SCIENCE AND TECHNOLOGY

FOR

STANDARD 5

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WHATSAPP # 0991295167

An investigation is a way of getting information or knowledge.
A scientific investigation is a process in which one designs and carries out experiments to obtain information or knowledge.
Scientific investigations can be carried out through experiments, field work and project work.

STAGES OF A SCIENTIFIC INVESTIGATION
Stage 1: Knowing the problem
Stage 2: Making a prediction
Stage 3: Planning the investigation
Stage 4: Carrying out the investigation
Stage 5: Making meaning of the results
Stage 6: Making conclusions

UNIT 2 WORM INFECTIONS

TYPES OF WORMS

There are many types of worms that infect people.

These include:

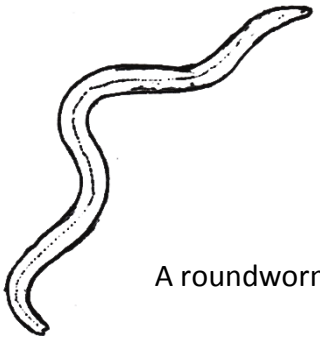
- Roundworms
- Tapeworms
- Hookworms

Organisms such as roundworms, tapeworms and hookworms that live and feed on other living things are called parasites.

People will show various signs and symptoms when infected with these parasites depending on the type of worm.

ROUNDWORMS

These worms look like earthworms, but they are either pink or white in appearance.



A roundworm

They have a head and a tail that are pointed.

They can grow up to 30 centimetres long.

SIGNS AND SYMPTOMS OF ROUNDWORM INFECTION

- Nausea
- Vomiting
- Stomach discomfort
- Body weakness
- Swollen belly
- Fever
- Obstruction of the intestines
- Sometimes the worms come out through the nose and mouth
- Loss of appetite
- Presence of eggs in faeces

THE LIFE CYCLE OF A ROUNDWORM

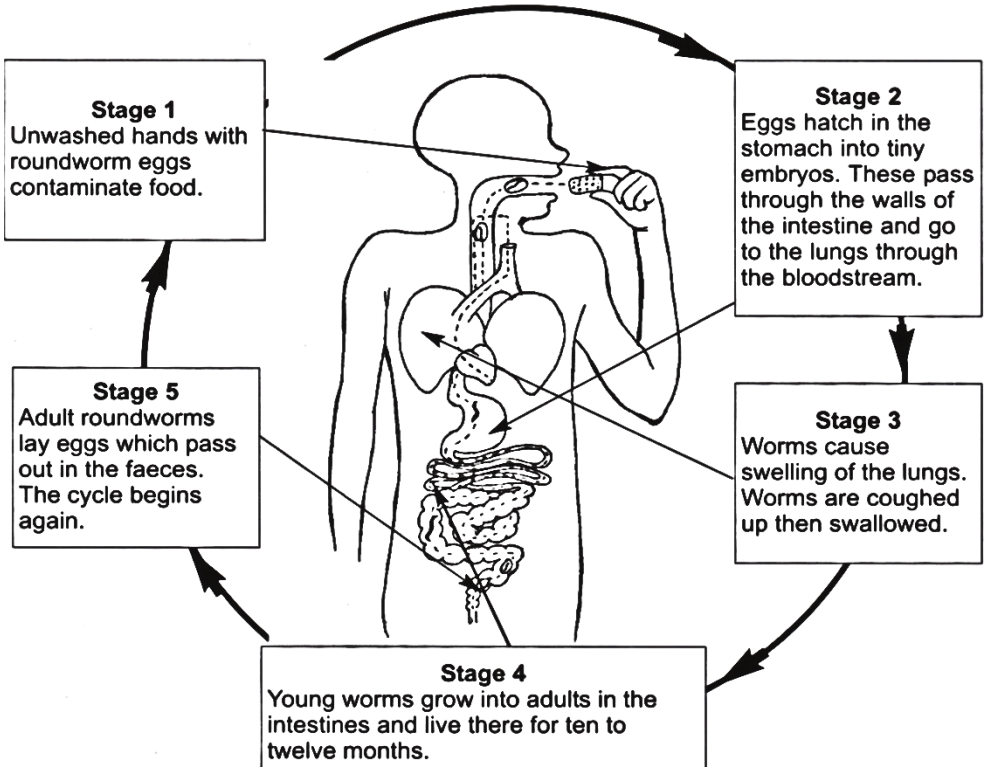
People get infected when they eat unwashed food containing the eggs of roundworms.

When in the body, the eggs hatch into larvae which enter the blood vessels.

The larvae move through the blood stream to the lungs where they are coughed up and swallowed into the intestines.

They finally grow into adult roundworms in the intestines.

The illustration below shows the life cycle of a roundworm

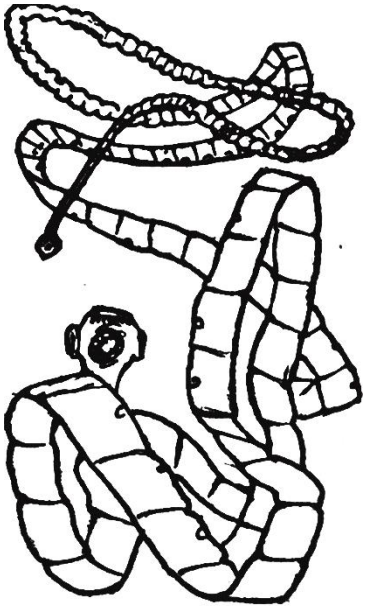


PREVENTION AND CONTROL OF ROUNDWORMS

- Using the toilet
- Washing hands after using the toilet
- Keeping fingernails short and clean
- Washing fruit and vegetables before eating
- Seeking treatment from the hospital as soon as signs appear
- Washing hands before eating or handling food

TAPEWORMS

These worms have flat, tape-like bodies.



They can grow up to 3.5 metres long.

Their heads are about the size of a pinhead.

The head has four evenly-spaced suckers and some of them have a ring of hooks.

Tapeworms use the suckers and hooks to stick to the lining of the intestines of the host animal.

These worms infect human beings, pigs, cattle and fish.

SIGNS AND SYMPTOMS OF TAPEWORM INFECTION

- Pain in the stomach
- Anaemia
- Loss of weight
- Diarrhoea
- Segments in faeces which contain eggs
- Patients looking pale
- Obstruction of intestines by large tapeworms

THE LIFE CYCLE OF A TAPEWORM

People get tapeworms from meat that is not well cooked.

Such meat include pork and beef.

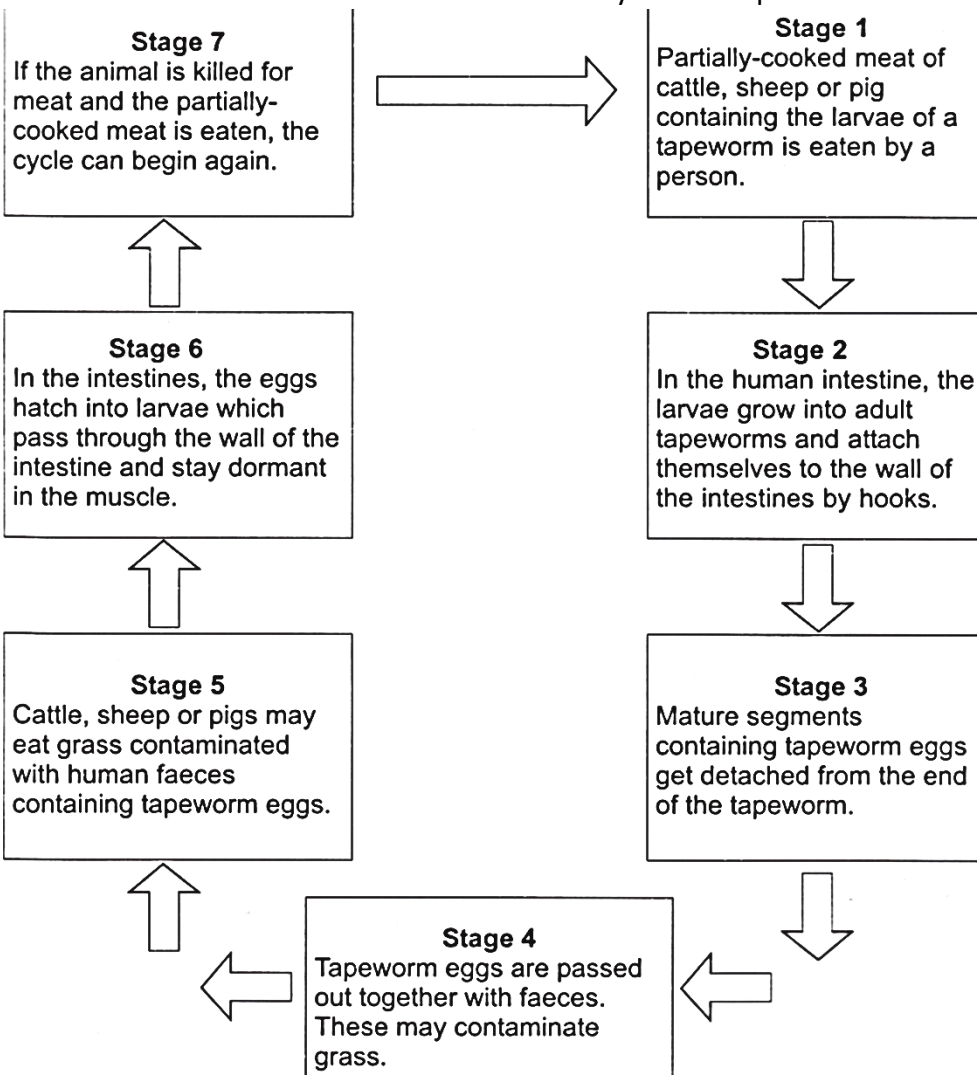
The worms live in the intestines of people who are infected.

These worms lay eggs which are passed out together with faeces.

Animals get them when they eat grass where these faeces with eggs are found.

Tape worm infection may sometimes reach the brain.

The illustration below shows the life cycle of a tapeworm

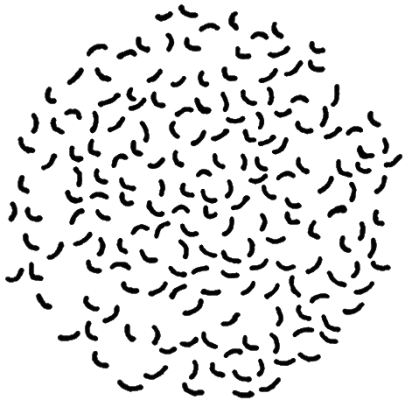


PREVENTION AND CONTROL OF TAPEWORM INFECTION

- Cooking meat and fish thoroughly
- Using the toilet always
- Seeking treatment from the hospital as soon as signs and symptoms appear
- Proper inspection of meat should be done
- People should follow rules of hygiene in the home
- Livestock should be given anti-worm drugs properly

HOOKWORMS

These are about 1 centimetre long and they are red in colour.



Hookworms

They cannot be easily seen in the faeces.

They are more common in adults than in children.

SIGNS AND SYMPTOMS OF HOOKWORM INFECTION

- Anaemia
- Diarrhoea
- Abnormal pain
- Weakness
- Loss of weight
- Weakness due to loss of blood
- Itching as larvae of hookworms enter bare feet
- Dry cough as the hookworms enter lungs

THE LIFE CYCLE OF A HOOKWORM

The larvae of hookworms enter the skin of a person and move through the blood vessels to the lungs.

While in the lungs, they cause the person to cough.

This causes the larvae to go into the intestines where they become adult hookworms.

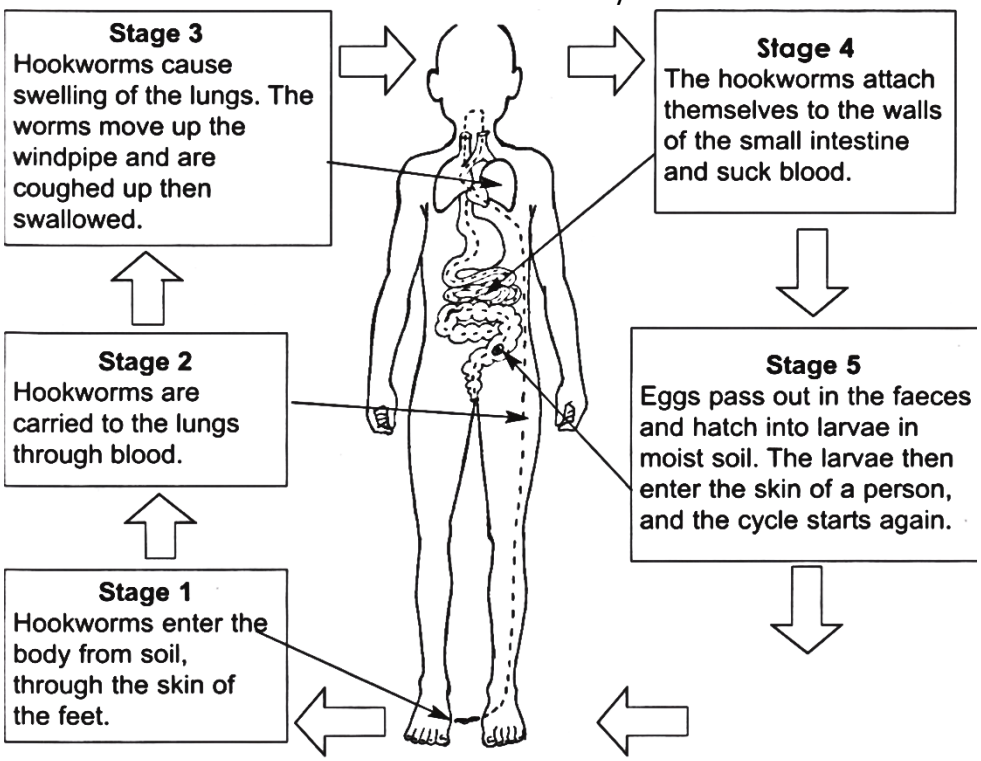
The adult hookworm uses its hooks to hold onto the walls of the intestines and sucks blood.

This leads to anaemia.

The adult hookworm lays eggs which later come out with faeces.

The eggs then hatch into larvae which later enter the human skin, usually through bare feet.

The illustration below shows the life cycle of a hookworm



PREVENTION AND CONTROL OF HOOKWORMS

- Avoiding walking with bare feet in water or wet soils.
- Using the toilet always
- Wearing boots and plastic gloves when working in wet places
- Wearing shoes
- Seeking treatment from the hospital as soon as signs and symptoms appear

UNIT 3 FOOD AND HEALTH

Food is anything which when eaten or drunk provides the body with nutrients for it to function properly.

These nutrients are carbohydrates, fats, proteins, minerals, vitamins and water.

Health is the status of the body being able to function properly.

People need to eat a variety of foods to stay healthy.

CLASSIFICATION OF FOOD

There are different ways of classifying food.

One way is classifying food according to three major functions: energy-giving foods, protective foods and body-building foods.

A. **Energy-giving foods**

These provide the body with energy.

The foods include maize, rice, cassava, sorghum, millet, potatoes, honey and sugarcane.

B. **Protective foods**

These protect the body from infections.

The foods are fruit and vegetables which include pawpaws, bwemba, malambe, bonongwe and chisoso.

C. **Body-building foods**

These provide the body with material for body building and repair of worn-out tissues.

These foods include meat, fish, eggs, grasshoppers, flying ants, mice beans and peas.

FOOD GROUPS

Food group	Nutrient found in the food group	Sources of nutrient
vegetables	Vitamins and minerals	✍ Dark green leafy vegetables such as bonongwe, luni, chisoso and pumpkin leaves ✍ Root vegetables such as Irish potatoes, sweet potatoes, beetroot, carrots and chinaka or chikande ✍ Fruit vegetables such as tomatoes, green paper, eggplant, pumpkins and cucumbers
fruit	Vitamins and carbohydrates	✍ Fruit such as oranges, bananas, water melons, masuku, malambe, masawu, katope, nthudza and guavas
Legumes and nuts	Proteins, fats and carbohydrates	✍ Beans, peas, pigeon peas, cow peas, groundnuts and macadamia nuts
Food from animals	Protein and fats	✍ Meat, insects, fish, milk, eggs and cheese
Fats	Fats	✍ Avocado pears, animal fats, cooking oil from cotton seeds or sunflower seeds
Staples	Carbohydrates	✍ Grains such as maize, rice, millet and sorghum ✍ Starch roots such as cassava, potatoes and yams

COMMON FOOD TABOOS AND BELIEFS

- A baby should not be given its mother's breast milk if the mother spends night away from the child. It is believed that the breast milk is rotten and will make the child sick
- A pregnant woman should not eat tomatoes because she will bear a child with skin rashes
- Pregnant woman should not eat sugarcane because the child will have a powdery skin like sugarcane
- Boys should not eat ground beans because they will be shot at the battle field
- Children should not eat eggs because they will have stomach problems
- A pregnant woman should not eat eggs because she will bear a child without hair

These food taboos and beliefs can influence one's food habits.

The food habits affect the food choice and eating patterns.

Some food habits are good while others are bad.

Though there is a wide variety of locally available foods, bad food habits limit one's food choice.

Some of the bad food habits are:

* Lack of variety in one's food choice
* Serving the best food portions to adults, especially men and visitors
* Eating from one plate with small children
* Feeding infants and young children on gravy only instead of meaty parts
* Introducing porridge to young babies as early as the first month after birth
* Believing that maize is the only staple food that can be served during meals
* Adding a lot of fat or oil in food when cooking
* Eating only one meal a day

EFFECTS OF FOOD TABOOS AND BELIEFS

→ A mother may give birth to a weak baby that has low birth weight if she does not eat foods rich in protein
→ Malnutrition results in young children and pregnant women
→ There is stunted growth in young children
→ There is low productivity in everyday activities because time is spent on looking after children and women suffering from malnutrition

IMPORTANCE OF EATING A VARIETY OF FOODS

♥ The body functions properly
♥ Living healthy and productive lives
♥ The body acquires necessary nutrients from a variety of foods

Good food habits can promote the eating of a variety of foods.

The good food habits include:

♦ Eating a variety of foods in meals
♦ Cooking food using a variety of methods
♦ Serving the best portions of food to vulnerable groups such as women and children
♦ Breast feeding babies exclusively during the first six months
♦ Eating three meals a day
♦ Serving the right quantities of food to each family member
♦ Eating food in separate dishes

UNIT 4 INDIGENOUS TECHNOLOGIES

Technology is the use of scientific knowledge and equipment in order to solve problems in everyday life.

Some of the technologies are locally developed.

These are called indigenous or local technologies.

Different kinds of technologies are often used to make work easier.

In our homes, most of the work is done using indigenous technologies.

These include:

- Mat
- Nkhokwe
- Chikwatu
- Mud stove
- Charcoal stove
- Winnower
- Adze
- Grinding stone
- Bow and arrow
- Canoe
- Fish trap (mono)

The indigenous technologies can be used for food processing and preservation, separation of mixtures, water purification, hunting, cooking, loading logs in a lorry, sawing timber, shelling maize and construction.

It is important to understand the scientific principles which are applied in these indigenous technologies.

Here are some examples:

- The process of removing cyanide from cassava involves soaking and diluting the poison in water leaving the cassava harmless
- When a catapult is pulled and released, the energy in the rubber band throws the stone away
- When separating maize from bran (winnowing) maize which is more dense that bran remains in the winnower. The bran which is less dense than maize gets blown away by the wind

These indigenous technologies may not be as efficient in doing their work.

It is therefore important to improve then in order to:

- Make them easier
- Make them do the intended work much faster
- Look better or attractive for marketing

The improvements can be made on some of the technologies are as follows:

- A bow that is made of sisal string can be improved by using strong string made of animal skin
- An arrow that is made of reed can be improved by using a piece of bamboo fitted with feathers at the tail for stability when it is released
- A whole pestle can be improved by carving the middle part for easy grip and handling

UNIT 5 TECHNOLOGICAL INNOVATIONS

TECHNOLOGIES USED IN THE COMMUNITIES

Technology involves the use of scientific knowledge and equipment in order to solve problems in everyday life.

The technologies can be used to solve problems in many areas such as transport, farming, processing food, food preservation, health, energy, hygiene, sanitation, hunting, construction and entertainment.

The technologies that are used in the communities to solve such problems include oxcarts, bicycles, hoes, ploughs, fertilizers, manure, mortar and pestle, fishing nets, maize mills, medicinal herbs, catapult and musical instruments.

PROBLEMS OF TECHNOLOGIES

Technology	Problems of the technology
Oxcart	- Has limited capacity - Limited distance to be covered at any one time - Requires animals such as cattle for its operation
Bicycle	- Can carry limited luggage - Can carry limited number of people
Hoe	- It is too slow for cultivation
Plough	- Cannot be used without cattle or similar animals
Fertilizer	- Can be too expensive - Pollutes water resources when it rains - Chemical fertilizers reduce natural fertility of the soil after several applications
Manure	- May require a lot of work to produce and apply
Mortar and pestle	- It is too slow for processing food
Fishing nets	- Can be too expensive to buy
Maize mill	- Can be too expensive to buy and maintain
Medicinal herbs	- May be difficult to determine the correct dosage
Catapult	- Difficult to target
Rubbish pits	- May be a breeding place for flies that are vectors of many diseases
Musical instruments	- May not produce desired quality of sound

DESIGNING NEW TECHNOLOGIES

Designing new technologies could be looked upon as a series of stages.

These stages are as follows:

Stage 1 Identifying the problem

- This involves being aware of a need or problem to be solved.

Stage 2 Doing research

- This involves finding out more about the problem identified.

Stage 3 Planning

- Start to plan how you will solve the problem.

Stage 4 Designing the technological process

- This involves coming up with the design of the technology.

Stage 5 Making the technological device

- Get the necessary tools and other materials to make the technological device.

Stage 6 Testing the technological device

- This involves checking whether the device made is working as expected.

Stage 7 Evaluating the technological device

- In order to assess how your product is processing, evaluation should take place at each stage of the technological process.
- Evaluation is necessary for quality control and saving on time and costs.

USING TECHNOLOGICAL DEVICES

Great care should be taken when using technological devices.

Careless use of the technologies can affect their durability and may lead to accidents and even death.

For example, a catapult can harm another person if not well targeted.

SCIENTIFIC AND TECHNOLOGICAL CONTRIBUTIONS

- ♠ People drink clean water
- ♠ People get high yields from improved varieties of crops and livestock
- ♠ Work in the homes is made easier due to electrical appliances
- ♠ Communication has become easier
- ♠ The average life span has increased
- ♠ Quality of people's lives have improved

Technology	Use
Winnower	Removing husks from the grain
Mphero	Grinding food into fine particles
Granary	Solving the problem of food storage

UNIT 6 PROBLEMS OF MARKETING

Marketing is the process of selling the right goods to the right customers, at the right time, right place as well as right price.

MARKETING POBLEMS AND THEIR SOLUTIONS

Problems of marketing	Possible solutions
Lack of direct access to buyers	Form cooperatives so as to market goods directly
Long distances to markets	Sellers should form groups so as to transport their goods as a group
High transport costs	Sellers should form groups so as to transport their goods as a group
Lack of transport	Form groups to have oxcarts or hire vehicles and other means of transport
Lack of storage facilities	Establish storage facilities or technologies for perishable goods
Bad roads	Maintain roads under local community development work
Stiff competition	- Know the strengths and weaknesses of competitors - Advertise business - Improve goods and services - Introduce new goods and services
Unreliable suppliers	Raise enough capital so as to order in bulk
Lack of knowledge of advertising	Provide training in advertising
Harsh weather conditions	Insure goods
High price of commodities	Maintain reasonable pricing of goods
Poor economic environment (customer purchasing power and spending habits)	Study customers to have a feel of their buying power and how they spend their money
Cultural environment	Know the society's basic values, perceptions, preferences and behaviours.
Lack of customer care	Be good and attend to all customers promptly

UNIT 7 TECHNOLOGIES FOR SENDING AND RECEIVING MESSAGES

There are many technologies that are used for sending and receiving messages in the communities.

These include:

- ☺ Drums
- ☺ Whistles
- ☺ Fax machines
- ☺ Radios
- ☺ Telephones
- ☺ Computers
- ☺ Cell phones
- ☺ Television sets

People use these technologies for different reasons such as emergencies. Greetings, weddings, birthday parties, meetings and warnings.

In order to send or receive messages, there is need to have a technology to use in order to write the appropriate language.

This is called 'coding' or inputting a message.

The interpretation of the message by the receiver is called 'decoding'.

UNIT 8 CLASSIFICATION OF ANIMALS

There are many animals that live in or around people's homes, schools and forests.

Some of these animals are people, dogs, cats, cattle, birds and lions.

These animals can be classified by looking at the food they eat and types of their skeletons.

CLASSIFICATION OF ANIMALS

Classification is the grouping of things according to their similarities and differences.

Living things are grouped into plant kingdom and animal kingdom.

The animal kingdom is further subdivided into:

- Mammals
- Insects
- Birds
- Fish
- Reptiles

CLASSIFICATION OF ANIMALS ACCORDING TO THE FOOD THEY EAT

Animals can be classified into three groups according to the food they eat.

Animals such as goats, elephants, cattle and hares that eat plants only are called herbivores.

Animals that eat other animals such as lions, leopards, hawks, snakes and hyenas are called carnivores.

Animals such as people, chickens, pigs, ducks and crows that eat both plants and animals are called omnivores.

CLASSIFICATION OF ANIMALS ACCORDING TO THEIR SKELETONS

Animals can be classified into groups according to whether they have a vertebral column (backbone) or not.

Animals such as people, monkeys, frogs, snakes and birds which have a backbone are called vertebrates.

Animals such as grasshoppers, cockroaches, ants, butterflies, beetles, earthworms and caterpillars which do not have a backbone are called invertebrates.

UNIT 9 TYPES OF ENERGY

Energy is the ability to do work.

People need energy to do things such as moving objects, sharpening things and playing.

TYPES OF ENERGY

- Light energy
- Heat energy
- Electric energy
- Sound energy
- Chemical energy
- Kinetic energy
- Potential energy

TYPES OF ENERGY AND THEIR USES

a. Light energy

This is the energy that comes from light.

It is produced by sources of light such as the sun, a lamp, a candle and a bulb.

Light energy can be used for lighting and producing other types of energy.

b. Heat energy

Heat energy can be produced by burning wood, charcoal, biogas, paraffin, methylated spirit and by friction.

Heat energy can be used for cooking, ironing, providing warmth and for welding.

c. Electrical energy

Electrical energy can be produced by using sunlight, generators and batteries.

Electrical energy can be used for producing light, cooking, ironing, in radios and other electrical appliances.

d. Sound energy

This kind of energy can be produced by beating, scratching, plucking and blowing objects.

e. Chemical energy

This type of energy can be produced from chemicals.

The chemicals in the batteries and the food we eat are examples of chemicals that produce energy.

f. Kinetic energy

This is one of the types of energy acquired by objects that are moving.

This is sometimes called energy of movement.

g. Potential energy

This is the energy which an object acquires if it is raised.

It is also called energy of height or energy of shape.

For example, if a spring or rubber band is stretched, it acquires energy of shape which is also called potential energy.

This energy of shape is sometimes referred to as strain energy.

UNIT 10 TECHNOLOGIES FOR MARKETING

There are several technologies that are used in marketing.

These include radios, computers, oxcarts, newspapers and television.

MARKETING TECHNOLOGIES

Marketing is the process of selling the right goods and services to the right customers, at the right time, place and price.

Certain technologies are used to increase productivity and sales.

These are known as marketing technologies.

The technologies that are used in marketing include media technologies such as newspapers, radios, televisions**,** billboards, computer, telephone and fax machine.

MARKETING TECHNOLOGIES AND THEIR USES

Marketing technology	uses
Computer, radio, fax machine, television and telephone	Advertising goods and services
Vehicles and oxcarts	Can be used for transportation Can be used for promotion of sales
Outdoor messages, for example, posters	Used for advertising
Newspapers and magazines	Used for advertising

IMPORTANCE OF MARKETING/ADVERTISING

- Letting people know about products and services
- Increasing the number of customers
- Increasing the profits

UNIT 11 THE RELATIONSHIP BETWEEN PLANTS AND ANIMALS

Animals depend on plants and other animals in the environment for food, oxygen, shelter and protection.

Green plants manufacture their own food for growth using light and carbon dioxide.

Some of the carbon dioxide is supplied by animals through the process of respiration.

When animals and plants die, they rot and provide manure for other plants to use.

Plants shed leaves which form humus.

Plants get their nutrients and water from the soil.

Animals which depend on plants will decrease if the plants decrease in the environment because the animals will have less food to eat.

UNIT 12 NUTRITION AND HEALTH

MEANING OF THE TERM "NUTRITION"

Nutrition is the process of providing the body with necessary substances for it to stay healthy.

Good nutrition involves eating foods that provide the body with all the major nutrients it needs in the right amount for it to keep healthy and grow.

Poor nutrition leads to poor health.

This results from eating foods that provide the body with inadequate or excess nutrients.

THE RELATIONSHIP BETWEEN NUTRITION AND HEALTH

- There is a direct relationship between nutrition and health.
- Good nutrition leads to good health.
- Malnutrition refers to a condition caused by lack or excess of certain essential nutrients in the body.
- Lack of essential nutrients in the body is called under-nutrition.
- Excess of certain nutrients in the body is called over-nutrition.

FOOD NUTRIENTS AND THEIR FUNCTIONS

Nutrient	Functions	Examples of food sources
1. Proteins	- Promote growth - Repair worn-out body tissues	Milk, meat, eggs, groundnuts, beans, fish, some insects
2. Carbohydrates	- Provide energy	Bananas, rice, bread, potatoes, cassava, maize, nsima, sugarcane, millet and honey
3. Fats and oils	- Provide energy	Butter, margarine groundnuts, cashew nuts, macadamia nuts, cheese, vegetable oils and oily fish
4. Vitamins Vitamin A	- Promotes growth - Maintains good eyesight	Green vegetables, pumpkins, carrots, eggs, meat, margarine, liver, oily fish and some varieties of sweet potatoes with yellow or orange colour
Vitamin B	- Promotes growth	Bread, meat, cereals (e.g. sorghum, wheat, millet, brown rice and oats), yeast, eggs
Vitamin C	- For healthy gums - Healing of cuts and wounds	Citric fruit (e.g. oranges, limes, lemons, tangerines and grape fruit), tomatoes, bananas, bwemba, malambe, pineapple and masawu
Vitamin D	- For strong teeth and bones	Sunshine, oily fish, margarine, butter, eggs, milk and cheese
5. Minerals **Iron**	- Helps in the formation of red blood cells which carry oxygen around the body	Liver, kidney, red meat, eggs, dark green leafy vegetables (e.g. bonongwe, kholowa, luni, chisoso) and dried fruit

Calcium	- For strong bones and teeth - For normal clotting of blood on wounds - For normal functioning of the heart and muscles	Milk, cheese, fish (e.g. utaka, Usipa, matemba), green vegetables, nuts, seeds and dried fruit
Phosphorus	- Used with calcium and vitamin D to form strong bones and teeth	Milk, cheese, nuts, meat, fish, green vegetables, fruit and eggs
Iodine	- For the proper functioning of the thyroid gland	Iodised salt, fish, shell fish and vegetables grown in the soil rich in iodine
6. Water	- Regulates body temperature - Helps in the removal of waste substances from the body especially urine - It is the main part of body fluids - Body processes e.g. digestion needs water in order to take place	Moist foods (e.g. milk, yoghurt, apples, bananas, water melons, juices and soft drinks)

EFFECTS OF TAKING INADEQUATE NUTRIENTS (UNDER-NUTRITION)

- Suppression of growth and development which can result in stunted growth and retarded development in children
- Incidences of deficiency diseases such as scurvy, marasmus, goitre and kwashiorkor
- Low productivity in everyday activities
- Death if left untreated
- Difficult treating some diseases such as blindness and rickets

EFFECTS OF TAKING EXCESS OF SOME NUTRIENTS (OVER-NUTRITION)

- Excess intake of carbohydrates and fats cause obesity. This leads to health problems such as high blood pressure, heart failure and diabetes
- Excess intake of protein causes health problems such as gout, obesity, heart failure and kidney failure

REFERENCES

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