 24 hours=15°.If it takes the earth to covers 15 degrees in 60 minutes, then 1° degrees is completed within 4 minutes. This is obtained by dividing 60 minutes by 15°.

This is the reason why places on the same longitude keep the same time even if they are located at different latitudes.

How to calculate local time using longitudes?

If the local time at the Greenwich Meridian is noon (12:00 Hrs.) what is the local time at Kigali which is 30° E?

a) Find the difference in degrees between the two latitudes. This 30°.
b) Multiply this difference by 4 minutes which is the time taken by the earth to rotate through 1°

This will be 30 x4 min=120 min.
2 hours.

Therefore, since Kigali is east of the Greenwich meridian, the time therefore is 2 hours ahead.

So, local time at Kigali is 2:00 pm (14hrs)

How to determine the longitude of a place using local time?

Given local time at place Y is 10:00 am and the local time at Greenwich is 12:00 noon. What is the Longitude of place Y?

Find the difference in time between the two longitudes. The difference is 2 hours.

The earth rotates through15° every 1 hour. Therefore, in 2 hours it will have rotated through 30°.

The time at Y is behind that at Greenwich Meridian time. So, Y is 30° W.

iii). Temperature difference

Due to the spherical shape, the parts of the Earth located in the tropical areas between 23.5° North and South of Equator, get direct sunlight all the year round. Regions located in higher latitude get less rays during the year.

3.3.3 Revolution of the earth

LEARNING ACTIVITY 3.3.2

1. Use internet and other Geographical sources to explain the meaning of the following;
   i). Solstice.
   ii). Equinox.
2. Mention the major latitudes and show how latitudinal location of a place determines temperature changes.

Revolution is the second type of motion of the earth. It is the movement of the earth around the Sun in a fixed path or orbit. Revolution causes the change of seasons. It takes 365days and 6hours (one year) to revolve around the sun at a speed of 106,260 km/h around the Sun (30 kilometers per second. It is important to note that we consider a year as consisting of 365days only and ignore six hours for the sake of convenience.

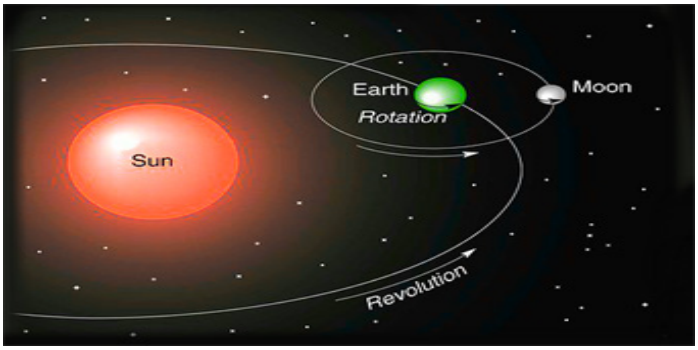


Fig. showing the revolution of the earth around the sun

i). Changes in seasons

Different parts of the earth experience climatic changes due to the changing position of the earth. In the high and mid altitude regions, the four seasons are experience. These include the following:

Summer

This is the hottest of the four seasons. This occurs immediately after the spring season and before autumn. When it is the summer solstice, the days are the longest and the nights are the shortest. Summer solstice marks the beginning of summer on 21st -22nd June in the northern hemisphere. When it is summer in the northern hemisphere, it will be winter in the southern hemisphere and the sun is overhead the Tropical of cancer.

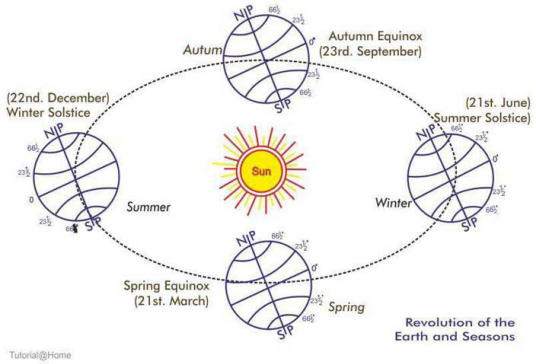
Winter solstice mark the beginning of winter in the northern hemisphere on 21st -22nd December. This is the coldest Season of the year experienced in polar and temperate zones of the northern Hemisphere. The southern Hemisphere will experience summer solstice and the sun is overhead the Tropic of Capricorn.

Spring

This is one of the four conventional temperate seasons, following winter and preceding summer. Spring Equinox marks the beginning of spring on March 21st -22nd .When it is spring in the northern hemisphere, it is autumn in the southern hemisphere and the sun is directly over the equator.

Autumn

This is a season of the year between summer and winter during which temperatures gradually decrease. Autumn equinox marks the beginning of autumn on September 21st -22nd. When it is autumn in the northern hemisphere, it is spring in the southern hemisphere and the sun is directly over the equator.



Seasons caused by Earth's revolution

ii). Varying length of day and night

In December, the hours of darkness steadily increase in the northern hemisphere as one moves towards the North Pole. This is because the sun is overhead the Tropic of Capricorn in the southern hemisphere.

The sun is vertically overhead at noon over the equator on two days each year. This is on 21st March and 23rd September. On these two days, all parts of the earth have equal hours at night and day. This time of the year is called the equinox meaning equal length of day and night.

iii). Climatic zones

Climatic zones on the earth surface are determined by temperature differences. There are three major climatic zones on the earth surface. These include; the polar, temperate and tropical climatic zones. Temperatures are high in the tropics because the sun's rays fall vertically at the equator and obliquely at the poles.

This explains why Polar Regions experience vast amount of ice due to low temperatures.

APPLICATION ACTIVITY 3.3

1. What is the time at Kigali 30^0 E, given time at Brazzaville which is located at 15^0E is 8:00 am?
2. What is the longitude of a place Y whose local time is 10:00 a.m. if the local time at Greenwich Meridian (0°) is 2:00 pm?
3. Discuss why areas in the Arctic Circle are always cold and covered by ice.

Skills lab

Make a poster of the solar system showing the position of the sun and its planets. Make a presentation about the characteristics of each planet.

END UNIT ASSESSMENT 3

1. Define the term universe and mention the heavenly bodies found there.
2. Explain what is meant by the term solar system and mention the planets in the solar system
3. Describe the peculiar elements of the earth.
4. Give reasons to explain why the Earth is the only planet that supports life.
5. Distinguish between rotation and revolution of the Earth.
6. Analyse the effects of rotation and revolution of the Earth.

UNIT 4

FORMATION OF RELIEF FEATURES OF RWANDA

Key Unit competence: The student-teacher should be able to explain the formation of relief regions of Rwanda and evaluate their effects on human activities.

4.0. INTRODUCTORY ACTIVITY

Rwanda is a landlocked country located in the heart of Africa. It is referred to as "a country of thousand hills". Use a map of Africa, different books of geography, atlas and internet to respond to the following questions:

1. Explain the location of Rwanda on the map of Africa using longitudes and latitudes.
2. State the area of Rwanda in terms of land and water surface area.
3. Describe the population composition and administrative divisions of Rwanda.
4. Describe the major relief regions of Rwanda.
5. Discuss the importance of the relief features of Rwanda.
6. Examine the problems related to the relief features of Rwanda.

4.1. General presentation of Rwanda

LEARNING ACTIVITY 4.1

Use the map of Africa , books of geography and internet and respond to the following questions

a) Show the location of Rwanda on the map of Africa above.

b) Rwanda is a landlocked country. What does this mean?

c) What is the total area covered by Rwanda in square kilometres.

Rwanda is a landlocked country situated in central Africa. Also known as 'The Land of a Thousand Hills. Rwanda is a landlocked country because it is not directly connected to the sea of ocean. It is surrounded by countries all over hence not bordering the ocean. The capital, Kigali, is located near the Centre of Rwanda.

The location of Rwanda

The country lies 75 miles south of the equator in the Tropic of Capricorn, 880 miles 'as the crow flies' west of the Indian Ocean and 1,250 miles east of the Atlantic Ocean - literally in the heart of Africa.

Rwanda is bordered by Uganda to the north, Tanzania to the east, Burundi to the south and the Democratic Republic of Congo to the west. According to latitudes, Rwanda is located between **1° 04' and 2° 51'** south of the Equator and in terms of Longitudes, Rwanda is between **28°53' and 30°53'**of longitude east of the Greenwich or Prime meridian.

The Relief

Geographically Rwanda is dominated by mountains in the north mainly volcanoes and bordered by Lake Kivu to the west. The Eastern region is flat dominated with plains.

The vegetation and flora

Much of Rwanda's natural rainforest - once covering a third of the country - has been cut down to make way for its ever-burgeoning population. The only remaining large stands of forest remain at the Nyungwe Forest National Park and, to a lesser degree, the Volcanoes National Park a mountainous area more dominated by rank vegetation and bamboo forest. The forest at Nyungwe is a true rainforest (receiving more than 2 000mm of rain a year) and is one of Africa's oldest. It has a very high biodiversity with at least 200 species of tree and a similar number of orchids.

Mountain grassland and moorland traditionally covered much of Rwanda's rolling highlands but terraced agriculture now dominates. This has led to serious soil erosion in some areas.

The poorer soils of the flatter east support typical open savannah and broad-leafed woodland species, acacias and grasses, similar to the classic savannahs and open woodland of East Africa.

The wetlands of the Akagera National Park are fringed by riverine forest and papyrus swamp.

In Rwanda the great animals of the wild are protected from poachers and roam free in the vast national parks. The Volcanoes National Park in the Virunga volcanic mountains with its high altitude forests is world famous for mountain gorillas - timid and passive family oriented giants. The Park is teeming with wildlife both large and small, while Lake Kivu to the west offers beautiful beaches, jutting peninsulas and an archipelago of islands.

Climate

The climate of Rwanda is not truly equatorial in spite of the country being located only 2°south of the equator. The climate is greatly influenced by the hilly and mountainous landscape making the relief of the country the main determining factor. The relief has modified the climate to a temperate tropical highland climate. It has lower temperatures than those typical for equatorial countries due to its high elevation. The climate of Rwanda is defined by two rainy seasons; February to May and September to December. Other months form dry seasons. During the rainy seasons, heavy downpours occur almost daily, alternating with sunny weather. The annual rainfall averages 800 millimeters and is generally heavier in the western and northwestern mountains than in the eastern savannas. Rainfall ranges from about 900 millimeters in the east and southeast to 1500 millimeters in the north and northwest volcanic highland areas. The Northern rainfall is heavier due to the orographic rainfall received. This is influenced by the mountains and highlands that have dense vegetation.

The total area and size of Rwanda

At 26,338 square kilometers, Rwanda is the world's 149th largest country and the fourth smallest on the African mainland after Gambia, Swaziland, and Djibouti. Comparatively, Rwanda is 86 times smaller than the Democratic Republic of Congo, 35 times smaller than Nigeria, 90 times smaller than Algeria and 323 times smaller than Brazil. It is comparable in size to Burundi, Lesotho, Haiti and Albania.

Total population

The fourth Population and Housing Census conducted in August 2012 (2012 RPHC), revealed that the total population of Rwanda was at that moment 10,515,973 persons. Females were 5,451,105 or 51.8% and males were 5,064,868 or 48.2% of the total population. The total numbers of foreigners were 87,346 of which 70% were DRC citizens.

At the same time, the 2012 RPHC counted 511,738 elderly persons (60 years and above) corresponding to 4.9% of the total population with 207,239 men and 304,499 women, while the youth, i.e. persons whose age is between 14 years and 35 years, were 4,166,777; corresponding to 40% of the total population. Among them, females were 2,033,130 and males were 2,133,647. Overall, the 2012 RPHC counted 446,453 persons aged 5 years and above, with disabilities in Rwanda. Among them, females were 225,303 and males totalized the number of 221,150. In the previous Census conducted in 2002, the total population of Rwanda was 8,128,553 persons. With the current numbers, according to experts; the population of Rwanda is expected to double towards 2047.

Rwanda is an overpopulated country whose production is mainly based on agriculture, and does not meet the needs of the population.

The population of the provinces and districts of Rwanda by census years

Name	Status	Population Census 2002-08-16	Population Census 2012-08-15
Eastern	**Province**	**1,700,137**	**2,595,703**
Bugesera	District	266,775	361,914
Gatsibo	District	283,456	433,020
Kayonza	District	209,723	344,157
Kirehe	District	229,468	340,368
Ngoma	District	235,109	336,928

Name	Status	Population Census 2002-08-16	Population Census 2012-08-15
Nyagatare	District	255,104	465,855
Rwamagana	District	220,502	313,461
Kigali	**City**	**765,325**	**1,132,686**
Gasabo	District	320,516	529,561
Kicukiro	District	207,819	318,564
Nyarugenge	District	236,990	284,561
Northern	**Province**	**1,560,862**	**1,726,370**
Burera	District	320,759	336,582
Gakenke	District	322,043	338,234
Gicumbi	District	359,716	395,606
Musanze	District	307,078	368,267
Rulindo	District	251,266	287,681
Western	**Province**	**2,043,555**	**2,471,239**
Karongi	District	278,944	331,808
Ngororero	District	282,249	333,713
Nyabihu	District	268,367	294,740
Nyamasheke	District	325,032	381,804
Rubavu	District	292,653	403,662
Rusizi	District	331,950	400,858
Rutsiro	District	264,360	324,654
Southern	**Province**	**2,058,674**	**2,589,975**
Gisagara	District	262,128	322,506
Huye	District	265,446	328,398
Kamonyi	District	261,336	340,501
Muhanga	District	287,219	319,141
Nyamagabe	District	280,007	341,491
Nyanza	District	225,209	323,719

Name	Status	Population Census 2002-08-16	Population Census 2012-08-15
Nyaruguru	District	231,496	294,334
Ruhango	District	245,833	319,885
Rwanda	**Republic**	**8,128,553**	**10,515,973**

Source: *National Institute of Statistics Rwanda (web).*

The Soil and Substratum: The land exploitation workforce is 89.6% of the active population (from the National Institute of Statistics report 2006). Over a total area of 26,338sq km, only 52% is exploitable i.e. about 1,385,000ha. Marshlands suitable for farming would add about 100,000ha to this area. At present available arable lands are about 0.60ha per household. Rwanda's substratum holds **minerals such as tin, wolfram, gold, Colombo-Tantalite and quarries**. Its land surface is 24,668 sq. km while its water surface is 1,670 sq. km.

Water Resources: Rwanda has a dense hydrological network. It is split up into two basins by a water divide line – the 'Congo Nile Ridge.' To the east of the Congo Nile Ridge there is the Nile Basin covering up to 67% of the national territory and at the west there is the Congo Basin covering 33%.

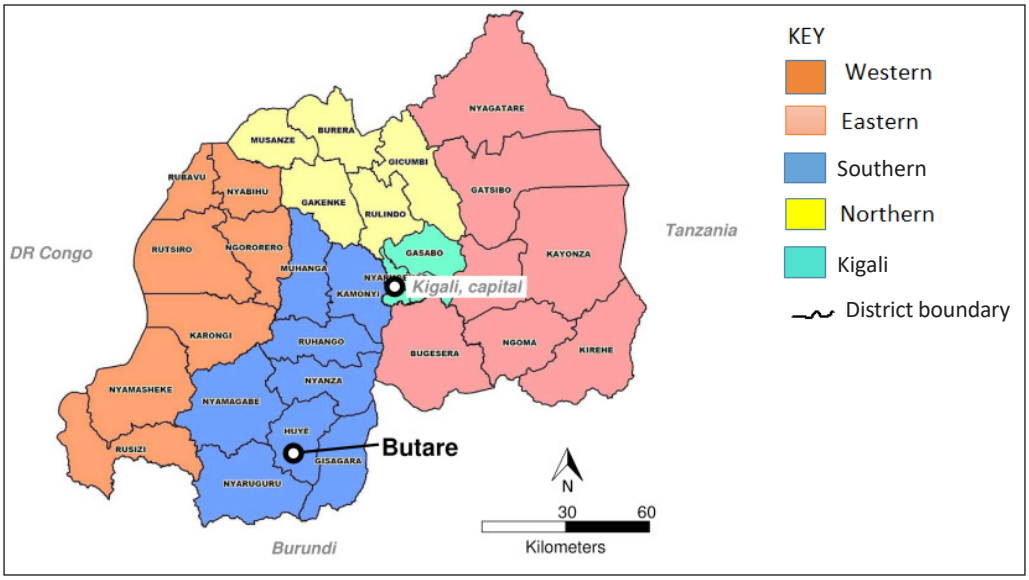
Rwanda is covered by diverse ecosystems – natural ecosystems, mountainous humid forests, savannah, wetlands, and planted forests. All these host a rich variety of flora and fauna species.

Economically, Rwandan economy is still agrarian, largely supported by the earnings from the export of coffee and tea, after tourism. Rwanda ranks among the poorest nations of the world. The agriculture sector contributes significantly to the GDP (Gross Domestic Product).

Administrative divisions of Rwanda.

Politically, the country is divided into 5 administrative divisions known as provinces. They include; Northern Province, Eastern Province, Southern Province, Western Province and Kigali City. These provinces are further portioned into 30 districts. The districts are then narrowed down to 416 sectors. Each of the provinces is headed by a governor. The districts are headed by mayors and the sectors are headed by the executive secretaries.

The administrative map of Rwanda: Provinces and Districts



Provinces are made up of different districts as shown in the table below:

Eastern Province	**Western Province**	**Kigali City**	**Southern Province**	**Northern Province**
Rwamagana	Rubavu	Gasabo	Kamonyi	Rulindo
Kayonza	Nyabihu	Kicukiro	Muhanga	Gakenke
Gatsibo	Ngororero	Nyarugenge	Ruhango	Gicumbi
Ngoma	Rutsiro		Nyamagabe	Burera
Bugesera	Karongi		Huye	Musanze
Kirehe	Nyamasheke		Gisagara	
Nyagatare	Rusizi		Nyanza	
			Nyaruguru	
Its provincial Headquarters is located in **Rwamagana District**.	Its provincial Headquarters is located in **Karongi District**.	Its provincial Headquarters is located in **Nyarugenge District**.	Its provincial Headquarters is located in **Nyanza District**.	Its provincial Headquarters is located in **Musanze District**.

APPLICATION ACTIVITY 4.1

1. Make a brief presentation of Rwanda with a special focus on latitudinal and longitudinal location, the area, population and the economic aspects.
2. Draw a sketch map of Rwanda and locate provinces and their districts.

4.2. The relief regions of Rwanda

LEARNING ACTIVITY 4.2

Using geographical documents and internet, research on the relief regions of Rwanda and respond to the following.

1. Explain the meaning of relief.
2. Describe the main relief regions of Rwanda.

The landscape of Rwanda is not homogenous. It is dominantly described by the rolling hills and mountainous appearances. The altitude decreases from West to East. The highest point on the land of Rwanda is situated on a volcanic mountain known as Mt. Karisimbi at an altitude of 4507 meters above sea level. The lowest point is found in the area drained by River Rusizi called Bugarama at 900 meters above sea level. The rising and falling relief has enriched the topography of the country. It is against this beautiful scenery that the country of Rwanda is referred to as **'the land of thousand hills.'** The tectonic movements are greatly responsible for the shaping of the relief of Rwanda as it is the case with other East African regions.

The term **Relief** refers to the nature of the landscape or the topographical set up of an area.

The Relief Regions of Rwanda

There are six relief regions in Rwanda. They include; the Eastern plain, the central plateau, the volcanic region, the highland areas, the Congo-Nile Crest/ watershed, the rift valley and the Rusizi region (Bugarama plains). To the north and west of the country, the relief is at a high elevation and steadily drops towards the Eastern parts of the country. The locations of the above outlined relief regions of Rwanda are illustrated below.

1. Congo-Nile Watershed (CNW)

The term 'watershed' strictly refers to the divide separating one drainage area from another (Wagner, 2002). Watershed means a ridge, like that formed by a chain of mountains, which sends water to two different rivers on either side.

CNW describes the highlands of the Western part that compose the divide of River Nile and River Congo. The CNW (Congo-Nile Watershed) stretches from the north to the south on a length of about 160km and a width varying between 20km and 50km. The CNW culminates on Mount Muhungwe in the north (3000m), decreases to 1200m at Rugabano in Kibuye and ends at the south in Nyungwe Forest, where its altitude can reach 2750m. The mean altitude of this CNW can be estimated at 2500m. It is a mountainous chain with sides highly dissected by a lot of valleys, with steep slopes and pointed tops. In the north, the CNW is limited by volcanic mountains. At the south west of the CNW we find Bugarama plain which an extension of Imbo plain belonging to Burundi. This is a tectonic ditch (fossé) filled of deposits. With its 900m of altitude, Bugarama is the lowest region of the country.

2. The Central Plateau

Extending from the south of Musanze to the border of Burundi, the central plateau is made of hills separated by large valleys are rich in alluvial deposits. This topographic unit is large – about 80km – nearly half the country. The altitude varies between 1500 and 2000m. This region is made up of many flat-topped hills and it is the reason why Rwanda is nominated "The Land of 1000 Hills." This hilly region is dominated at the north by highlands of Buberuka and Gicumbi at an altitude of 2000m, with long ridges, narrow valleys, long and strong slopes which make a truly mountainous region. This region covers areas such as Muhanga, Ruhango, Nyanza, Huye, Gisagara and Kigali.

3. The Eastern Plains

These plains extend from the east of Akanyaru – Kigali – Gicumbi to the border of Tanzania. These develop basins of Umutara and Bugesera. Its altitude generally varies between 1000m and 1500m. This is a flat area occupied by many lakes. They include Lakes Cyohoha, Lake Sake, Lake Mugesera, Lake Muhazi and others. Rivers include River Akagera, River Nyabarongo and their tributaries. The swamps or marshlands are located near the lakes and rivers.

4. Slopes and borders of Lake Kivu

This relief region is located along the shores of Lake Kivu. The average altitude ranges between 1460 and 3000 metres above sea level. The landscape of this area was greatly formed by tectonic forces. The region has steep escarpments that have been severely eroded.

5. Rusizi region (Bugarama plains)

This is the lowest region in Rwanda. It is also the hottest part of the country. It is located to the southwest of the country close to the border with Burundi and the Democratic Republic of Congo. It is an extension of Imbo plain in Burundi. Its elevation is 900 metres above sea level. This region is drained by River Rusizi. The lowlands of the southwest in Bugarama plain are part of the tectonic depression of the African Rift Valley.

Bugarama with rice plains and hills of Burundi in the background

6. Virunga Region (Volcanoes)

This is the relief region of Rwanda that is associated with the presence of volcanic ranges, hence the name volcanic region. Locally, the region is known as the Birunga region. The chain of Virunga extends for 90km and 5 volcanoes are located in Rwanda, while another 3 are located in DRC. The volcanic activity of that chain is complex. The fluid lava emitted has diverted the Nyabarongo River from South-North direction to South-East direction.

The volcanoes of Rwanda are:

i). Mt. Karisimbi

- It is classified as a complex volcano.
- The highest among the Virunga ranges.
- Its height stands at 4,507metres above sea level.
- There is a crater lake on its summit that is about 120 meters in diameter.
- In the wet periods of the year, the highest peak receives precipitation in form of snow. Hence, it has seasonal glaciers.
- The presence of ice crystals influenced the naming of this volcano. It usually has crystals that resemble shells hence the name Karisimbi which means white shell.

ii). Mt. Bushokoro /Bisoke

- It has a composite cone.
- It has an altitude of about 3,711metres.
- It has cracks and joints.
- It has the biggest Crater Lake in Rwanda.

iii). Mt. Sabyinyo

- It is the oldest volcano in Rwanda.
- It is located at the Uganda, Congo and Rwanda border.
- It is made up of the layers of lava that suffered severe erosion.
- It has steep sided rocks that rise above as necks. They are separated from each other by deep furrows. Hence the name Sabyinyo. The name stands for the "master teeth."
- It has the average altitude of about 3,634 metres.

iv). Mt. Gahinga

- This mountain is of a small size when compared with other Virunga ranges making the smallest volcano in the chain
- It is located between Rwanda and Uganda border.
- Therefore, it is shared by the two countries.
- Its elevation is 3,474 metres.

v). Mt. Muhabura

- The elevation of this volcano is 4,127metres.
- Its formation is recent hence making it the youngest volcano among the Virunga ranges of Rwanda.
- It has a small crater lake of about 100 meters in diameter.
- It is the most visible volcano in Rwanda.
- It is at the border of Rwanda and Uganda.
- It still shows signs of erupting, hence being a dormant volcano.

Karisimbi volcano

APPLICATION ACTIVITY 4.2

Make a brief description of topographic units of Rwanda.

4.3. The major relief features of Rwanda

LEARNING ACTIVITY 4.3

Move around your school and describe the physical features identified there.

The relief is the shape of the surface of the earth. It is the physical appearance and set up of the land surface in any given area. Some parts may be low while others may be high. Some may be gentle while others are steep. There are surfaces which are flat while others are undulating. Therefore, the surface of the earth cannot be uniform especially over a wide area. Rather it consists of difference in shapes and height of the land.

Physical features are naturally created features of the Earth. They are found on the earth's surface or form in ocean basins (marine relief features). They include mountains, valleys, rivers, lakes, hills, escarpments and plateaus. These features have been shaped by a number of factors and processes.

Some of the processes responsible for the formation of the above landforms include: faulting, vulcanicity, folding, warping, deposition and denudation (weathering and erosion).

Mountains

Mountains are very large and high landforms rising to great elevation of height above the sea level and bounded by steep slopes. There is no standard specific altitude used to define a mountain, however,

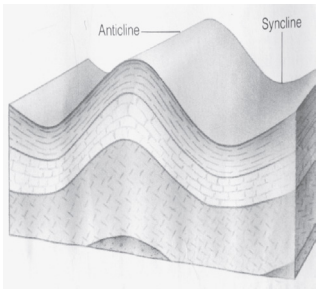
some geologists take relief features rising above 2000meters to be mountains. Examples of mountains found in Rwanda are: Mount Karisimbi, Mount Sabyinyo and others.

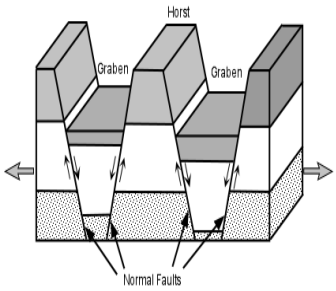
Sabyinyo Volcano

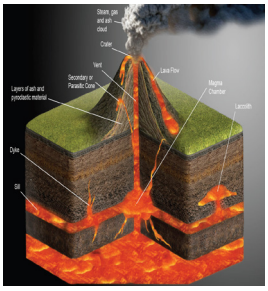
Karisimbi Volcano

Formation of mountains

Mountains are either folded, faulted or result from volcanic eruption and other tectonic processes. That's why mountains are classified as Block Mountains, Volcanic Mountains, inselbergs and Fold Mountains.







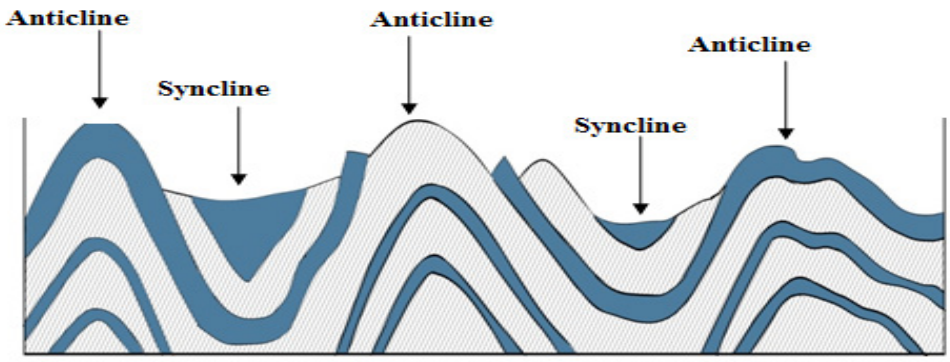
Hills

A hill is a raised part of the land which is lower than a mountain. Rwanda is known as the Country of a Thousand hills. Examples of hills include the hills of Nyamahura, Bugamba, hills of Gishwati and others. In most cases, hills of resulted from folding and denudation processes.

Gishwati Hills

Valleys

A valley is a low-lying area between hills. Valleys usually contain a stream or river flowing along the valley floor. The sides of large valleys in low-lying areas are usually gently sloping with an average slope of just a few degrees. Every valley is separated from adjacent valleys by a ridge called a drainage divide. An example is Bugarama Valley. Both valleys and hills are either resulted from folding, faulting or warping. In folding synclines represent the valleys while the anticlines represent the hill.



The structure of a fold

Erosion also is responsible for the creation of hills and valleys. It removes sediments from one area and transports materials down slope from elevated sites. Along the way, valleys are created. Accumulation of these materials at their destination over time creates small hills.

Plain

A plain is low and nearly flat land. Plains are extensive areas consisting of gently sloping valleys separated by low hills. Plains occur in central and eastern Rwanda**.** Along rivers (Nyabarongo, Akanyaru and Akagera), there are alluvial

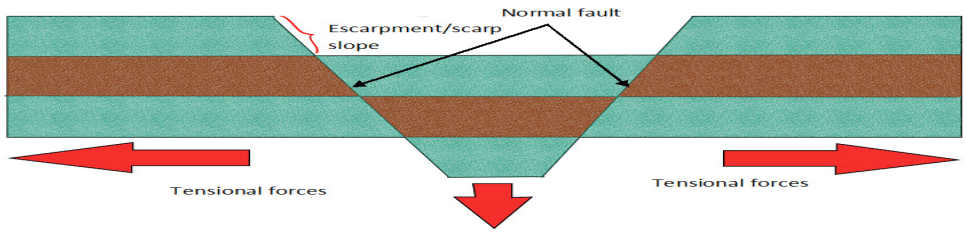
(flood) plains which are formed by the gradual accumulation of silt brought down by rivers. However, some plains were formed due to prolonged period of erosion having worn down lands that were once much higher.

Plateau

A plateau is a raised land that is almost flat at the top with gentle slopes on all sides to the lower ground. It is an elevated plain. In Rwanda, a plateau covers the central part and the Eastern province. The plateaus were formed due to large scale compression that formed the basin and consequent upward of the surrounding area.

Escarpment

An escarpment is a steep step like face produced by fracturing of the rock, followed by the displacement of one block on the opposite of the fault line.



Rivers

A river is anybody of fresh water flowing from a source to a large lake or to the sea, fed by such sources as springs and tributary streams. A river can also refer to a large natural stream of water flowing in a channel to the sea, a lake, or another river.

There are many rivers in Rwanda: Akanayaru, Nyabarongo, Rusizi, Sebeya, Akagera and many others. The largest rive in Rwanda is Akagera.

River Rusizi

Lakes

Lakes are large bodies of water that are surrounded by land and are not part of an ocean. Lakes are relatively still bodies of water when compared to a river where the water flows. They can contain either salt or fresh water and are larger than ponds.

A Lake is large, inland body of fresh or salty water surrounded by land.

Lakes are distinguished from bodies of water such as bays and gulfs, and some seas, that have an interchange with the ocean and are subject to tides. They are defined as large mass of water occupying a depression in the land. There are many lakes in Rwanda. They include Lake Kivu, Lake Rweru, Lake Muhazi, Lake Burera, and Lake Ruhondo.

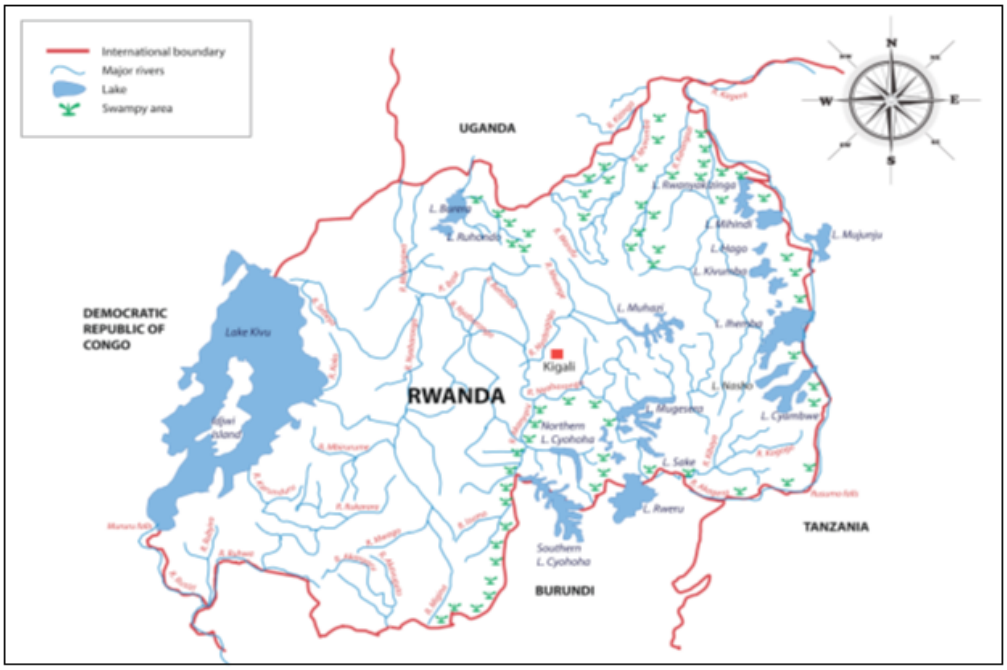
Lake Kivu

Lava-dammed lakes are formed when a flow of lava sometimes blocks a river valley (**Burera and Ruhondo), deposit Lakes** formed when a meander of a river on a flood plain is cut off to form a lake (lake Mugesera, Cyohoha, Rweru), o**x-bow lakes of Akagera which are** lakes originating from meanders of Akagera river which have been cut off as a result of deposition of sediments e.g. Rwampanga, Rwakibari, Ihema, Mihindi.

Other lakes are separated from the river by papyrus which can have 10km of width. They are Nasho, Cyanbwe, Kivumba, Hago and Rwanyakizinga.

There are also Crater lakes formed as a result of volcanic eruption. Crater lakes of Rwanda are located on Bisoke, Muhabura and on the side of Karisimbi.

Hydrographic map of Rwanda



APPLICATION ACTIVITY 4.3

Describe the physical features found in Rwanda.

4.4. Problems related to the relief features of Rwanda

LEARNING ACTIVITY 4.4

The government of Rwanda is encouraging the population to settle in grouped settlement and always avoid settling in high risk zones.

What are the problems associated with settling on steep slopes?

Despite their importance, the relief features of Rwanda also pose the following problems.

- Faulting discourages transport. The features formed such as the rift valleys are barriers to transport and communication. Construction work of roads is very expensive in terms of money and machinery needed.
- Where high mountains are formed, it is difficult to practice agriculture. This is one of the major reasons which mechanised agriculture is not widely practiced in all parts of the country.
- Faulting causes volcanic eruptions which are destructive. The molten lava destroys farmland, leads to loss of lives of humans and animals. For example, in the year 2002, the volcanic eruption at Goma left many people homeless.
- Vulcanicity may cause violent earthquakes. For example, in 2002, houses were destroyed in Rubavu by earthquakes when Mt. Nyiragongo erupted. The earthquakes are sometimes responsible for landslides which are destructive to life and property.
- Regions with relief landforms such as volcanic mountains and folds are highly associated with soil erosion and landslides due to the high and steep slopes that are formed.
- The leeward sides of the mountains formed receive very little rainfall. This is responsible for drought conditions which discourage crop production and consequently food shortage problems are realised.
- The steep and rugged slopes of warped mountains discourage settlements, agriculture and livestock keeping. It is also difficult for such regions to register development in terms of infrastructure.

APPLICATION ACTIVITY 4.4

Describe the problems related to the relief features of Rwanda.

4.5. Importance of the relief features to the development of Rwanda

LEARNING ACTIVITY 4.5

Use geographical documents and internet and explain the importance of relief features to the economic development of Rwanda.

- The plateaus and basins formed by folding have enabled the growth of crops, human settlement and the construction of transport and communication networks. The plateaus for example, have flat tops which are very cheap to construct houses and transport routes. The basins are associated with fertile alluvial soils suitable for arable farming.
- The highlands formed by folding have influenced the climate of the areas where they are found especially rainfall formation.
- The formation of lakes in valleys has encouraged fishing and sand harvesting.
- Relief features such as hills, Rift valleys, among others are tourist attraction sites. Tourists contribute to the economy of the country by bringing in foreign exchange that supports other sectors of the economy.
- Features such as Lakes are sources of rivers. Kivu for instance is the source of water for River Rusizi. The many rivers and lakes in the country provide water for domestic and industrial uses.
- The escarpments and fault scarps along rivers e.g. River Rusizi are important for the generation of hydroelectric power.
- Volcanic landforms like the lava plateaus break down giving rise to fertile volcanic soils that are suitable for crop cultivation. This is the reason why the volcanic regions of Musanze, Nyabihu, Burera, etc. are suitable for food production in the country.

- Volcanic landscapes like the volcanoes in the Northern Province provide beautiful sceneries that attract tourists who bring in foreign exchange to the country.
- Lava from volcanic eruptions block the flow of rivers leading to the formation of lava dammed lakes such as Lakes Burera and Ruhondo. The lakes provide water for domestic and industrial use. Fishing activities are also carried out which improve people diet.
- Volcanic landscapes are associated with minerals such as Wolfram, Tungsten and Tin. This has promoted the growth and development of the mining industry in such areas.

APPLICATION ACTIVITY 4.5

What are the benefits of various relief features in the area where they are found?

Skills lab

Make/ mold a map of Rwanda using any local materials and indicate different relief features.

END UNIT ASSESSMENT 4

1. State the location of Rwanda using latitudes and longitudes.
2. Name the neighbouring countries of Rwanda.
3. Rwanda is a landlocked country. Define the term landlocked.
4. Show how the relief of Rwanda has influenced human activities and the economic development of the country.
5. With the help of a sketch map of Rwanda, name and indicate the relief regions of Rwanda.
6. Analyse the importance of the relief features in the economic development of Rwanda.

UNIT 5

ROCKS IN RWANDA

Key Unit competence: The student-teacher should be able to compare major types of rocks in Rwanda and evaluate their importance.

5.0. INTRODUCTORY ACTIVITY

A rock is a naturally occurring solid that is made up of one or more minerals that constitutes a significant part of the earth's crust. Use internet, textbooks, maps and photographs of Geography of Rwanda to answer to the following questions:

1. Identify different types of rocks.
2. Describe the characteristics of rocks.
3. Assess the economic importance of rocks in Rwanda.

5.1. Classification and characteristics of rocks in Rwanda

LEARNING ACTIVITY 5.1

Observe the rock provided below and answer the following questions:

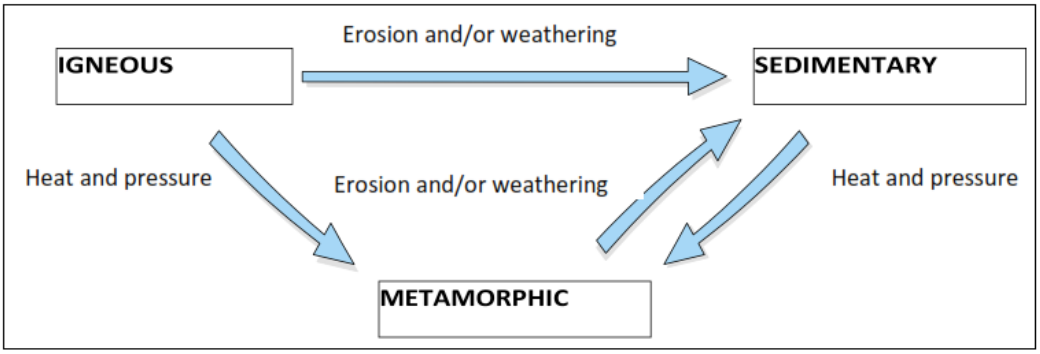
1. Identify the types of rock given above.
2. In which category can it be classified?
3. Give the characteristics of the rocks identified above.

A rock is a naturally occurring solid that is made up of one or more minerals that constitutes a significant part of the earth's crust. It may be unconsolidated such as sand and clay or consolidated such as granite, limestone and coal. Most rocks of the earth's crust are very old in terms of human standards, the time of formation ranging back many millions of years. But rocks are also being formed at this very hour as a volcano emits lava that solidifies on contact with the atmosphere. The largest parts of Rwanda are made up of rocks that changed their mineralogical and chemical compositions due to the metamorphism. The examples include schist and quartzite that were exposed forming granites which occupy the greatest part of Rwanda.

The rock types of Rwanda

Rocks can be divided into three main groups: according to their mode of formation. These are; **igneous**, **sedimentary** and **metamorphic**. Igneous rocks are formed as molten **magma** deep in the earth's crust. They cool slowly and solidify underground. They are very resistant to erosion. Most sedimentary rocks consist of mineral particles formed by the breakdown of older rocks. Limestone, chalk and coal are sedimentary rocks formed from the fossilised remains of animals and plants. Metamorphic rocks have been changed as the result of heat, pressure or chemical reactions.

Relationship between rock types



a) Igneous rock

They are formed by volcanic activities in the north western and the south western regions of Rwanda. Igneous rocks are rocks formed by cooling of molten material from a volcano or from deep inside the earth. This molten material from the interior of the earth is known as magma. Igneous rocks are also called magmatic rocks or volcanic rocks.

They are into two types:

i). Extrusive rocks

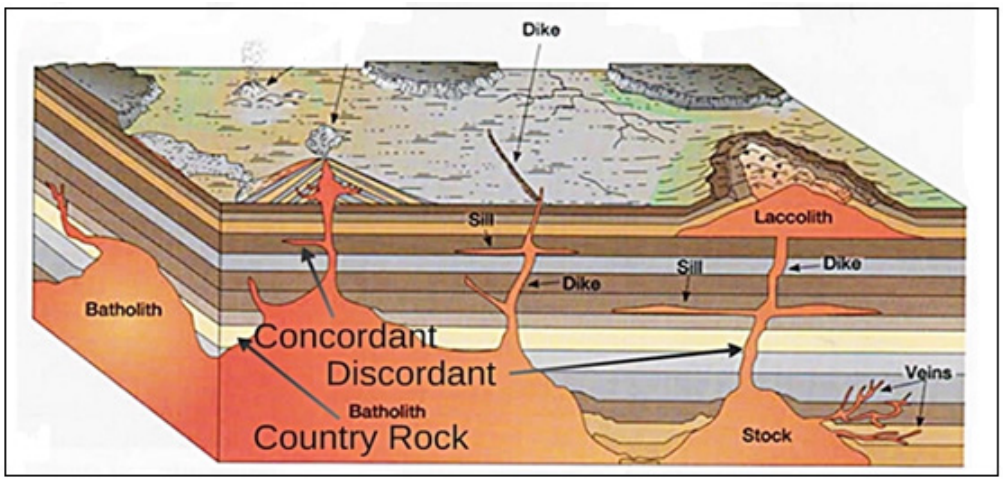
They are formed when lava solidified at the surface. They are also called volcanic igneous rocks. These extrusive rocks are basalt, obsidian, ashes and cinders, etc. Examples of extrusive igneous rocks can be found in places where vulcanicity took place. They are abundant in Northern Province (Musanze and Burera) and in Western Province (Nyabihu, Rubavu, Rutsiro, Rusizi and Nyamasheke districts). They are dark because they come from basic and fluid lava.

ii). Intrusive or plutonic rocks

They are formed when the magma solidifies in deep rock layers before reaching the surface land.

They include; **Hypabyssals**; these solidified immediately under the surface such as lapoliths, laccoliths, Sills, dyes and batholiths. These can easily be exposed by erosion.

The different Hypabyssals rocks are seen in the diagram below:



Intrusive volcanic rocks also include the **Plutonic rocks (a Greek word meaning fire)** named after Pluto, the Greek underground god of fire. These have large crystals because their rate of cooling was very slow since it as not exposed to the surface.

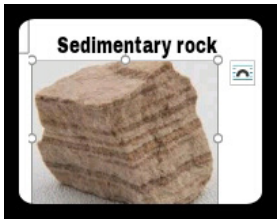
For example: granite, diorite, gabbro, etc. They are found under the highlands of Rwanda and they appear on the steep slopes. There are some igneous intrusions in some parts of Rusizi and the shores of Lake Kivu. They are used as queries to get stones, sand, etc.

Characteristics of igneous rocks

Igneous rocks have the following characteristics:

- They are formed by cooling of magma which solidifies into or on to the earth's surface.
- They have a lot of minerals.
- They do not have strata or layers.
- They do not contain fossils (fossils are remains of plants and animals fixed in rocks)
- The number of joints increases upwards in any igneous rock
- They have a crystal appearance after cooling and solidification e.g. quartz and dolerite.

ii). Sedimentary rocks



Sedimentary rocks are the result of the accumulation of small pieces broken off from pre-existing rocks (igneous rocks, metamorphic rocks and sedimentary rocks) or precipitation of dissolved minerals. Sedimentary rocks form when sediments become pressed or cemented together or when sediments precipitate out of solution.

Formation of Sedimentary Rocks

When an igneous rock is exposed at the surface of the Earth, it is subjected to the processes of Earth-sculpture, carried on b weathering, erosion (by running water, ice, waves and wind) and deposition. The products broken down are transported and deposited in strata on either dry land or under water. They are cemented to form solid sedimentary rocks in layers called strata.

Classification of Sedimentary Rocks

Sedimentary rocks may be classified depending on their mode of formation which can be mechanically, organically and chemically formed.

Mechanically formed sedimentary rocks

These are formed when inorganic rock particles are weathered, eroded, deposited and cemented in layers. This group is composed of a variety of either course or fine texture rocks formed by compaction and cementation of detrital sediments such as silt, clay, sand and gravel.

Most of sedimentary rocks found in Rwanda are **mechanically** formed.

Organically formed Sedimentary rocks

These rocks are formed from decomposition of remains of once living organisms both fauna and flora which accumulate over a time. The remains of these organic matter contain calcium carbonate salts ($CaCo_3$) and Iron oxide which cement their skeleton to form organic sedimentary rocks.

Examples: Limestone in Bugarama plain and close to Nyabarongo valley near Kigali, peat in many swamps of Rwanda such as Akanyuru, Akagera, and Methane gas in Lake Kivu.

Chemically formed sedimentary rocks

These rocks are precipitated or evapourated from solutions of salt. All water falling on earth as rain and running over the surface carries salts in solution. The salts may be precipitated by direct evapouration of water, chemical interaction or by release of pressure where underground water reaches the surface. Deposition of calcium on beds o streams and in the form of stalactites and stalagmites in caves is a familiar feature in the limestone regions. Examples of chemically formed sedimentary rocks include; rock salt, Dolomite, Gypsum and Potash.

Characteristics of sedimentary rocks

Sedimentary rocks have the following characteristics:

- Sedimentary rocks are the product of other rocks that were already formed.
- They appear in the form of layers or strata.
- They are formed from materials of older rocks, plant and animal remains.
- Sedimentary rocks are found over the largest surface area of the earth.
- Sedimentary rocks have various minerals because they are a product of

different sources.

- Most of the sedimentary rocks allow liquids and gases to pass through them (permeable and porous).
- Sedimentary rocks are characterized by different sizes of joints.
- Sedimentation units in the sedimentary rocks having a thickness of greater than one centimetre are called *beds*.
- They have no crystalline look because they do not form under the influence of heat.

NB: Because sedimentary rocks are formed as a result of deposition, they are mainly found in lowland areas for example river beds, lakes, etc. where wind deposition is predominant.

iii). Metamorphic rocks

They are formed from either igneous or sedimentary rocks under the influence of greater pressure and heat. Most of metamorphic rocks are found under the highlands of Rwanda (Congo-Nile Crest, Central plateaus, etc.) because they are caused by pressure and heat from compression tectonic forces and molten rocks in motion under the crust (Birunga region). For example: quartzite, slate, gneiss, schist, etc.

In Rwanda, there are several quarries where we exploit metamorphic rocks. Almost 80% rocks of Rwanda are metamorphic and igneous origin. These rocks found in Rwanda contain minerals necessary for economic development of Rwanda. Examples of Metamorphic rocks are; marble, slate,

Formation of Metamorphic rocks

Metamorphic rocks are formed in two ways.

1. Region metamorphism or dislocation: This is where a large region is subjected to different temperature conditions b the advancing igneous rock.
2. Contact metamorphism: This is when igneous rocks come under direct contact with other rocks and change their chemical composition and physical structure.

Types of metamorphic rocks	
Rock before metamorphism	**Example of metamorphic rock formed**
Granite (igneous)	Gneiss
Shale (sedimentary)	Schist and hornfels
Clay (sedimentary)	Slate
Limestone (sedimentary)	Quartzite and marble
Sandstone (sedimentary)	Phyllite
Slate (metamorphic)	Felspars, Hornblade, Mica

Metamorphic rocks

Characteristics of Metamorphic Rocks

Metamorphic rocks present two distinctive physical characteristics:

Foliated metamorphic rocks and Non-foliated metamorphic rocks. Foliated metamorphic rocks such as gneiss, Phyllite, schist and slate have a layered or banded appearance that is produced by exposure to the heat and pressure. Non-foliated metamorphic rocks such as hornfels, marble, quartzite do not have a layered or banded appearance.

Metamorphic Rocks have also the following characteristics:

- They are harder than the original rocks. Therefore, they are not easily eroded.
- They do not split easily.

- They contain minerals.
- Some are made up of just one mineral, for example, marble.
- They have a different texture from the original rock.

APPLICATION ACTIVITY 5.1

1. Describe the characteristics of metamorphic and sedimentary rocks.
2. Identify district of Rwanda where igneous rocks are found.
3. Observe rocks found in your environment and explain their characteristics. where they are found?

5.2. Importance of rocks in Rwanda.

LEARNING ACTIVITY 5.2

Use geographical documents and internet to explain the importance of rocks.

a) Formation of soils

Rocks are broken down into tiny particles through the process of weathering. This leads to the formation of soil that supports plant growth. For example, the igneous rocks around the volcanic mountains in the Northern and Western Provinces of Rwanda have been weathered leading to the formation of fertile volcanic soils. These soils have supported crop production in these areas.

b) Minerals

Rocks provide humans with valuable minerals that are used in various ways. For example, micro- diamonds in Gicumbi and tin in Muhanga are minerals. These are exported earning the country foreign exchange.

c) Construction materials

Rocks are used in various ways in the building of infrastructure. For example, igneous and sedimentary rocks are obtained from quarries to provide stones that are needed in building. Some coloured stones are used to decorate houses and to construct fences.

Rocks are used in construction

d) Road construction

Closely related to the above, the construction of road pavements and slope stabilisation systems, require strong stones that are resistant to weathering and erosion.

e) Research and study purposes

Rocks and minerals are used in various studies by student teachers at different levels of education. Geologists use rocks to understand their discipline and plan for the future. Student teachers in secondary schools use them to understand the topic on rocks.

f) Source of water

The nature and texture of rocks prevailing in a given area will determine the volume of the underground water present in the area. Rocks that allow proper circulation of water make large volumes of underground water that is beneficial to humans through springs, wells and boreholes.

g) Source of energy

Peat coal is used as a source of energy in some homes in Rwanda. Hot rocks found beneath the Earth's surface are responsible for the generation of geothermal energy.

h) Tourism development

There are many rocks in Rwanda that attract tourists from all over the world. For example, in the Southern Province, there are wonderful cliffs and rocks such as "Ibere rya Bigogwe (Bigogwe Breast), Urutare rwa Ndaba (Ndaba Rock) and Urutare rwa Kamegeri (Kamegeri Rock).

Urutare rwa Ndaba

Ibere rya Bigogwe

i) Ornamental stones

The precious stones got from highly valued rocks such as gold and diamond are used as ornaments.

j) Millstones and grindstones

Low income earners whose economic abilities cannot allow them to access better food processing depend on metamorphic and granite rocks to process dry products that need pounding or grinding.

Millstones and grindstones

There are some disadvantages of rocks such as:

- Areas with many rocks such as outcrops make it difficult to develop transport and communication infrastructure, especially roads. This is clearly witnessed in some parts of Northern and Western provinces of Rwanda where some areas are inaccessible due to their rocky nature.
- In steep areas, falling rocks lead to serious accidents where houses or homes are destroyed. Sometimes people and animals lose their lives.
- It is difficult and expensive to construct houses in rocky areas. Sometimes people give up on such important developments.
- The formation of sedimentary rocks leads to creation of young soils which barely support agriculture.

APPLICATION ACTIVITY 5.2

Discuss the importance of rocks in the economic development of Rwanda

Skills lab

Make a field study around your school, and collect various rocks and arrange them according to igneous, sedimentary and metamorphic. Present the characteristics of each category.

END UNIT ASSESSMENT 5

1. Complete the following table:

Type of rock	Location	Characteristics
1.		
2.		
3.		

2. Discuss the merits and demerits of rocks in Rwanda.

UNIT 6

SOILS IN RWANDA

Key Unit competence: The student-teacher should be able to compare major types of soil in Rwanda and assess their importance.

6.0. INTRODUCTORY ACTIVITY

Soil is a very important and valuable resource for all living organisms. Use internet, textbooks, maps and photographs of soils in Rwanda to answer to the questions below:

1. Define soil.
2. Describe different types of soils in Rwanda.
3. Explain the types, causes and effects of soil erosion in Rwanda.
4. Describe various soil conservation and management measures in Rwanda.

6.1. Definition and types of soils in Rwanda

LEARNING ACTIVITY 6.1

Use internet, textbooks, maps and photographs of soils in Rwanda to research on the meaning of soil and types of soils in Rwanda.

Soil is the upper layer of the Earth in which plants grow. It is made up of a mixture of rock particles, organic matter, minerals, gases, liquids, air and living organisms that support life.

Types of soils and where they are found

Generally, there are four different types of soils. Three are basic while the fourth one is a combination of the three: Clay , Silt, Sand and Loam

Rwanda also has these soils in addition to other soil types. The table below shows a summary of their characteristics and places where they are found.

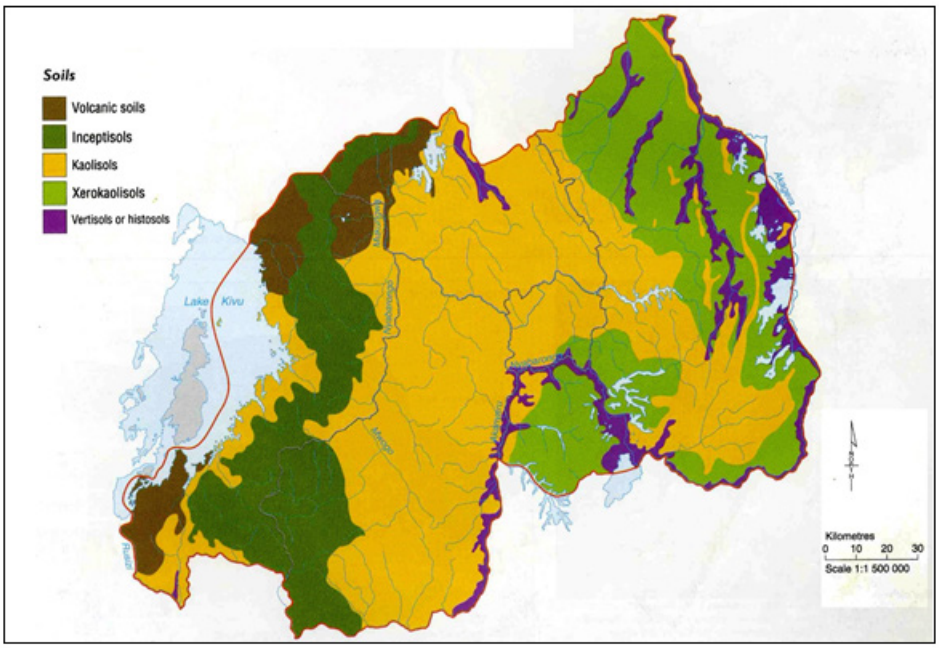
Soil types in Rwanda and places where they are found

Types	Characteristics
Loam soil **Source:** *Google image* 	- These are very fertile soil. - They have the ability to support the growth of crops. - They have a high content of humus, salt, sand and sometimes clay. - They are well drained and rarely become waterlogged. - They have high levels of water moisture which is maintained for a long period of time. - They are found in the Northern and Western provinces of Rwanda.
Clay soil **Source:** *Google image* 	- The amount of humus is relatively low. - They have large quantities of nutrients. - They have the ability to retain water for a long time. - They have high level of acidity. Therefore, they only support specific -types of crops such as rice. - They are associated with limited decomposition due to the absence of bacteria. - They are common along the rivers, valleys and swamps such as Akanyaru swamp in Gisagara district.
Sandy soil 	- They are described by their large particles, such as allow the presence of huge pore space. - They have a high level of percolation i.e. they are easily infiltrated by surface run-off. - They are common in Umutara and Bugesera.

Lateritic soils 	- Normally sandy in structure and saline in nature, arid soils vary from red to brown in color. - They are formed when rock fragments bond together to form a very hard substance known as laterite or murram. - They are formed as a result of leaching. - Laterite soils however are poor in organic matter, nitrogen, phosphate, and calcium, but rich in iron oxide and potash. - Even if they are normally infertile; however, they are widely used to make bricks used in building construction. - They are found in the Rusumo region of Eastern province.

There is a wide range of soils in Rwanda. The soils are classified according to how they are formed and where they occur. Basing on these classifications, the country has the following types of soils listed and described below.

Soils types of Rwanda, their characteristics and places of occurrence



Soil distribution in Rwanda

1. Kaolisols

This is the dominant soil type in Rwanda. It is specifically common in central part of Rwanda. It is red in color, thick and is composed of iron oxide. It becomes water logged during the rainy season. It is subdivided into two:

i). Humus-bearing Kaolisols

This forms from parent granitic rocks and metamorphosed basaltic rocks. Is common in low altitudes of the central region and extends to the west. They are covered with humus resulting from plant decomposition. These soils are rich but fragile when exposed to runoff. That's why it is necessary to protect the humus-bearing layer by planting more plants, use of anti-erosion terracing and maintain its soil fertility by fallow or use of manure and fertilizers. It is commonly found in Gicumbi district.

ii). Xerokaolisols

This is mostly found in the Eastern province especially in Bugesera. It is thin and is covered by aluminum but the top most layer is hard and poor. Therefore, the cultivation on these soils must carefully be carried out in order to avoid the appearance of this sterile (infertile) lateritic layer on the surface.

2. Valley soils

These are soils which form in valley floors of hills and mountains most especially river valleys. It forms from old alluvial deposits. It is also classified into two groups:

i). Histosol

This forms from decomposition of organic materials mostly decaying vegetation in valley floors. The soil remains muddy for a bigger period of the year and is covered by swampy vegetation. Example, Rugezi Swamps.

ii). Vertisol

These are light, black and mineral rich soils. These soils however, may lose fertility very easily more especially under dry conditions. They dry up and harden during the dry season and muddy during the wet season. Example, Nyabarongo valley.

3. Altitudinal Soils/ Incept soils

This is formed under the influence of low temperatures and high rainfall. The slopes and plateaus covered by mountain forests of the Congo-Nile peak have fertile soils. However, it is necessary to control erosion and preserve the fertility of these soils by the use manure.

4. Volcanic soils

These are formed from vulcanicity. They are found in Musanze, Burera in Northern Province, and Rubavu, Nyabihu, Rusizi and Nyamasheke in western province. These soils are more fertile for agriculture, but need much attention because they may easily be affected by erosion.

APPLICATION ACTIVITY 6.1

1. Define the term soil.
2. With reference to the map of Rwanda, locate different types of soils in west and eastern part of Rwanda.
3. Describe the characteristics of loam soils.

6.2. Soil erosion in Rwanda

LEARNING ACTIVITY 6.2

Use internet, textbooks, maps and photographs to research on soil erosion in Rwanda and answer the following questions:

1. Explain the types of soil erosion in Rwanda.
2. Discuss the causes of soil erosion in Rwanda.
3. Examine the effects of soil erosion in Rwanda.

6.2.1. Types of soil erosion in Rwanda

Soil erosion is a process through which the top soil is removed by running water, wind and animals. In Rwanda, the areas affected by severe soil erosion are the steep slopes of Northern and western region (the mountainous regions).

Major types of soil erosion in Rwanda

There are 4 types of soil erosion. These are:

Splash erosion: This is caused by the force of pounding raindrops that hit the upper layer of soils detaching small soil particles from the unconsolidated soils. In the process, the soil particles are splashed away as the raindrops fall on the ground hence the name splash erosion. This type of erosion is very common in the Eastern Province in areas where the vegetation cover is minimal or completely lacks in some places.

Splash Erosion

Sheet erosion: It is a type of soil erosion where the top soils are washed uniformly by the running water such as surface runoff. This occurs mainly along slopes or on steep pieces of land that have little or no vegetation cover. This means that water flows evenly over an area, wiping off the top soils.

Rill erosion: It occurs when several tiny channels, measuring a few centimeters deep are created by water on a piece of land. The tiny channels are referred to as rills. The rills in rill erosion usually take a linear pattern. They are formed by water.

Rill Erosion

Gully erosion: It occurs when big depressions are created by the heavy run-off that occupies narrow rills. This water widens and deepens the rills to form gullies. This type of erosion is common in parts of Musanze, Gicumbi, Western and Southern Provinces of Rwanda.

Gully erosion

6.2.2. Causes of soil erosion in Rwanda

a) Relief

This influences the occurrence of soil erosion whereby areas with steep gradients cause the run-off to flow at high speeds hence quickly eroding and transporting the soils. Areas with gentle slopes and flat regions, the run-off flows at a lesser speed and the strength to erode is reduced.

b) Climate

In Rwanda, rainfall is the most active agent of erosion. In areas where heavy rainfall is received the surface runoff present washes away large quantities of the top soils. On the other hand, wind erosion is dominant in areas such as parts of Bugesera and the Eastern Province. There is also seasonal glacial erosion on the summit of Mt. Karisimbi especially during the wet season.

c) Destruction of vegetation

Plant roots hold the soil particles together enabling them to resist erosion therefore areas with less vegetation cover or bare soils are subjected to agents of erosion.

d) Bush burning

The pastoral communities have a tendency of burning grass or pasture lands during the dry season in preparation for the rainy season. The burning of vegetation leaves a given area bare and totally exposed to agents of erosion.

e) Poor methods of farming

Farming methods such as monoculture and ploughing of land along slopes speed up erosion. They subject the soils to erosion especially by water.

f) Mining and quarrying

These activities expose the soils to erosion. They make the soil particles unstable and when agents of erosion come by, much of the soils are carried away. Methods such as open cast mining cause severe erosion.

g) Overgrazing

In some parts of Rwanda where animals are still communally grazed, much of the soils remain bare due to the clearance of the vegetation by animals. This exposes the land to agents of erosion.

6.2.3. Effects of soil erosion

The following are the effects of soil erosion.

a) Limited mechanized agriculture

The use of modern machines like tractors is made difficult because of gullies which affect their movement in farms, this in turn affects crop production.

b) Destruction of crops

Crops destroyed by erosion in Gakenke (© Manirakiza Vincent)

Erosion destroys crops on farmyards. The eroded materials destroy the crops to ground. This is common in the northern province of Rwanda which is hilly and mountainous.

c) Low soil productivity

Soil erosion leads to the loss of soil nutrients which in turn affects the yields. The bare soil in Hilly slopes can no longer support crop production.

d) Famine

Soil erosion leads to vegetation destruction and this affects rainfall formation. This phenomenon limits agricultural productivity hence famine.

e) Change of the Landscape

It changes the landscape appearance and natural beauty of the areas affected because of presence of landslides, gullies and rills.

f) Siltation

The eroded materials at times are deposited on people's land or along river banks. Such silt displaces people and destroys their property. This is common in flat lands adjacent to hilly areas.

g) Flooding

Floods cause a lot of damages including loss of human life, destruction of crops, transport routs are cut off and communication is made difficult.

Flooding in Bigogwe (© ManirakizaVincent)

APPLICATION ACTIVITY 6.2

1. Identify the types of erosion in Rwanda.
2. Explain the causes of soil erosion in Rwanda.
3. Examine the effects of soil erosion in Rwanda.

6.3. Appropriate soil management and the conservation measures

LEARNING ACTIVITY 6.3

Use internet, textbooks, media etc. to research on soil conservation and soil management and answer the following questions:

1. Differentiate between soil conservation and soil management.
2. Identify soil conservation measures in Rwanda.

Soil conservation refers to the prevention of soils from erosion, degradation or loss of fertility while soil management refers to all the measures put in place to ensure proper use of soils in a sustainable manner.

Soil erosion and depletion are the major threats to soil as a resource. Therefore, sound farming techniques must be employed to prevent soil erosion and impoverishments, and to ensure that agriculture is more profitable in the world, the following should be done:

a) Mulching

This method consists of covering the bare ground with a layer of organic matter such as straw. This helps to maintain soil moisture and limit rapid evaporation.

Mulching on a banana plantation. Google photo.

b) Crop rotation

This is done to avoid the effects of monoculture and add mineral salts to soil, hence improving soil cohesion and reducing soil erosion.

c) Contour ploughing

This method prevents excessive soil loss, as gullies are less likely to develop and also reduce run-off so that plants receive more water. Row crops and small grains are often planted in contour pattern so that the plants can absorb much of the rain, and erosion is minimized.

Contours on the hills of Rwanda to control soil erosion

d) Terrace farming

This method is practically used on the steep slopes to avail enough flat land to grow. It is best way to reduce surface run off and soil erosion.

Radical terracing (Irish potatoes): Rwankuba Sector ***Source:*** *https://www.newtimes.co.rw/section/read/208765*

e) Intercropping method consist of growing different crops in alternative rows and sown at different periods to protect the soil from rain wash.

Multiple cropping/ intercropping, google image

f) Fallowing

Sometimes it is very important to allow a farmland to rest or lie fallow, so that the natural forces can act on the soil. Fallowing also increases the sub-soil moisture and improves the general structure of the soil.

g) Zero grazing: (Reducing the number of animals grazing in an area according to the carrying capacity of land.)

Zero grazing in Nyagatare

h) Afforestation: It is a process of planting trees in a virginal and without any trees to create a forest. Trees as wind breaks are planted and they reduce the speed of wind hence reducing soil erosion. Therefore, afforestation is the creation of a new forest.

Forests help to hold the soils together so as to reduce soil erosion.

i) Growth of cover crops

This is used in gentle area to reduce splash erosion and surface run off e.g. the growth of Pumpkins.

j) Education and mass mobilization

This can be done through education of farmers and pastoralists about the causes and effects of soil erosion, and how to avoid them. This should also be done through agricultural seminars, radio programs, and demonstration farms.

APPLICATION ACTIVITY 6.3

"Terracing is the most effective method of controlling soil erosion in Rwanda". Discuss.

Skills lab

Observe the following image and apply the activity that follow:

By using the knowledge you have about soil properties, use plastic bottle, bucket or old sack, sample of soils, vegetables or flower siblings and glove and make a bottle/sack or bucket garden in your school compound.

END UNIT ASSESSMENT 6

1. Explain the types of erosion in Rwanda.
2. Discuss the causes of soil erosion in Rwanda.
3. Examine the effects of soil erosion in Rwanda.
4. Describe the soil management and conservation measures in Rwanda.

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