

Grade 8 Agricultural Studies

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CHAPTER 1

GENERAL FARMING AND PRODUCTION FACTORS

Introduction

Agriculture is the art and science in cultivating the soil, growing crops and raising livestock. It includes the preparation of plant and animal products for people to use and their distribution to markets.

Agriculture provides most of the world's food and fabrics. Agriculture also provides fiber (produced from fiber crops) and leather for clothes, wood for construction and paper products. Cotton, wool, and leather are all agricultural products

These products, as well as the agricultural methods used, may vary from one part of the world to another based on the resources available.

MODULE 1

Agriculture as in industry and agricultural development

Objectives:

The learners should be aware of the importance of Agriculture as an industry and contributing factors to Agricultural development.

Upon completion you should be able to answer questions on

- Factors contributing to agricultural development
- Importance of agriculture as an industry

Keywords/terms and concepts – not all words or terminology is are listed in the table, some words should be highlighted by the educator **who can also** develop word searches, crossword puzzles and matching Columns a and b to strengthen biological terminology. (See <https://worksheets.theteacherscorner.net/>)

Keyword	Meaning
Cultivating	Preparing a land/field and grow crops on it, or to grow a particular crop
Fiber	Fibre include cotton, wool, and silk. Agricultural producers also use hemp to make rope and flax for linen. Bamboo fibre is also been used to make cloth.
Self sufficient	<u>Able to provide</u> everything you need, <u>especially food</u> , for yourself without the <u>help of other people</u>
Northern Hemisphere	Part of the planet that is north of the equator. It has about 88 percent of world's population and most of the world's land.
Developed country	Economy is highly progressed and possesses great technological infrastructure, as compared to other nations.
Developing country	Low levels of living and productivity, high population growth, underdeveloped industry and a reliance on agriculture and exports for economic sustainability.

Emerging economy	Does not rely primarily on agriculture, have made impressive gains in infrastructure and industrial growth, and are experiencing increasing incomes and quick economic growth
Primary industry	Concerned with obtaining or providing natural raw materials for conversion into commodities and products for the consumer
Commercial	Involving or relating to the buying and selling of goods.
Foreign exchange	It is the conversion of a country's currency into another.

Agriculture as an industry

Food production is a world issue and not only important in South Africa. The **challenge** to food producers world wide is to produce enough food for the 9 Billion people as estimated will inhabit planet earth by 2030 as indicated below.



Currently, South Africa is self-sufficient in all major agricultural products but in a normal year is also a net food exporter, making it 1 of 6 countries in the world capable of exporting food on a regular basis. Because South Africa's summer harvest season coincides with winter in the Northern Hemisphere (European countries) **making** the South Africa is also well positioned to supply agricultural goods to countries in the developed world.

The agricultural industry provides for the essential human requirements, it is the primary industry in any country of the world, and it supplies the real needs of people as a:

- **Provider of Food**
Man cannot produce food himself and is therefore thus directly dependent on agriculture for his food. Therefore, agriculture is **one of** the most important industries on earth. In Southern Africa more than enough food is produced for its own use, as well as considerable quantities for export purposes.
- **Provider of Raw Materials**
The largest percentage of a country's agricultural soil is used for food production, but an important and ever-growing percentage is used to produce agricultural products which **although** of limited food value, **is also** used in manufacturing processes. Agricultural products are therefore also used to supply industries with raw materials **as follows**:
 - Fibers: cotton, sisal, flax, wool, mohair.
 - Commercial products: tobacco, alcoholic drinks (grapes and grains), castor oil, tea and coffee, glue (maize), dairy products, oil (oil seeds), leather (hides and skins).
 - Products for the canning industry: meat, vegetables and fruit.
- **Provider of Work Opportunities**
More than 50% of the total population of Southern Africa live from or are directly dependent on agriculture **for their livelihoods**. This varies from owners, farm managers,

farm foremen, workers and their families, to those who process and sell agricultural products.

- **Provider of Economic Stability**
Although agriculture has only been market-oriented since the 1950's, it succeeded in its two basic aims, namely, to produce enough basic products for the population of Southern Africa and to earn foreign exchange.

Because of the need to increase production for our growing our population and world population, greater demands were made placed on our agricultural resources. This led to an increase in non-sustainable farming methods such as overgrazing and other cultivation practices. These practices resulted in water and soil losses and the weakening of our production potential.

Highlights of agricultural development in South Africa

Earlier farmers in south Africa consists of hunter gatherers and nomadic farmers. Before settlers came, indigenous people farmed in Southern Africa. Farmers in those days had many problems like drought, diseases and predators which killed their animals and crops, but they got over these problems because there was plenty of land. People organise themselves better for farming as the whole community were involved in subsistence farming.

Many events and inventions influenced agricultural development in South Africa.

- *Immigration:*
The refreshment station at the Cape was established by Jan van Riebeeck to provide vegetables, meat and fruit to ships that passed the Cape. As the numbers of people increased more food is needed, agricultural development had to be speeded up.

The population of the settlement consisted of soldiers, gardeners and artisans. Wheat, vegetables and fruit were cultivated and cattle were obtained from the local indigenous people in exchange for goods they needed. Indigenous animal breeds were used by the local farmers and developed good characteristics over many years.

The first farmers who could cultivate their own farms were the free burghers, in 1657. With the arrival of the French Huguenots during 1688 the wine and fruit industries were started.

The first wool sheep were imported during 1689. This was the beginning of the wool industry. As the trek-farmers who spread further inland and more land became available, production could be increased. They were mainly responsible for the development and improvement of the indigenous cattle, e.g. the Afrikaner and Drakensberger cattle, the Boer goat and fat-tailed sheep. These farmers introduced the horse as a domestic animal to the people living in country areas. They established their own farms and became mainly self-supporting. (please rework this)

The new towns and mines that developed in the country provided markets for farmers and these farmers made a living by selling food in town. They also used to exchange **barter** food for goods they needed, such as clothes and tools.

- *Industrial Revolution:*
The industrial revolutions ensure better and more efficient farm implements were developed, and so were better, more regular and cheaper methods of transport.

This also led to the development of factories. With the increase in the number of factories, the number of workers also increased. This required increased production of food. The development of artificial intelligence in technology also result in labour that is been replaced by machines.

- **First** industrial revolution began in Britain in the second half of the 18th century and flowed from the understanding of steam power. In addition, the development of the steam engine came, which changed our world with machines for in, transport, textile manufacturing and agriculture that **reduce** the need for manpower. Further consequences were the urbanisation of the population and the origin of the affluent middle class.
 - **Second industrial revolution** started approximately 100 years later and ended with the first World War. The focus **was** on the improved processes in steel production, the advances in electricity production (Thomas Edison and his bulb) and the latter's role in improving communication (Alexander Graham Bell and the telephone), the development of the Internal combustion engine as well as the mass production of the car (Gottlieb Daimler)
 - **Third or digital revolution**, which started in the Fifties, brought semiconductors, mainframe computers, personal **computers** and the Internet. This technology has resulted in disruptive changes in many industries, including a variety of communication and energy provisioning. The development of artificial intelligence in technology also result in labor that is been replaced by machines.
 - **Fourth Industrial** revolution is happening now and many of the things we just dreamt about in the 1950 's and 60 's have become a reality. These include genetic sequencing and manipulation with the accompanying major medical **benefits**, artificial intelligence, miniature sensors and 3D printing, all of which bring about rapid change in manufacturing and the way we live and produce food.
- Control measures for plant and animal diseases:
Tsetse-fly and malaria mosquitoes were destroyed, and new areas became habitable for production purposes.
 - Development of irrigation schemes:
Because of irrigation schemes more land could be cultivated, and better crops could be produced.
 - Agricultural research:
Agricultural research in the RSA is,
 - firstly, aimed at solving agricultural problems and
 - secondly at utilizing the country's agricultural potential without harming its resources.

New crops (propagation and selection) and better cultivars and the breeding of better animals resulted in a higher income and better crop and animal production. Research programmes, together with information services have therefore ensured that agricultural production increases faster than the population.
 - Training facilities and Improved agricultural education:
Agricultural high schools form the bases of introducing learners to agriculture. More schools in the country introduce agricultural subjects in their curriculum.
 - Agricultural publications:
All of these increase the farmer's and publics knowledge of agriculture.
 - Agricultural legislation:
Agricultural related acts aim to prevent the exploitation of our natural resources and promote save food production. Legislation is primarily aimed at the *scientific*

development of agricultural production in harmony with the natural resources. It is aimed at stabilizing the prices of agricultural products for the sake of a constant flow of agricultural products and to keep production costs low,

- The Soil Conservation Act provides for measures against soil erosion and for the conservation of the soil, vegetation and water supply.
 - The Marketing Act is concerned with the provision of marketing channels, trade and consumer prices of certain agricultural products, as well as levies on certain products.
- Development of markets:
Foreign and local markets increased. More people in a specific area result in the need of agricultural products. These products are available in markets and Small businesses for people to purchase.
 - Financial aid to farmers.
Financial aid is made available to farmers to help increase their production ability to meet the food demand.
 - Agricultural records.
Farmers must effectively utilize his soil, capital and labour for optimal production and he must then be able to take definite management decisions. If the farmer is better informed, he is more inclined to make better decisions. Available agricultural records, e.g. rainfall, average temperatures, individual details of animals, herd averages, etc. can contribute greatly to an increase in production.
 - Increased prosperity.
A general increase in the standard of living has led to:
 - A greater demand for food which leads to an increase in agricultural production.
 - A demand for 'luxuries' which are not essential for survival, i.e. wine, flowers, textiles, etc.

Module questions

1. Why is agriculture important in South Africa?
2. What does Agriculture as a “provider of raw materials” mean?
3. Name ten highlights in the agricultural development of South Africa.
4. Indicate how
 - (a) agricultural research
 - (b) legislation and
 - (c) industrial development has good effects on agricultural development in South Africa.
5. Explain how
 - (a) the discovery of minerals and
 - (b) the building of railwaysresulted in economic changes in South African agriculture.

MODULE 2

Agricultural factors of production and resources used in farming for sustainable agriculture:

Objectives:

The learners should understand the basic production factors and resource use in agriculture.

Upon completion you should be able to answer questions on

The factors of production and basic resources required for farming:

- Land (Natural resources)
- Capital (Financial resources)
- Labour (Human resources)
- Entrepreneurship
 - Describe entrepreneurship in the agricultural context:
 - Characteristics and competencies of an entrepreneur

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Keyword	Meaning
Grains	Crops like maize, wheat, barley are generally refed to as grains or grain crops
Input	Resources used to produce a product
Output	The product that's been produced through using the inputs
Commodities	Part of the planet that is north of the equator. It has about 80 percent of world's population and most of the world's land.
Arable	Land that can be cultivated (ploughed) to be planted
Resources	are materials, energy, services, staff, knowledge, or other assets that are transformed to produce benefit
Renewable	Can be reused
Non - renewable	Cannot be reused
Sustainable agriculture	Meeting society's food and textile present needs, without compromising the ability of future generations to meet their needs
Non-sustainable	Not taking care of our agricultural resources

Agriculture provides the world with food like meat, grains, vegetables, fruits and fiber for fabrics, wood for construction and paper. These commodities, as well as the agricultural methods used to produce them, may vary from one part of the world to another based on the resources available.

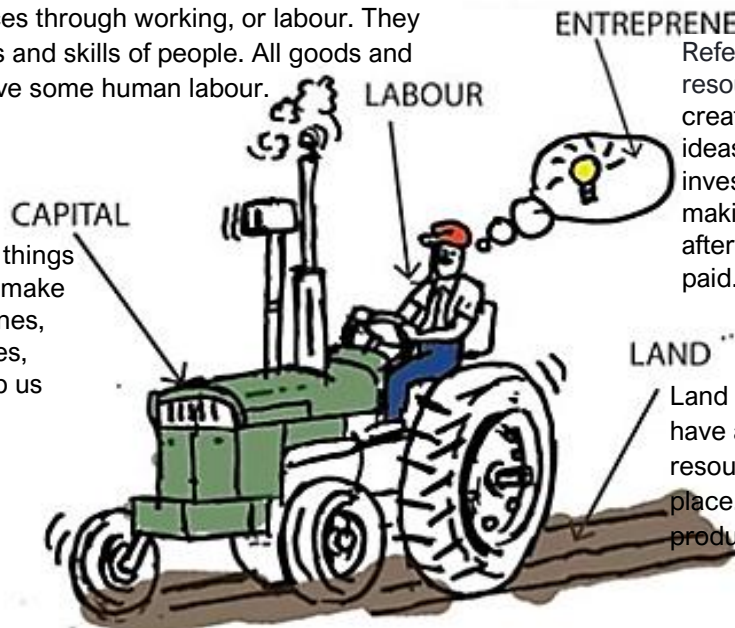
In order to produce these commodities, we use inputs. These inputs are contained in the factors of production. These inputs are thus needed to supply goods and services.

The factors of production are:

- Land
- Labour
- Capital
- Entrepreneurship

Labour involves using human resources. Human Resources describe the people who produce goods or provide services through working, or labour. They include talents and skills of people. All goods and services involve some human labour.

Capital refers to the things we need in order to make other things. Machines, tools, trucks, factories, roads. These all help us make other things.



ENTREPRENEURSHIP
Refers to the ability to put the other three resources together to create value. They create new businesses by applying new ideas to satisfy customer needs. They invest their own money in hopes of making a profit, or what remains (profit) after the costs of running the business are paid.

LAND
Land involves the natural resources we have as a country. Natural Resources are resources found in nature at a specific place. They are the starting point for producing goods.

Schematic representation of factors of production

Example: For producing wheat, a farmer uses inputs like soil, tractor, tools, seeds, manure, water, tractor driver, insecticides and his own services.

If these inputs (soil, tractor, seed, various tools) are classified into production factors it will be divided as follows

- Land (soil, water)
- Capital (tractor, tools, manure, insecticides)
- Labour (tractor driver)
- Entrepreneur (own services, spot the gap in the market)

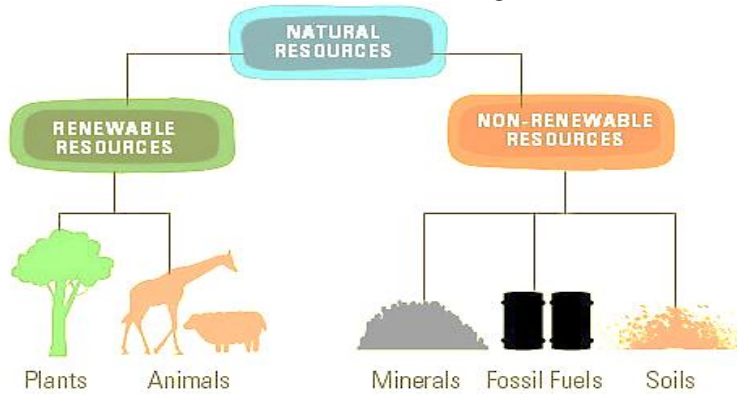


Watch the video on Factors of Production

But what is a resource?

A **resource** is a source or supply from which a benefit is produced and that has some utility. Resources can broadly be classified upon their availability and are classified into

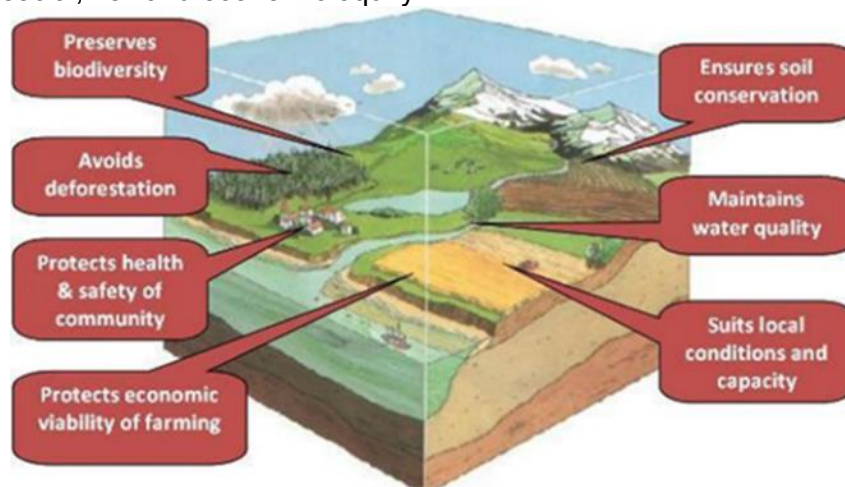
- renewable - resources are air, water, wind, solar energy, etc. They can also be classified as actual and potential based on level of development and use, based on origin they can also be classified as biotic (living) and abiotic (non-living),
- non-renewable resources are coal, crude oil, natural gas, soil, etc



An item becomes a resource with time and developing technology. Typically, resources are materials, energy, services, staff, knowledge, or other assets that are transformed to produce benefit and, in the process, may be consumed or made unavailable.

For South Africa to be self-sufficient in the production of food and fiber it is best that these resources that are used are taken care of by the people working and living on the land. Agricultural production should be both optimal and sustainable.

- **Optimal agricultural** production can only be obtained by farming with highly productive plants or animal cultivars or breeds using resources sustainably.
- **Sustainable agriculture** needs to meet society's food and textile needs in the present without compromising the ability of future generations to meet their own needs.
 - Sustainable agriculture seeks to integrate three main objectives:
 - a healthy environment, by conserving soil and water, so that the land can produce food or other crops for many generations.
 - economic profitability, and
 - social, risk and economic equity.

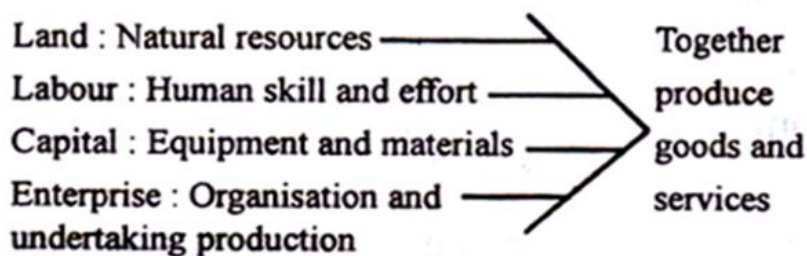


Diagrammatic representation of sustainable agriculture

- Unsustainable agriculture thus destroys the resources used in producing agricultural commodities.



Every person involved in the food system—growers, food processors, distributors, retailers, consumers, and waste managers—can play a role in ensuring a sustainable agricultural system.



Division of resources used in the production of goods and services

Each factor of production can thus be grouped into resources, these resources are then used as inputs to produce goods and services to satisfy the needs and wants of consumers. These resources can be categorised into natural resources (land), human resources (labour), manufactured and financial resources (capital) and personal resources (entrepreneurial).

- **Natural resources (Land).**

Influence of natural resources on agricultural production in South Africa

Southern Africa is a relatively poor agricultural country regarding its natural resources, mainly because of the following reasons:

- The quality of the soil types is relatively poor.
- Only about 12% of the total area is arable.
- The carrying capacity of the natural grazing is low by international standards.
- Climatic conditions and the rainfall are unreliable and variable.
- The extent and quality of agricultural production vary considerably from year to year.

Agricultural production is influenced by the following factors:

- soil - comprising the growth medium for the plant, the
- vegetation – composition and structure
- terrain - enabling the crop to be planted, to grow and to be harvested sustainably.
- climate conditions - which supply the plant (vegetation) with enough water and heat, the

The natural resources cannot change in an area, it is dictated by the location of the farm, but the growing conditions can be manipulated as we will discuss later in crop and animal production.

- **Human resources (Labour)**

Human resources are solely responsible for making use of natural resources and the transformation of its products to be used. The human is at the center of all work, and all development comes from the human mind. Man has become fully substitute and is being replaced by machines and technology to improve efficiency in the production process. But man is developing to handle these machines and technology.

Agriculture is a dominant economic activity in South Africa. The sector provides employment for 70% to 80% of the labour force in developing countries and between 40% and 50% in developed countries.

Human efforts done mentally or physically with the aim of earning income is known as labour. Thus, labour is a physical or mental effort of human being in the process of production. The compensation given to labourers in return for their productive work is called wages (or compensation of employees).

- **Manufactured and Financial resources (Capital)**

Capital in a farming business is important as the farmer needs it to purchase inputs. These inputs are then used to produce outputs. Capital is therefore not only regarded as money, but also includes the value of all the goods the farmer uses to make the production process easier and more effective.

Capital include Land, fixed improvements (buildings dams etc.), machinery, equipment, livestock, fertiliser, fuel, are all required in a farming business to produce a product. Financial capital is needed to invest in these assets in order to change them into products.

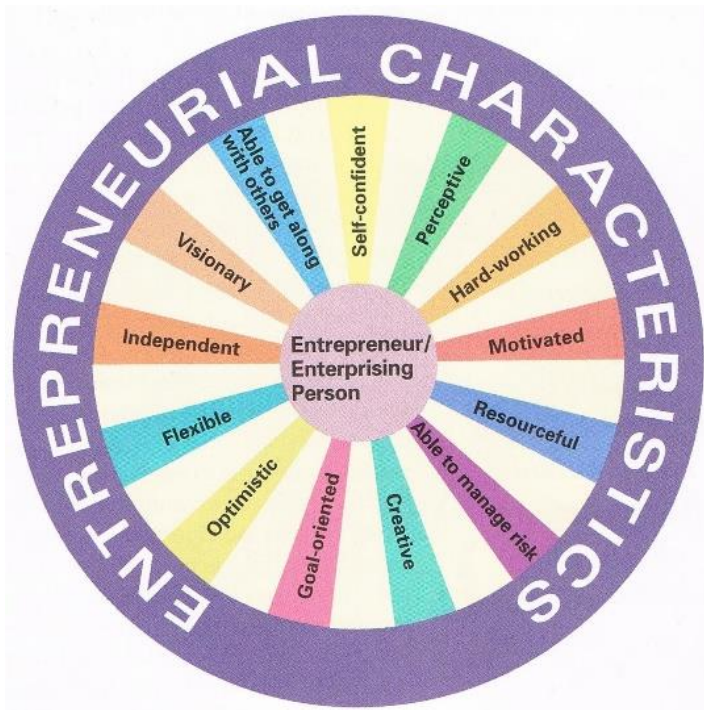
All man-made goods which are used for further production of wealth are included in capital. It is the produced means of production. An increase in the capital of an economy means an increase in the productive capacity of the economy. Logically and chronologically, capital is derived from land and labour.

- **Personal resources (Entrepreneur)**

An entrepreneur is a person who organises the above factors and undertakes the risks and uncertainties involved in the production. The entrepreneur is also the one with the big idea or vision, he uses/analyse these three factors, brings them together, organises and coordinates them so as to earn maximum profit. For example, Mr. X who takes the risk of producing a product will be called an entrepreneur. He is loosely identified with the owner, speculator, innovator or inventor and organiser of the business.

Thus, entrepreneurship is a trait or quality owned by the entrepreneur as defined by

his personal resources (education, time, talent and skills). The entrepreneur should also realise that he cannot do everything himself and know when to get the right people to help.



Activity – Identify an entrepreneur in your town and see how many of the qualities he does have

A farmer or entrepreneur must effectively utilize his resources (natural, financial, Human and personal) for optimal production and he/she must then be able to take definite management decisions.

For farmers to farm sustainable, information like

- climate (average temperatures and sunshine days, wind) and rainfall,
- soil tests and slope of land is needed in decision making
- individual details of animals, herd averages are needed, are obtained through record keeping (done later)

Through close observation and the availability of information obtained, the farmer can then made better informed decisions like

- the best methods to use for producing good yields,
- the best crops and livestock to use

while working and conserving the land.

Activity – Gather information about your environment and discuss it on how it can influence the production of commodities in your area. etc.

- Learners should use the four factors of production, identify resources of each in their immediate environment as connected to the local farming environment.

Possible module questions

1. Name and discuss the four factors of production.
2. Name the natural resource factors that influence agricultural production.
3. Why is the collection of information important in agricultural production, name three examples of information that could be used?
4. What is the main purpose the entrepreneur as a production factor?

MODULE 3

Conservation of Natural resources

Objectives:

The learners should explain and understand the importance of conservation of our natural resources.

Upon completion you should be able to answer questions on the conservation of our natural resources

- Soil
- Water
- Vegetation

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Keyword	Meaning
Conservation	Care and protection of the natural resources so that they can persist for future generations
Grazing	the vegetation or pastures that is available for livestock to feed upon
Generations	average period , generally considered to be about thirty years, during which children are born and grow up , become adults, and begin to have children of their own
Logging	il the process of cutting trees
Ecosystem	Large community of living organisms (plants, animals and microbes) in a particular area.
Urbanisation	Population shift from rural areas to urban areas ,
Urban	Means belonging to, or relating to, a town or city
No - till	an agricultural technique for growing crops or pasture without disturbing the soil through tillage . No-till farming decreases the amount of soil erosion tillage causes in certain soils, especially in sandy and dry soils on sloping terrain.
Deterioration	When something gets worse due to neglect or an unfortunate health problem, stuff starts to deteriorate — or fall apart.

Conservation is the care and protection of the natural resources so that they can persist for future generations. It includes maintaining diversity of species, genes, and ecosystems, as well as functions of the environment, such as nutrient cycling. Conservation seeks the sustainable use of natural resources by humans, for activities such as agriculture, hunting, logging, or mining.

Conservation is like preservation, both relate to the protection of nature, preservation simply means protecting nature from human use (eg. Game reserve like the Kruger national park – or any in their province).

Conservation of resources is important because we want to make sure we can keep those resources available for generations to come.

Environmentally, conservation is important, as resource extraction methods are harmful to the environment eg.

- Mining, forestry and agriculture destroy topsoil, releases toxins, and ruins ecosystems.
- Crop production and grazing, if done wrong, causes erosion, destroys animal habitat, and can also ruin ecosystems.

The better we can conserve the natural resources by reducing usage or recycling, the less we will ruin the earth's ecosystems.

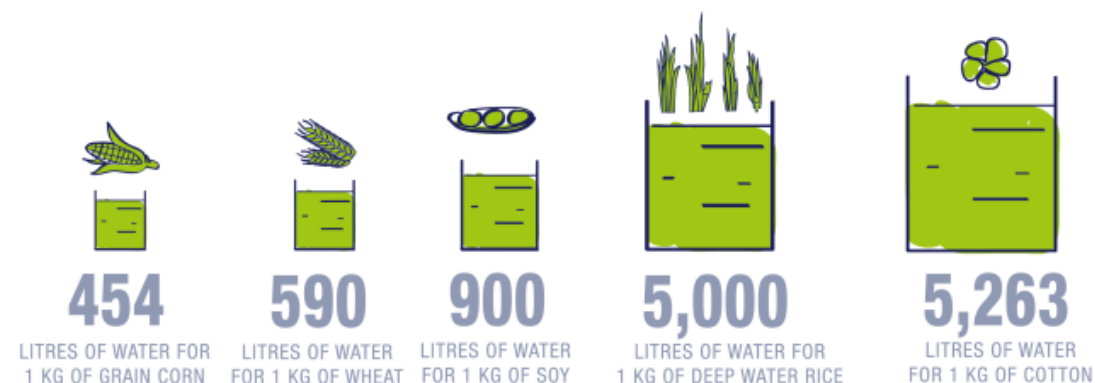
Economically, resource conservation is a great decision. It costs about 20x more (in energy costs for refinement and re-establishing costs) to stabilise an area not being looked after

Conservation of water

Only 1% of available water used by humans (compared to the global sum of all withdrawals) is for drinking, washing and cooking. An additional 10% is calculated for all other domestic uses (toilet flushing etc). Industry uses 19% and the rest, a massive 70%, is used by agriculture for irrigation, drawing water from rivers, lakes and underground water strata. In general, countries that are drier will use more water for agricultural purposes than countries with higher rainfalls. In Europe, for example, agriculture, industry and civil use account for 64%, 24% and 12% respectively of all use made

- Water conservation is the practice of using water efficiently to reduce unnecessary water usage. Water is the resource most used in agricultural production. Water conservation is important because fresh clean water is a limited resource, as well as a costly one. Conservation of this natural resource is critical for the environment.
- Farmers, the world's greatest users of water, recognize the need to conserve water, especially in the face of a rising population and climate change with prolonged droughts and extreme temperatures. Agriculture uses three times the amount of water it did 50 years ago, and by 2050 it will need a further 19 percent.

Farmers' efforts to conserve water are paying off: it only takes half the irrigated water to produce cotton today compared to 20 years ago. But efforts must be ongoing as plants need considerable amounts of water to grow. That's because they are composed of about 90 percent water, which is needed to maintain their structure and for photosynthesis to occur. For instance, nearly 454 liters of water are needed to grow one kilo of corn alone.



Quantities of water required by crops

Farmers today are conserving water in several ways, such as

- using herbicides and herbicide-tolerant biotech crops,

- application of water using the correct irrigation system,
- correct soil cultivation practices like, no-till farming so soil doesn't need to be turned over and can retain moisture. With no-till farming, farmers can increase soil moisture content by as much as 24 percent. Soil moisture is important since plants take in water through their roots.

The International Food Policy Research Institute (IFPRI) predicts that in 2050, no-till farming, coupled with irrigation, will increase global maize yields by 67 percent.

Water conservation not only helps farmers produce more food with less water, it can help them cut costs. On the other side, with water scarcity, food prices go UP.

Conservation of Soil

- Soil erosion is removal of soil due to movement of water and/or air. Soil erosion may lead to the significant loss of soil productivity and thus may lead to the desertification under severe conditions.
- Conservation of soil and water resources is important for sustainability of agriculture and environment. Soil and water resources are under pressure due to ever increasing population thereby ensuing growing demand for food, fiber and shelter.
- Soil and water resources are being deteriorated due to different human actions and natural factors. Soil erosion is one of the several major deteriorative processes which results in deterioration of the soil.
- Water and wind are the major agencies which are responsible of soil erosion. Causes like
 - deforestation,
 - over-grazing,
 - intensive cultivation,
 - mismanagement of cultivated soils and
 - intensive urbanization
 are major factors triggering the soil erosion.

The concept of soil conservation cannot be materialized without conserving and efficient use of water resources. It is therefore pre-requisite that soil conservation practices should be adopted. Soil conservation practice include

- soil management,
- crop management,
- surface engineering,
- and range land management.

For sustainable agriculture and environment, it is pertinent to protect the soil resources against erosion. Different control measures should be adopted to protect the soil resources against erosion.



Living soil: Watch video on the importance of soil in our daily lives. (1hour)

Conservation of natural vegetation

Forests and grasslands provide a natural habitat for many species of animals. Changes in climate and human activities led to the loss of forest and grass cover which is affecting the inhabiting animals. Several species of animals have become endangered or extinct due to the loss of their natural habitat and indiscriminate killing.

- Deforestation,
- Overgrazing,
- soil erosion,
- construction activities,
- forest fires, and
- landslides are the major factors that impact an area's natural cover.

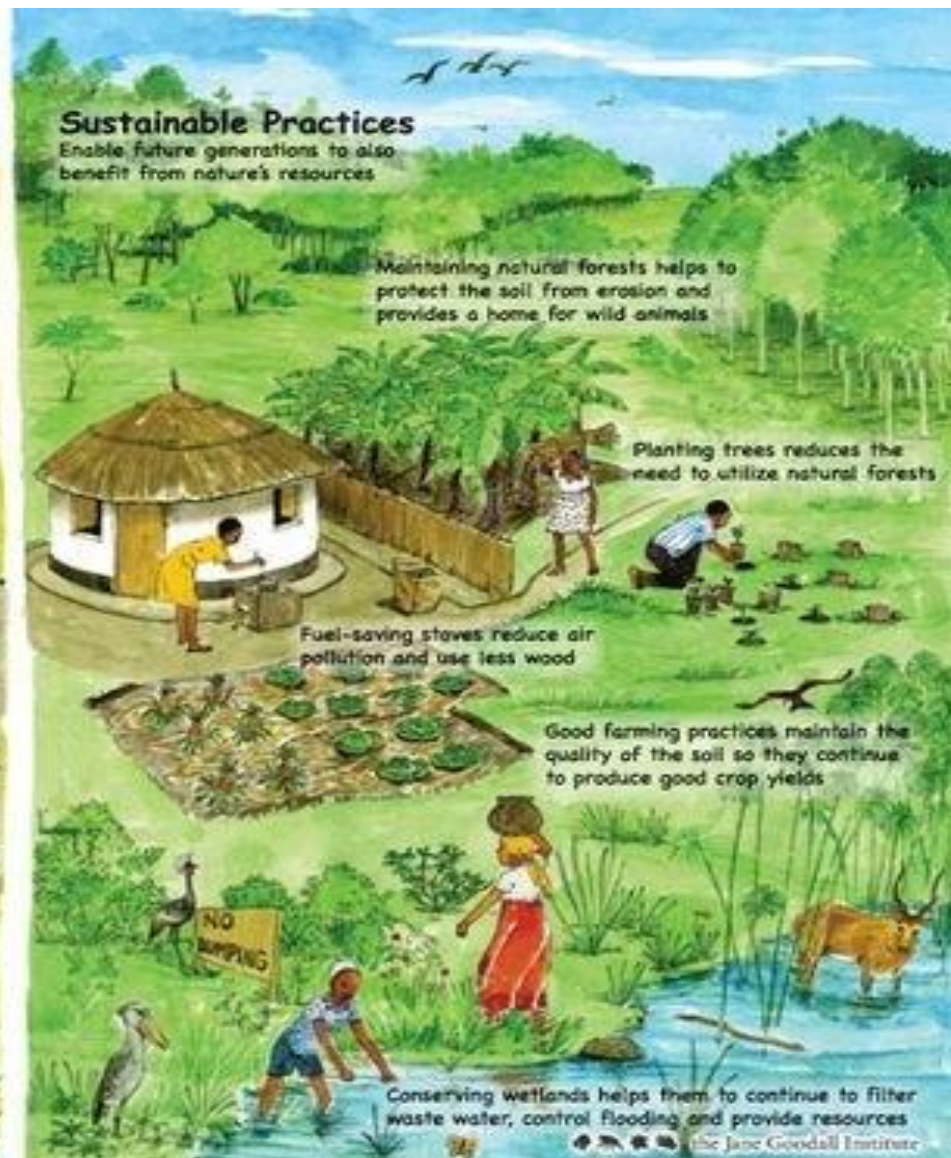
The best way to ensure conservation of our resources and the different species of animals is by educating people about how important animals and our resources are to our ecosystem.

Creation of national parks is another measure to protect our natural vegetation and wildlife. A national park is a natural area protected against human development and pollution having the aim of protecting and conserving specific ecosystems for the present and future generations.

Natural habitats like creeks, wetlands and lakes also need to be conserved to protect the natural resources and ecosystems in those areas for which adequate measures need to be implemented by the governments of various countries.

Module questions

1. What is soil erosion?
2. What are the causes of soil erosion?
3. What are the results of soil erosion?
4. How can we prevent soil erosion?
5. Why is agriculture so important to a country?
6. Why is it important to conserve soil?
7. Name three factors that have a detrimental (bad) effect on agricultural production.
8. Why must the veld coverage be maintained?
9. What can we do to conserve water?



Activity: Study the picture: identify the poor and good farming practices

WE CANNOT SURVIVE WITHOUT OUR ECOSYSTEMS

OUR ECOSYSTEMS PROVIDE ESSENTIAL NEEDS SUCH AS THE AIR WE BREATHE, FOOD, WATER AND ENERGY; THEY REGULATE SYSTEMS WE NEED TO SURVIVE INCLUDING CLIMATE, WATER AND NUTRIENT CYCLES; THEY SUSTAIN OUR ECONOMY, EDUCATION, CULTURE AND HERITAGE



CLIMATE

A stable climate provides a regular pattern of weather that allows humans, crops and animals to survive. Trees, plants and soil store carbon which helps maintain stability. Trees and plants also regulate temperature through creating shade and produce the oxygen we need to breathe!

WATER

In a healthy natural environment, trees and plants ensure we have water to drink, wash and grow crops with. Trees sustain rainfall by storing and releasing water vapour into the air; they prevent soil erosion, drought and floods through storing water in their roots, leaves and branches. They safeguard our lakes and rivers and the wildlife that depend on them - in turn supplying us with food water and income.

HEALTH

Ecosystems protect human health through providing clean water, food and medicine. Many animals play a role in pest control, disease reduction and recycling of nutrients. For example vultures eat carcasses, carnivores eat rats, beetles and insects recycle nutrients from dead plants and animals.

SHELTER

The natural environment provides resources to create shelter such as timber, stone and clay for building, grass and leaves for thatching.

ENERGY

The natural environment provides renewable sources of energy including solar, wind and hydroelectric power, as well as carbon-based sources that need to be sustainably managed such as wood, charcoal and gas.

INCOME

When the ecosystems are sustainably managed they provide income in many ways including from agriculture, honey production, crafts, tourism, energy production and fisheries.

CULTURE

Ecosystems are the root of human culture and identity, providing education from the natural world, sacred places to worship and believe, inspiration and recreation.

RESOURCES

In addition to essential needs, ecosystems provide a huge variety of resources that can support the economy and culture such as minerals and genetic material. Scientists are still discovering new species in the Southern Highlands, so there may be many more species to be found and resources to be sustainably used.

HEALTHY ECOSYSTEMS = HEALTHY PEOPLE!

By protecting the natural environment you are protecting your family, your food, your health and your wealth.

WE CANNOT SURVIVE WITHOUT OUR ECOSYSTEMS

HUMAN ACTIVITIES SUCH AS DEFORESTATION, UNCONTROLLED HUNTING AND BURNING CAN DAMAGE OUR ECOSYSTEMS. THIS HARMS HUMAN LIVES THROUGH REDUCED AGRICULTURAL YIELDS AND WATER SUPPLY, INCREASED ILL HEALTH AND THE NEGATIVE EFFECTS OF CLIMATE CHANGE.



CLIMATE

Trees and plants help maintain the water cycle and local weather patterns as well as storing carbon which protects us against climate change. Destroying vegetation reduces rainfall, decreases water catchment and increases temperatures through lack of shade.

FOOD

An ecosystem is made up of plants and animals, which provide and protect our food in many ways. If these species are removed, for example through deforestation, hunting and fire, then their services such as soil conservation, crop pollination and seed dispersal also decrease resulting in lower yields. Wild food resources such as food, fruits and honey will also decrease.

WATER

Trees and plants sustain rainfall by storing and releasing water vapour into the air. They also safeguard water supplies by storing it in their roots, leaves and branches. Removing trees and plants results in soil erosion, droughts, floods, sedimentation of streams and rivers as well as reducing the wildlife that live in them. This reduces food resources and income.

HEALTH

Ecosystems provide clean water, food and medicines and support many animals that help reduce disease and control pests. If ecosystems are damaged, hunger and ill health increase. Destroying habitat can also cause crop raiding and conflict with animals that have lost their food supply and homes.

SHELTER

The natural environment provides resources used for building such as wood, grass and clay. However, if these are not sustainably managed, they will be depleted for humans and wildlife alike.

ENERGY

Renewable sources of energy include solar, wind and hydroelectric power. Some carbon-based sources such as wood and charcoal can be sustainably used, whereas oil, coal and gas are non-renewable. Oil, gas and coal extraction can cause environmental damage and their use is the primary cause of climate change.

INCOME

If ecosystems are not managed sustainably, income from agriculture, crafts, tourism, forestry, fisheries and other sources will decrease and ultimately vanish.

CULTURE

Ecosystems are the root of human culture, beliefs and identity. If the natural environment is damaged, culture and tradition risk being lost along with sources of inspiration and recreation.

RESOURCES

Ecosystems provide many resources such as minerals, food, medicines, minerals and genetic material. If these are wisely used they can support livelihoods, health and culture. We are still discovering new species and resources in the Southern Highlands which would be lost if the natural environment is destroyed.

UNHEALTHY ECOSYSTEMS = UNHEALTHY PEOPLE!

By protecting the natural environment you are protecting your family, your food, your health and your wealth.

MODULE 4

Farming Systems

Objectives:

Learner should be able to explain and understand the farming systems found in South Africa

Upon completion you should be able to define, identify and answer questions on the farming systems used in South Africa.

- Define the following farming systems:
 - Commercial (industrial) farming
 - Subsistence farming

Keywords/terms and concepts – not all words or terminology is listed in the table, some words should be highlighted by the educator. Educators can develop word searches, crossword puzzles and matching Colom a and b to strengthen terms and terminology. (See <https://worksheets.theteacherscorner.net/>)

Keyword	Meaning
Commercial	Commercial means involving or relating to the buying and selling of goods usually for profit
Domestic	Locally produced or tamed animal

Agricultural production is structured around the grouping of individual farming systems that have the following characteristics:

- have similar resource bases
- consist of similar business patterns
- experience similar domestic livelihoods and limitations
- could utilise similar development strategies and interventions

Based on the above characteristics two distinct agricultural systems are found in South Africa:

- Commercial agriculture or industrialized agriculture
 - Commercial farmers sell their crops and animals in order to make a profit.
 - commercial agriculture sector followed a capital-intensive trajectory
 - using latest technology available
- Subsistence agriculture
 - Subsistence farmers only produce enough food for local consumption. There is little, if any surplus left to sell.
 - farmers having small and scattered land areas, most farmers practicing this method are poorer and seldom use
 1. synthetic fertilizer
 2. High-yield seed varieties
 - In this system, work is done manually following traditional processes.

The two systems produce similar crops and livestock, they differ markedly in the scale of operation, method of production and market orientation.

Commercial and subsistence smallholder farming can be made more productive and sustainable by, among other measures:

- Stabilising pricing
- providing better product markets
- improving access to financial services and reducing risks.
- enhancing the performance of producer organisations; and

- promoting innovation through science and technology.



Watch video about farming systems

Activity: Collate a collage of farming systems used in South Africa

Module questions.

1. Name the two farming systems found in South Africa.
2. Draw a table and compare these two farming systems regarding profitability and the use of resources.

Farm planning (The homestead)

Objective

The learners should be able to explain and understand the essential principles in planning the farm layout and essential buildings on the farmyard for optimal production.

Upon completing this you should be able to answer questions on:

- Farmyard layout and essential farm buildings
 - housing and ablution, stables, milking parlour, shed (vehicles, implement, shearing etc.), workshop, tool storeroom, chemical storeroom, fowl-runs pigsties

Keywords/terms and concepts – not all words or terminology is listed in the table, some words should be highlighted by the educator. Educators can develop word searches, crossword puzzles and matching Colom a and b to strengthen terms and terminology. (See <https://worksheets.theteacherscorner.net/>)

Key terms and concepts	Meaning
Homestead	homestead is a house and surrounding land owned by a family
Slope	a surface that lies at an angle to the horizontal so that some points on it are higher than others:
North-slope	Direction the slope faces
Making a profit	profit is money you make , as opposed to money you lose. ... Businesses need to make a profit — money — or they'll have to fire employees, cut expenses, and maybe go out of business entirely.
Farm buildings	Farm building , any of the structures used in farming operations, which may include buildings to house families and workers, as well as livestock, machinery, and crops.
Soil utilisation	The use of soil for building, production of crops etc.
Pasturage	Vegetation used by animals as grazing
Vineyards	a plantation of grapevines, typically producing grapes used in winemaking and table grape production
Beef cattle	Farm animals(cattle) used to produce beef
Dairy cattle	Farm animals (cattle) used to produce milk
Irrigation	Artificial supply of water to land or crops to help growth and production.
Daily diet requirements	the estimated amount of a nutrients (or calories) per day considered necessary for the maintenance of good health
Horticulture	The cultivation, processing, and sale of fruits, nuts, vegetables, and ornamental plants
Stock farming	Stock farming is the practice of keeping a livestock farm.
Hectare (1 hectare	Area comprises of 100m x 100m

Now that we have done farming systems and you decided which system you will follow; you can now plan your homestead and layout of buildings.

The homestead

The homestead consists of the farmhouse, gardens and the farm buildings. It is very important because it is the home of the farmer and is the center from which he runs the farm.

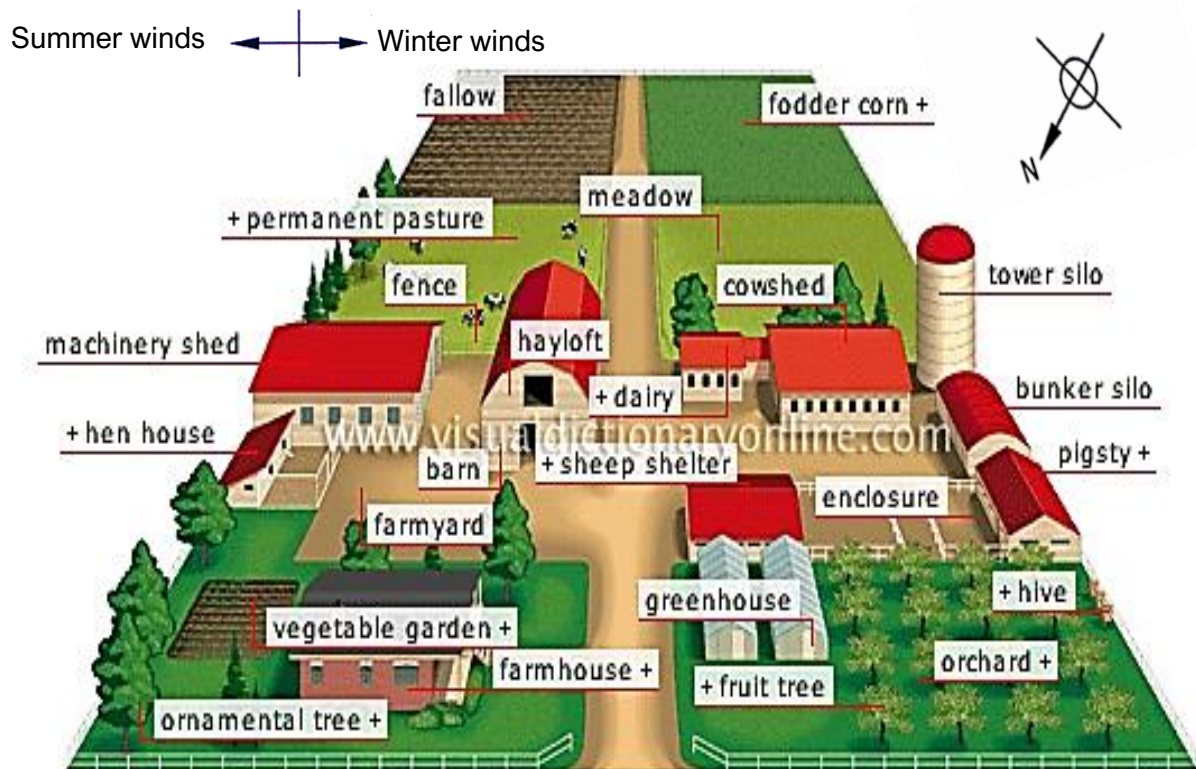
- Choice of a suitable position
The homestead must be situated in a position from where it is easy to reach and to control every part of the farm.
It should, if possible, be near a public road. This makes the transport of farm products to the market much easier. It is then also easier for the people living on the farm to travel to the nearest village or town with its churches, schools, shops and opportunities for meeting other people.
The homestead must be close to a good source of water. There must be sufficient water to supply the needs of the people, animals, gardens and orchards on the farm.
- The farmhouse
To simplify supervision and management, the farmhouse should be near the other buildings on the farm.
The site of the farmhouse and of all the farm buildings should be well drained. If possible, a north-eastern slope should be chosen. This ensure the maximum amount of sunlight and warmth in winter, and cooler conditions in summer.
The farmhouse should be planned so that the farmer and his family can live in comfort. It should also be a place where visitors can be entertained in attractive and pleasant surroundings.
- Essential farm buildings
These should be planned carefully to avoid unnecessary waste of time, work and money.

The following points should be kept in mind when:

- The site for the buildings should be a suitable distance from the farmhouse.
- A good and economical supply of water must be available.
- Roads in this working area must be wide and strong enough to carry heavy trucks.
- The units nearest to the farmhouse should consist of the office, storeroom, tool room, workshop and the sheds for vehicles and farming implements, vegetable garden, fruit trees and chicken coop.
- Sheds, barns, toolrooms and workshops should be within easy reach of each other.

- Certain groups of buildings form separate units:
 - milksheds, feed sheds, haybarns, milking rooms and washrooms for cattle belong together.
 - pigsties, dips, loading ramps and feed sheds for pigs should be grouped together.
 - poultry sheds, hatching chambers, hatcheries and chicken slaughtering places form a unit.
 - The units for pigs, and horses should preferably be far enough away from the farmhouse and milking area to avoid having flies and unpleasant smells in and around the farmhouse.

Basic farmyard layout.

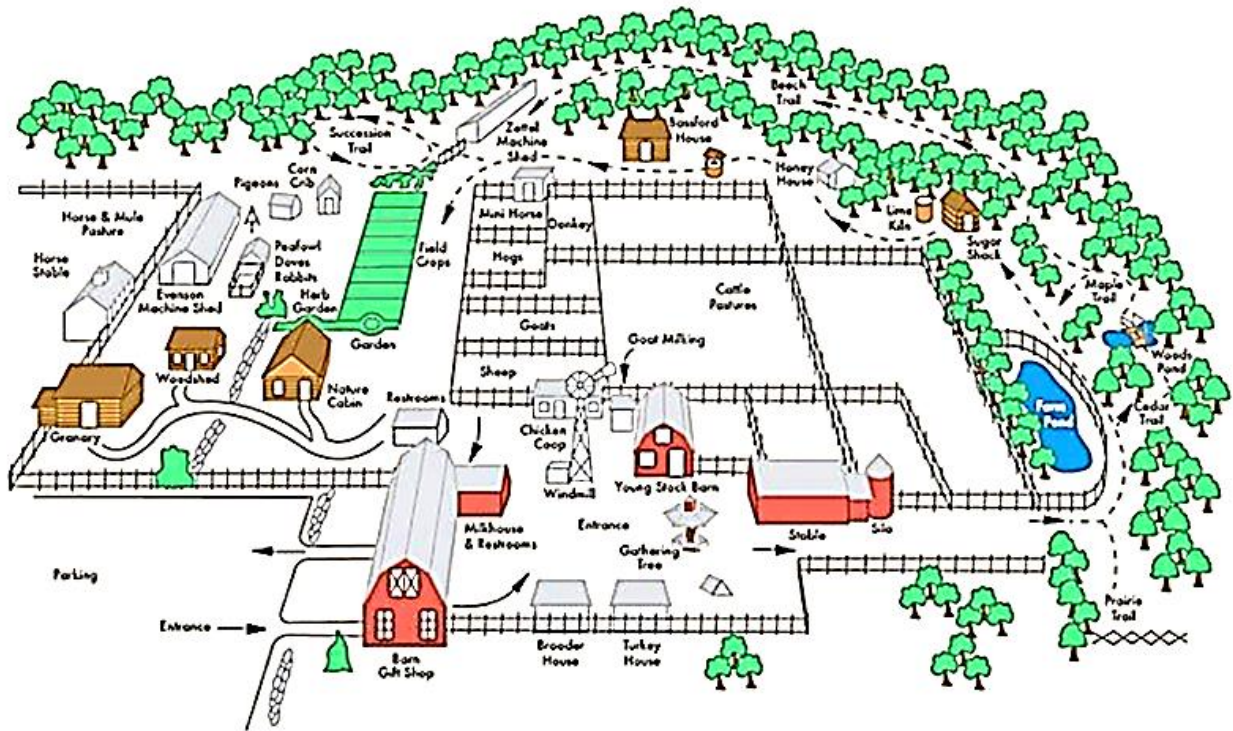


Module questions

1. Describe the factors to be taken into consideration when choosing a suitable setting for building a farmhouse.
2. Describe the ideal arrangement of different farm buildings on a farm.
3. Briefly explain what each of the farm buildings in the diagram above are used for:
 - 3.1. Machinery shed.
 - 3.2. Pigsty
 - 3.3. Silo's
4. Why should the following building not be close to the farmhouse
 - 4.1. Pigsty and cowshed

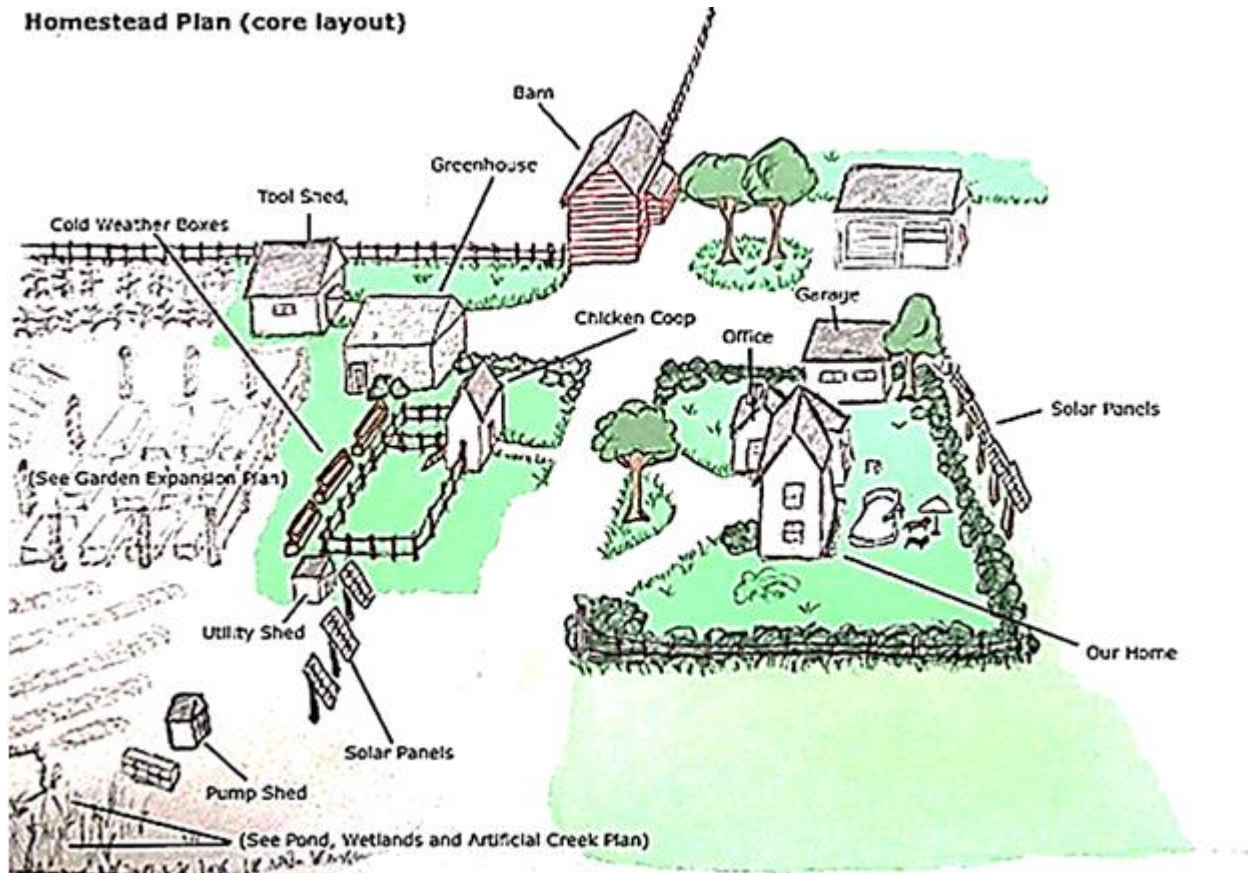
Complete the following activity: Compare the following diagrams regarding their layout.

A



B

Homestead Plan (core layout)



Which of these two layouts represent a commercial farming system and which one a subsistence farming system? Provide reasons for your answer by indicating the differences.

CHAPTER 2:

Safety on the farm and workshop and communication

MODULE 1

Importance of safety

Objective

The learners should be able to understand the importance of safety on the farm.

- Apply the OHS guidelines in the farm and workshop.

Upon completing this you should be able to answer questions on:

- Communication regarding safety and safe practices
- Personal safety equipment on the farm and in the workshop
- **General safety regulations on the farm and in the workshop**

Keywords/terms and concepts – not all words or terminology is listed in the table, some words should be highlighted by the educator. Educators can develop word searches, crossword puzzles and matching Colom a and b to strengthen terms and terminology. (See <https://worksheets.theteacherscorner.net/>)

Safety on the farm and in the workshop

Occupational Health and safety act

Introduction to the OHS Act.

In South Africa, the Occupational Health and Safety Act (the OHS Act) provides regulations for the following:

- The health and safety of all the people in the workplace.
- The activities of people at work.

The OHS Act applies to all employers and workers. Everyone using or entering areas where work is done must know about the dangers and hazards in the area.

According to the Act, all incidents and accidents must be reported to the authorities if the incident or accident related to work done in the workplace, farm or workshop where one of the following happened:

- A dangerous substance was spilled.
- A substance under pressure was released in an uncontrolled manner.
- Machinery not working right, or break caused objects to fly, fall or move in an uncontrolled way.
- Machinery ran out of control.

















- **Communication in the workshop and on the farm**




















Signages used as communication

Because a workshop is usually loud and verbal communication is minimum, symbols are used. These symbols are represented by different colors and shapes, See poster on next page.

Safety signs in the workshop or farm are used to communicate the expected danger or action. Employers must make sure that all warning signs and signage is visible for workers to see. Workers should adhere to these signs to promote safe practices.

Every workshop should display safety rules, be specifically careful around electrical tools and sharp tools in the workplace.

	MEANING	SHAPE & COLOUR	SYMBOLS are put inside the safety shape. These are used in all EEC Countries		
PROHIBITION	You must not. Do not do. Stop.	 RED means STOP	 No admittance	 No smoking	 No dirty clothes
MANDATORY	You must do. Carry out the action given by the sign.	 BLUE means OBEY	 Keep clear	 Head protection must be worn	 Wear gloves
WARNING	Caution. Risk of danger. Hazard ahead.	 YELLOW means risk of DANGER	 Danger high voltage	 Danger mind your head	 Danger fork lifts in operation
SAFE CONDITION	The safe way. Where to go in an emergency	 GREEN means GO	 First aid station	 Emergency phone	 Emergency exit

<p>MULTI-PURPOSE SIGNS To be used when the hazard requires more than one of the 4 types to convey the safety message.</p>	   
<p>SUPPLEMENTARY TEXT If the safety sign needs additional information it may be added in words.</p>	   
<p>FIRE EQUIPMENT SIGNS For indicating the location of fire fighting equipment and how they should be used.</p>	   
<p>WORKS TRAFFIC SIGNS Are the same design as public road signs.</p>	      <div style="border: 1px solid black; padding: 5px; display: inline-block;"> <p>DANGER IDENTIFICATION MARKING</p>  </div>

Explanation of signs and color codes used on safety signs in the workshop

Verbal communication

On a farm, workers are sometimes apart or not within eyesight of each other. Verbal communication is the required for workers to contact one another through.

- Two-way radio – normally fix with-in a vehicle using the vehicles power to operate, have a large operating range.



- Walkie talky - use smaller rechargeable batteries can be carried around on a person does not have a large operating range.



These type of communication does only incur a once of cost during purchase.

Workshop practices and regulations

- Elements of workshop and farm safety
 - Dress for safety
 - Be familiar with safety rules
 - Handle materials carefully
 - Handle tools properly
 - Practice good house keeping
 - Exercise caution when using hazardous materials








Safety in the workshop




- You can only start working with tools and equipment if you've been trained to work with that specific tool.
- The OHS Act states that protective equipment and other safety measures related to the workplace and machinery, must be used as required.

Personal Safety equipment and clothing (Personal protective equipment (PPE))

Safety equipment and PPE protects people against hazards and dangerous situations. Different equipment and PPE are used for different tasks and in different areas.

Workers must also have the correct PPE. The employer must tell the workers about all potential hazards and they must also try to identify hazards themselves.

Body part protection needed, and equipment used	
<p>Body</p>  <p>Overall</p>	<p>Flame retarded overall is used where acids, steam or other hazardous chemicals are found. Standard body protection has long sleeves that should not be shortened.</p> <p>When working with close to equipment that is rotating, loose clothes should be removed to limit the danger of clothing being caught while equipment is in operation. Failure to do so can cause serious injuries.</p>
<p>Eyes</p>  <p>Safety glasses</p>	<p>When something could get into someone's eyes, like dust, acid or gases. Safety glasses or goggles are normally made from a strong plastic material that is resistant to a range of fluids. Any contact of these types of substances with your goggles, remove them and wash your face and goggles.</p>
<p>Ears</p>  <p>Earmuffs</p>	<p>Used in noisy areas (85 decibels (dB) or higher). You should use ear protection whenever noises are higher than normal. Earmuffs and earplugs must be kept in a clean condition to prevent ear infections and replaced when they are damaged. Never lend your ear protection to someone else</p>
<p>Head</p>  <p>Hardhat / Helmet</p>	<p>Where objects could fall and land on someone's head you should wear a hardhat/helmet. It also protects against liquids like water, acids and rain. These were originally made from metal, but now are made from a rigid plastic or polyethylene. Hard hats must be kept in a good condition. A hard hat with holes, cracks or other damage must be replaced.</p>
<p>Feet</p>  <p>Gumboots / Steelpoint boots</p>	<p>Protects feet from falling equipment, workpieces and tools. Examples of foot protection are safety boots or shoes with steel toe caps, and gumboots when working in rain, or muddy areas where normal shoes would not be suitable. Boots and shoes must be kept clean from any oil, mud and other materials that can cause damage over a long period.</p>

<p>Hands</p>  <p>Gloves</p>	<p>When hands could be exposed to rough areas, acids, sharp objects, electrical dangers and heat. Examples of this are leather gloves and rubber gloves. Different types of hand protection are used in different situations. For example, rubber gloves are used when working with chemicals.</p>
<p>Lungs</p>  <p>Full face mask / Mask</p>	<p>Wearing a mask at work is no luxury, definitely not when coming into contact with hazardous materials. Dust masks offer protection against fine dust and other dangerous particles. If the materials are truly toxic, use a full-face mask. This adheres tightly to the face, to protect the nose and mouth against harmful pollution.</p>
<p>Falling</p>  <p>Harness</p>	<p>When working at heights of 1,5 m or higher. Examples of fall protection are harnesses, safety belts and ropes. Safety harnesses must be taken care of by cleaning them after use, preventing any twists or knots in the material and replacing damaged shackles.</p>

- **General safety regulations.**

The OHS Act also covers general safety regulations, which specify the following:

- It is everyone's responsibility to determine if there are risks related to the equipment or machinery they use.
- A person using equipment or machinery must take the proper steps to prevent injuries and damage to equipment.
- Safety guards and equipment must be installed on all rotating or moving equipment, which must be kept in good condition.
 - If safety guards cannot be fitted, then other safety measures must be put in place.
- The required safety equipment for the conditions should be available

This can include:

 - Personal protective equipment.
 - Fall protection.
 - Safety signs, barriers, lock-out devices
 - Ointments, respirators, breathing apparatuses, masks, and air lines.
 - Proper insulating material on the floor.
- No one can remove any safety device, guard, barrier, lock-out device or any piece of equipment unless it is causing a safety risk or if it needs to be removed for maintenance.
- Employees must be given correct instructions about all the limitations and use of safety equipment.
- Work will not be allowed unless all the required safety equipment is issued and used.

Special safety equipment:

Certain working environments have hazards that need special equipment.

Situation	Equipment	Reason
Welding	Welding helmet	Protect your eyes from harmful rays
	Leather apron leather gloves, leather boot protectors	Protect your body and clothing from spatter
Electricity	Flame resistant clothing and overalls	Protect your body from fire caused by electric sparks
Confined spaces	Breathing apparatus or air mask	Help you breathe if there is not enough oxygen
Dark areas	High visibility clothing and reflective clothing	Help others to see you in the dark
	Adequate lighting	Help others to see you in the dark and allow you see the work you are doing
Gas areas	Breathing apparatus or air mask	Help you breathe if there is not enough oxygen
	Gas testing device	Test for dangerous, explosive gases

Signs that indicate unsafe working practices in the workshop



Signs that show the prevention of back injuries in the workshop.



PREVENT BACK INJURY SIGNS

WT



#207435137



Activity: Educator can use the signs above and ask learners to identify them, its purpose.

Module question

1. What does PPE stand for?
2. List and discuss 6 PPE necessary for every worker. Also provide an example when it is important to wear this protection.
3. Name the color and discuss the meaning there of in the usage of signs.
4. Name and discuss two types of communication used on the farm.
5. Name 7 general safety regulations that is specified or covered by The OHS Act.

CHAPTER 3 Tools and equipment

Module 1 Farm implements

Objective

Learners should be able to explain and understand the purpose soil cultivation and the function of the farm implements used

- Primary cultivation
 - Ripper
 - Plough
- Secondary cultivation
 - Seed drill/planter, cultivator

Upon completing this you should be able to answer questions on:

- the various implements used in primary and secondary cultivation of soil.

Keywords/terms and concepts – not all words or terminology is listed in the table, some words should be highlighted by the educator. Educators can develop word searches, crossword puzzles and matching Colom a and b to strengthen terms and terminology. (See <https://worksheets.theteacherscorner.net/>)

Key terms and concepts	Meaning
No-till	Planting a crop in the field without any pre cultivation.

Primary cultivation implements

Primary cultivation is when the soil is been loosened and aerated before planting can take place. It entails deep penetration of the soil up to a depth of 15cm to 75cm. Heavy heavy machinery is used, and it is usually the first step in the cultivation process. It breaks the soil deep down to allow for plants roots to enter deeper into the soil.

The following implements are used in the primary cultivation process

Implement	Use
Rippers	Rippers are used where deep cultivation is needed. When fields are cultivated to the same depth for several years, a 'plough sole' develops. This limiting layer inhibits effective water infiltration and root development. To establish better drainage, conservation and utilisation, it is important that the layer is regularly broken up.



Watch deep ripping of fields

Mouldboard plough



This implement is used to turn sods/soil up to 300 mm deep and is especially suitable for heavier soils with a lot of structure. A further advantage of the turning of the soil is that weeds' seed and unwanted crop residue can be deeply buried.



Watch video on
ploughing fields

Disc ploughs



The disc plough has a cutting action and its main advantage is that it penetrates better under hard, dry conditions with the added benefit that its wear and tear is less than a with a mouldboard plough. This implement is more efficient in fields with lots of plant residue and less clogging occurs. This implement is suitable for heavier and harder soils where structural loss is not so critical but is not recommended on sandy soils.

Chisel ploughs

Chisel ploughs are mainly used to turn soil to a depth of 250 mm. This plough is therefore more suitable for soils where a loose structured topsoil is desired to improve infiltration and reduce erosion. Under dry conditions, big sods are broken loose, which inhibit plant development.



Secondary cultivation implements and planting

Secondary cultivation is done to make clods smaller, level and firm the top layer 5cm to 15cm of the soil.

The main objectives of this operation are to prepare the seedbed, manage crop residue, incorporate fertilisers and agro-chemicals, control weeds, de-compact soil layers, increase water infiltration and level the soil surface.

The main machines used during this operation are disk harrows, cultivators and rotary tillers. However, for small-scale farmers, jembes(hoe) and rakes work.

Rotavators



Under the right conditions, this is a beneficial implement that can prepare a seedbed in one step, especially in damp clay soils.

On dry, sandy soils it destroys the structure in a very short time span. In many cases, rotating rotavators are used for weed control, but is only effective on weeds with shallow root systems. Rotavators leaves a fine, bare surface behind that is easily eroded by wind.



Video on rotavator building beds to plant in

Harrows

Tine harrows consist of a variety of hoeing

Tine harrows



implements that are mainly used for the control of young weeds, but they are also used as surface crust crushers.

Cultivation depth is rarely more than 100 mm. The implements are only effective on moist soil. On dry, clay soil it is completely ineffective because the teeth cannot penetrate the soil. They are often used for seedbed preparation.

Tooth Harrows



Harrows also consist of a variety of implements. The toothed harrow is mainly used to level a seedbed and is only effective if the seedbed is already finely pounded.



Watch video of choosing the correct harrow to use

Off Set disc harrow



Used to incorporate organic matter into the top layer of a cultivated field. It is also used to chop up unwanted weeds or crop remainders.

Planters or seed drills



Planters are implements used for the distribution of seed, 38fertilizer, etc. To produce a product (crop). This includes conventional planters and non-till planters. Planters planting small seeds in narrow rows are referred to as seed a seed-drill.



Watch planting using a no-till planter

Soil cultivators



Cultivator, [farm implement](#) or [machine](#) designed to stir the soil around a [crop](#) to break the soil crust and allow water infiltration, promote growth and destroy weeds.



Watch video of cultivator working in field of planted crops

Activity: While fields are being cultivated measure the cultivated depth of the implement. Determine whether it is a primary or secondary implement used.

Module questions

1. Name three important agricultural implements that you would normally find on a farm. Give reasons for your answer.
2. What type of plough is usually drawn by animals?
3. Write down three uses for cultivators.
4. What is the planter called that is used to plant fine seeds in narrow rows?
5. What else, apart from seeds, can a planter add to the soil?
6. What type of cultivator is most commonly used?

MODULE 2

Workshop hand tools

Objective:

Learners should be able to explain and understand the purpose or function of hand tools (as listed in section)

- Identification, use and maintenance
- Select the appropriate tool for use in a specific task


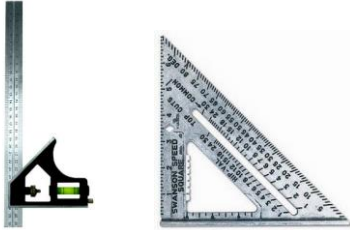


Upon completing this you should be able to answer questions on:





- the various tools in the workshop and their uses

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The farm workshop is an extension of the production process as it need to do small repairs and build needed structures on the farm. To do that various tools are required There's an adage that says: "anything worth doing is worth doing right." This means that to do the job right we need the correct tool. (doing the job right requires the right set of tools)

The tools in your workshop will depend on your areas of specialty, interests and level of experience. Following is a list of some the more essential hand-tools that should be found in any basic workshop.

<p>Measuring Tools</p> 	<p>Measuring tapes come in a variety of lengths such as 3, 5 and 8-10 meters. Remember that the longer the tape, the heavier it will be.</p> <p>A 30 m tape is a good choice for a serious builder or craftsman. Tape measures are marked in mm and centimeters, which simplifies measurement and calculation of exact measurements.</p>
<p>A speed square.</p> 	<p>Used for measuring and marking angles in construction. It is constructed with a lipped straight edge making it easy to mark 45-degree and 90-degree angles, and it has designations for some of the more commonly used measurements and angles. A speed square is an absolute necessity for serious building and construction</p>
<p>Levels</p> 	<p>Come in a variety of sizes, lengths and styles -- including high-tech levels that use a laser beam. The basic level uses a straight edge and liquid-filled containers that contain a bubble. The bubble is lined up between markings on the liquid-filled tubes to determine when a surface or line is level.</p>
<p>Hammers</p> 	<p>Hammers come in a variety of styles for varying uses and are available in different weights depending on how they'll be used.</p> <p>Commonly used hammers include tack hammers and standard nailing hammers.</p> <p>Dead-blow hammers are used in woodworking, and don't bounce when struck against a material.</p> <p>Rubber and wood mallets are also useful, particularly for woodworking to make fit adjustments without marring the surface of the wood.</p>

<p>Drills</p> 	<p>The cordless drill is a timesaving, versatile and frequently used tools found in nearly every workshop. Not only is it used for drilling holes in wood, masonry, drywall or other materials using a variety of bits, it can also be outfitted with a number of adapters such as screwdriver attachments, hole saws and steel-brush paint removers.</p> <p>Corded drills have the disadvantage of the cord that limits your movement, but they are available in strengths and torque greater than their cordless counterparts.</p>
<p>Screwdrivers</p>  <p style="text-align: center;">Screwdriver tips</p>	<p>Every workshop -- or toolbox for that matter - needs to have both Phillips head and flat-head (slotted) screwdrivers. Each of these types comes in a variety of sizes. There are other types of screwdrivers, as well -- such as hex and torx head -- for more specialized uses. Phillips is the most common.</p>
<p>A nut driver</p> 	<p>Works just like a screwdriver but has a socket at the end for tightening and removing nuts as with a socket wrench.</p>
<p>Six-in-one tool (multi tool)</p> 	<p>A is a handy household tool that's essentially a screwdriver with six interchangeable attachments -- small and large Phillips head, small and large flat-head and two sizes of nut-drivers.</p>
<p>Wrenches</p>	<p>An adjustable wrench is useful around the house as well as for working in the shop or on automobiles.</p>



The open end of the wrench adjusts by rotating a threaded adjuster, and the wrenches themselves are available in a wide variety of overall sizes.

Open-end wrenches are available in incremental sizes (metric and standard) and are open at both ends.

Box wrenches are available in the same size increments and are closed at both ends.

Pipe wrench

Wood Chisels



Cement Chisels



A **chisel** is a [tool](#) with a characteristically shaped cutting edge (such that wood chisels have lent part of their name to a particular [grind](#)) of [blade](#) on its end, for carving or cutting a hard material such as [wood](#), [stone](#), or [metal](#) by hand, struck with a mallet, or mechanical power.^[1] The handle and blade of some types of chisel are made of metal or of wood with a sharp edge in it.

Chiselling use involves forcing the blade into some material to cut it. The driving force may be applied by pushing by hand, or by using a [mallet](#) or [hammer](#)

Cutting Tools

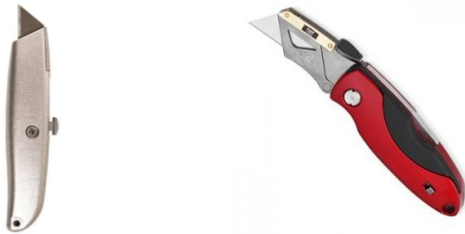


Hand-cutting tools are used for cutting sheet metal and other materials. These include:

- Tin snips
- Left-cutting aviation snips
- Right-cutting aviation snips
- Straight-cutting aviation snips
- Scissors or heavy-duty shears



Utility knife



The utility knife is an amazing multipurpose tool with countless uses. Its retractable blade and lightweight design allows it to be safely carried in pockets or toolboxes.

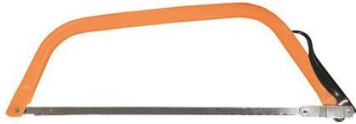
Aside from cutting boxes or tape, there are a number of other uses you may not be aware of.

Wood plane

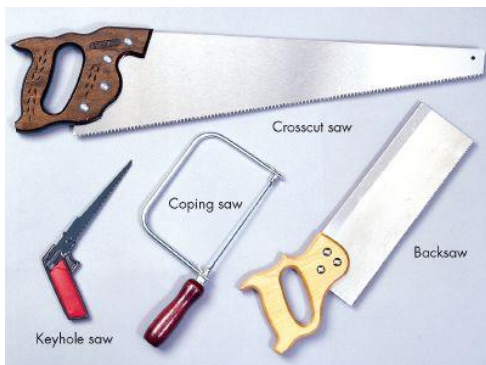


A hand **plane** is a tool for shaping **wood**, using muscle power to force the cutting blade over the **wood** surface

Saws



Bowsaw used for wood cutting



A **saw** is a tool consisting of a tough blade, wire, or chain with a hard toothed edge.

It is used to cut through material, very often wood though sometimes metal or stone.

The cut is made by placing the toothed edge against the material and moving it forcefully forth and less forcefully back or continuously forward.

Hand-saws

Large and small cross-cut saw - Wood

Coping saw – Small delicate cuts in wood

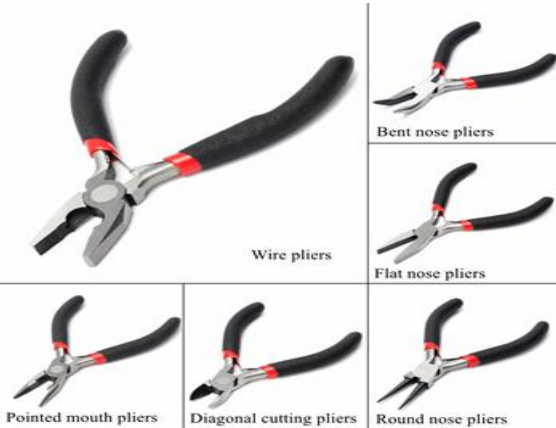


Keyhole saw – cutting key holes or shapes inside a piece of wood.

Bowsaw – cutting trees

Hacksaw – used for cutting metal



Hacksaw use for metal

<p>Pliers</p> 	<p>Pliers are a hand tool used to hold objects firmly, possibly developed from tongs used to handle hot metal in Bronze Age Europe.^[1]</p> <p>They are also useful for bending and compressing a wide range of materials.</p> <p>Generally, pliers consist of a pair of metal first-class levers joined at a fulcrum positioned closer to one end of the levers, creating short jaws on one side of the fulcrum, and longer handles on the other side.</p>
<p>Sanding blocks</p> 	<p>A sanding block is a block used to hold sandpaper. In its simplest form, it is a block of wood or cork with one smooth flat side.</p> <p>The user wraps the sandpaper around the block, and holds it in place (by inserting a fitted piece of cardboard under the sandpaper, one can soften the impact on the wood and protect against tears or uneven wear on the sandpaper). Sanding blocks are helpful because they prevent the "waves" created by plain sandpaper.</p> <p>Used for sanding down wood / preparing wood for final finishing.</p>
<p>Files and rasps</p> 	<p>Files and rasps basically have the same function. A rasp is a coarse form of file used for coarsely shaping wood or other material. Typically a hand tool, it consists of a generally tapered rectangular, round, or half-round sectioned bar of case hardened steel with distinct, individually cut teeth. A narrow, pointed tang is common at one end, to which a handle may be fitted.</p> <p>The file is used on harder material like metal.</p>

Activity: Educator can set a practical test on the identification of tools and equipment as listed above.

The above equipment and tools should be used appropriately for the task at hand in building the hydroponic system in the Practical assessment task.

MODULE 3

Alternative energy

Objective:

Learners should be able to explain and understand alternative energy


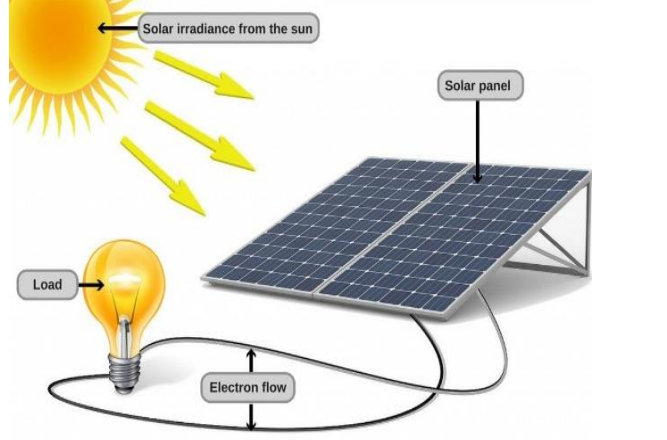
Upon completing this you should be able to answer questions on:

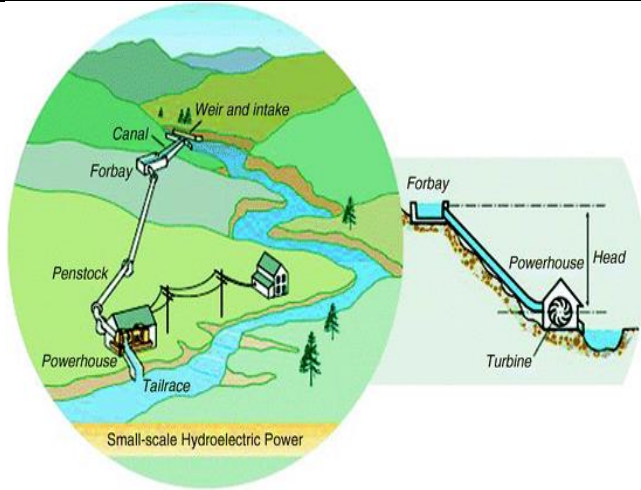
- Alternative energy and their uses

Keywords/terms and concepts – not all words or terminology is listed in the table, some words should be highlighted by the educator. Educators can develop word searches, crossword puzzles and matching Colom a and b to strengthen terms and terminology. (See <https://worksheets.theteacherscorner.net/>)

ALTERNATIVE ENERGY

Name and Understand the alternative sources of energy that can be used on a farm.

	<p>Wind energy: Wind energy refers to capturing the energy from moving air, i.e., wind, and converting it into a force or electricity. Historically, we have used it mainly for grinding grain and pumping water. A typical application of the use of wind power on a farm is the use of a windmill to act as a pump to extract water via a pump mechanism or to create electrical energy using a generator.</p>
	<p>Solar energy Solar power is electricity generated from the levels of natural energy contained within the sun's rays (solar radiation) The application of this on a farm is to use solar panels. Energy is captured via the solar panels, which charges a battery system (energy storage device) to be used as a source of electricity.</p>



Hydro- energy

Hydropower uses the energy of moving water for a variety of useful applications. Hydroelectricity generates electricity by harnessing the gravitational force of falling water. The most common type of watermill grinds grains into flour. Watermills can also be used to move water from a lower to a higher level.



Bio-fuel

Biofuel or bio-organic fuel is any plant or animal matter which can be combusted and used as a fuel. Biodiesel can be manufactured from vegetable oils e.g. soy, canola, sunflower seed, algae or animal fats and used as a source of petrol or diesel in farm vehicles.



Bio- gas

Biogas is a type of biofuel that is naturally produced from the decomposition of organic waste. When organic matter, such as food scraps and animal waste, break down in an anaerobic environment (an environment absent of oxygen) they release a blend of gases, primarily methane and carbon dioxide. The resulting biogas can be used in several ways including: gas, electricity, heat, and transportation fuels.

Activity:

