

THE LESTER VAUGHAN SCHOOL

FIRST FORM INTEGRATED SCIENCE

WORK BOOK

The Scientist at Work
Senses and Sense Organs
Characteristics of Living Organisms
Animals and Plants
Vertebrates and Invertebrates
Insects
Household Pests
Livestock

Compiled by Tanya Harding

Deputy Principal, The Lester Vaughan School, 2016

TABLE OF CONTENTS

How to excel at Integrated Science
Syllabus
The Scientists at Work
Senses and Sense Organs
Characteristics of Living Organisms
Animals and Plants
Vertebrates and Invertebrates
Insects
Household Pests
Livestock

HOW TO EXCEL AT INTEGRATED SCIENCE

1. Pay close attention in class. If you are talking or listening to someone who is talking, you are not listening to your teacher. Take part in class discussions, let your teacher know that you are paying attention.
2. Science has its own vocabulary, so you need to learn all the new words, how to spell them and how define them and how to use them in a sentence.
3. While your teacher is going through a topic, you may have to highlight key words or phrases so get a **highlighter of a ruler and pen and underline important points.**
4. You're smart but **everyone needs to study for tests!** Most students fail tests because they do not prepare properly for them.
5. Learn your diagrams. Trace diagrams and label them with numbers. Practise labelling the diagram until you **always** get it right.
6. **Test yourself** by writing questions based on your notes. Example: Your teacher makes you label a diagram of an eye and then gives you the functions of the parts of an eye. Your questions become: 1) Label the parts of the eye. 2) State the function of the following: retina, lens, cornea etc.
7. **Get help.** If you do not understand something in class, ask your teacher to explain. You can form a study group sometimes you friends are really good at explaining things.
8. Do not get distracted during practicals. You need to write up you lab quickly and make accurate observations so that you can analyse them. If you are not focused you will get poor marks in your practicals.
9. Read over your notes on a regular basis.
10. Complete all of your assignments well.
11. Take your Food and Nutrition classes seriously. It is part of Integrated Science, almost every aspect of food and cooking involves Science.
12. Always aim for 100 %. *Stop thinking of 50 % as a pass – think of your new pass mark as 70 %.*

WHAT WILL YOU NEED

Pens, HB pencil, coloured markers or highlighter, ruler, eraser, sharpener, glue stick, a memory stick

For success, attitude is as important as ability. The secret to success - try!

SYLLABUS

TOPIC	DETAILS
The Scientist at Work	Science and Its Application, Safety and First Aid, Measurement
Senses and Sense Organs	The eye, the ear, taste and smell
Living Things	Characteristics of Living Organisms, Animals and Plants, Vertebrates and Invertebrates, Insects, Household Pests, Livestock

PRACTICAL REMINDERS

Format: Aim, Materials and Apparatus, Method, Observations, Discussion, Conclusion

Aim: Tells you the purpose of the experiment

Materials and Apparatus: Everything you will need to do your experiment.

Method: This is what you did and is written in past tense and third person.

Observations: This includes what you measured or observed. Your observations can be presented in tables, diagrams, drawings or graphs. Each of these requires a title.

Discussion: Here you give some back ground information, discuss your observations and relate them back to the aim.

Conclusion: A simple statement on what your experiment tells you.

SCHOOL BASED ASSESSMENTS

These are assignments which will contribute to your final grade in Science. They will also be used for the CCSLC examination you will take at the end of Third Form.

CONTINUOUS ASSESSMENT

Practicals, Projects, Standardized Test 50 %, Promotion Exam 50 %

The Scientist at Work

SCIENCE AND ITS APPLICATION

Class Discussion

- 1) What is science?
- 2) What is the difference between science and technology?
- 3) What skills do you think Scientists need?

Homework - Find out what the *Scientific Method* is.

GROUP ACTIVITY – the contribution of science to the development of our standard of living

Discuss with the members of your group what life was like back in the cave man days? How has life improved since those days? Identify how science has contributed to those changes.



THE SCIENTIFIC METHOD

One of the main goals of science is to explain the things we see happening around us. There is a logical sequence which must be used for Scientists to reach a conclusion. Your teacher will go through the following steps of the Scientific method.

- 1) Observation (Problem statement)
- 2) Hypothesis
- 3) Design of experiment to test hypothesis including variables
- 4) Conduct experiment
- 5) Observations/Results
- 6) Conclusion

After an experiment is done, you might realize you need to do over the experiment. Redesigning experiments is a normal part of an investigation.

GROUP ACTIVITY – scientific method

Observation

Jody observed that on rainy days she sees earthworms on the surface of the garden but on sunny days she never sees any.

1. Write a hypothesis to explain this observation.
2. Design an experiment to investigate your hypothesis.
3. You will present your experiment to the class.

Homework: For the following observation, write a hypothesis and design an experiment to test it. Junior noticed that clothes on the line dry faster on windy days than still days.

CCSLC ASSIGNMENT – MODULE 1 PORTFOLIO

You will need a piece of letter size paper, a piece of construction paper, glue.

Create a summary table/chart with the safety symbols and their meanings with accompanying discussion regarding safety/precautions.

You will be graded on the accuracy of your information and on your presentation so make sure your chart looks good!

CLASS DISCUSSION

Discuss first aid or safety procedures for the following:

1. A chemical splash in the eye
2. A minor burn
3. Ingestion of a household cleaner.
4. A cut with a sharp tool.

Scientific Contributions to Society

Homework Assignment

Do research on five scientists, at least one should be a local scientist, one from the region and international. State the accomplishments of all the scientists. Discuss the research work of a regional scientist.

MEASUREMENT

GROUP WORK - ACTIVITY 1 – The sense of touch

Aim: To determine if we can always trust our senses

Materials/Apparatus: one beaker with warm water, one beaker with room temperature water, one beaker with cold water.

Method: Arrange the beakers from warm to cold. Place your right index finger into the cold water, at the same time place your left index finger into the warm water. Take both fingers and place them into the room temperature water.

Observation: What do you feel?

Discussion: Why is measurement important in science investigations? Explain your results.

Conclusion: What conclusion can you make about your ability to sense different temperatures?

Based on your experiment, why do you think measurement is important in science?

DEFINITIONS OF MEASUREMENT TERMS

Length – the distance between two points.

Mass – the amount of material in a substance

Temperature – the amount of heat in a substance

Time – measure of the duration of an event/interval between events

Volume – the amount of space a substance occupies

ACTIVITY

Copy and complete the following table in your notebooks.

	Measuring Instrument	SI unit
Length		
Mass		
Temperature		
Time		
Volume		

Your teacher will demonstrate the use of following instruments: ruler, balance, thermometer, stop clock and measuring cylinder above. Write

CCSLC ASSIGNMENT TITLE: MEASURING HEIGHT

MATERIALS/APPARATUS: metre rule, chalk, 30 cm ruler,

METHOD: Measure the heights of the following method: (i) remove the shoes; (ii) stand the person up against the wall; (iii) place the ruler horizontally at the top of the person's head; (iv) mark the spot on the wall with a piece of chalk; (v) use the metre rule to measure the height from the floor.

OBSERVATION: Write down your observations in a table as shown below:

Name	Height/cm

Use your observation table to draw a bar chart of your results

DISCUSSION: Which student in your group was tallest? Which student in your group was shortest? What was the average height of the students in your group?

a list of rules to use with EACH piece of equipment based on what your teacher demonstrated.

PRACTICAL ACTIVITY

TITLE: MEASURING VOLUME OF AN IRREGULAR SHAPE

MATERIALS/APPARATUS: 50 ml measuring cylinder, string, rock

METHOD: Pour some water into the measuring cylinder – about half way up. Read off the volume accurately. Tie a string around the rock and carefully lower it into the measuring cylinder. Read off the volume

OBSERVATION: Write down the two volumes.

DISCUSSION: Calculate the volume of the rock by subtracting the first volume from the second volume. Do you think this is an accurate way of measuring the volume of an irregularly shaped object? Give reasons for your answer.

HOMEWORK – CCSLC PORTFOLIO ASSIGNMENT

Write a reflective piece (three paragraphs) on what you have learnt about Scientists at Work.

Senses and Sense Organs

CLASS DISCUSSION

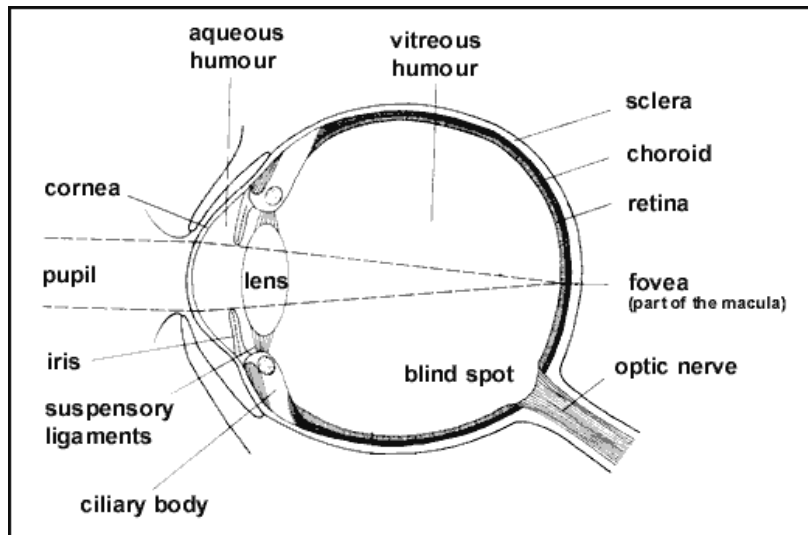
1. What are the five senses?
2. List the five sense organs.

MODULE 4: THE INDIVIDUAL

THE EYE

The eye is what allows us to sense light energy.

- The lens of the eye focuses light onto the retina so that the object can be seen.
- The retina contains light sensitive cells that send the image to the brain
- The iris is the coloured part of the eye and it controls the size of the pupil.
- The pupil is a hole through which light enters the eye. It is small in bright light to protect the eye and large in dim light to let as much light in as possible.
- The ciliary muscle works along with suspensory ligaments to change the size of the lens. When you are looking at a near object the ciliary muscle contracts and the suspensory ligaments relax, making the lens thick. When you are looking at a far



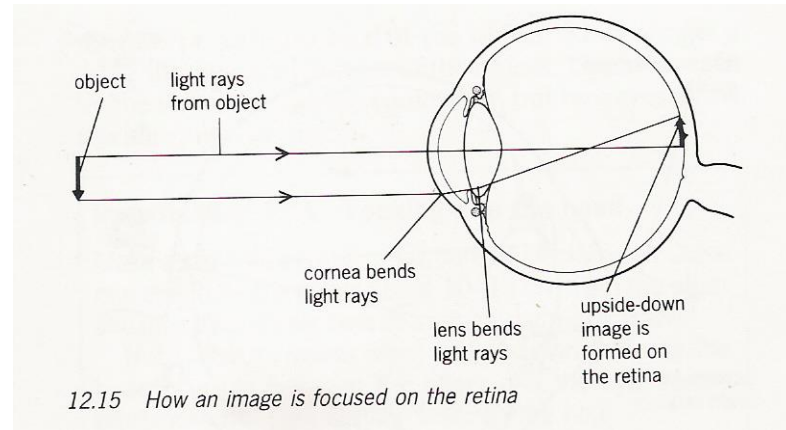
object the ciliary muscles relax and suspensory ligaments

KEY WORDS AND PHRASES FROM MODULE 1

Science, scientific method, aim, materials, apparatus, discussion, conclusion, variable, safety, first aid, measurement, length, mass, temperature, time, volume, ruler, balance, thermometer, stop clock, measuring cylinder.

constrict making the lens thin. This ability to change the thickness of the lens is called accommodation.

How we see



Light passes through the pupil and is bent by the lens onto the retina. The light rays cross over so that the image formed on the retina is upside down. The light sensitive cells of the eye transmit the image to the optic nerve, which transmits the image to the brain where it is received, right way up.

REVIEW QUESTIONS

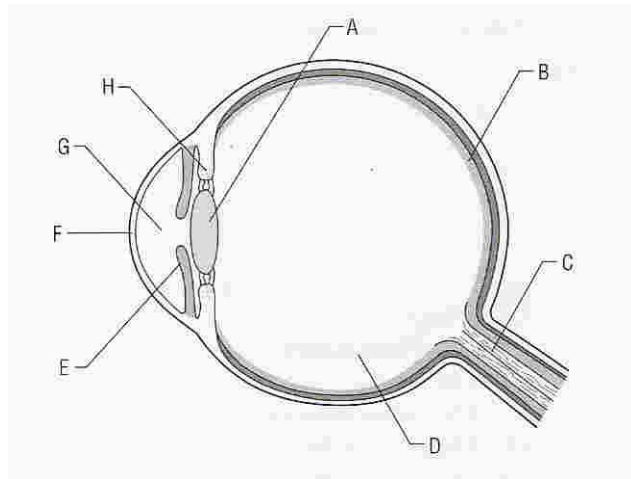
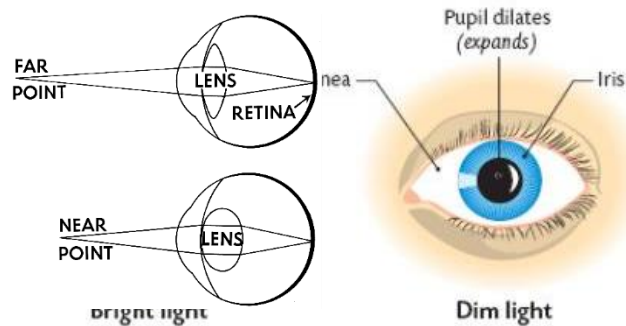


Diagram of the eye

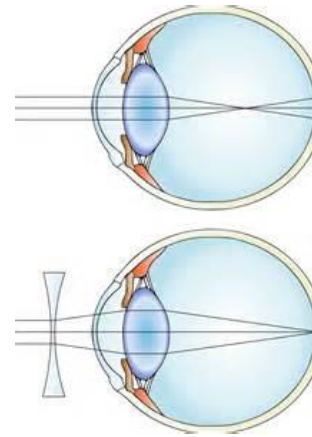
1. Label the diagram of the eye in the above diagram.
2. Write down the functions for the following structures:

Pupil, lens, cornea, ciliary muscle, retina, iris, optic nerve

ACCOMMODATION



Accommodation is the ability of the eye to focus on near and far objects. This is done by adjusting the shape of the



lens. This change of shape is done by the ciliary muscles and suspensory ligaments. Read page 8 and look at the following diagrams to (i) Describe what happens to lens when we look at something near and something far.

PUPIL RESPONSE

Try this activity with a friend.

Face a window, close your eyes and cover them with your hands for one minute. Move your hand away and open your eyes. Get your friend to tell you what happened to the size of your pupils. Now let your friend do the same thing for you.

- (1) What happens to the pupils in bright light?
- (2) What happens to the pupils in dull light?
- (3) Why do you think these changes occur?

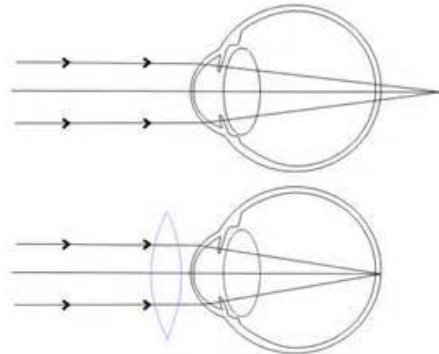
CARE AND DISEASES OF THE EYE

Myopia – short sighted, the person can only see clearly if objects are close. The light rays meet in front of the retina.

Correction: concave lens makes rays diverge.

Hypermetropia – long sight, the person can only see far away, light rays focus behind the retina.

Correction: convex lens makes rays converge.



Glaucoma increases the pressure in the eye, this reduces blood flow to the retina which damages the rods and cones and the optic nerve area. Left untreated this disease leads to blindness but it can be treated with eye drops

Cataracts Clouding develops in the lens due to changes in the lens protein. Light cannot move freely through the lens, it is scattered and decreases vision.

Correction: surgical removal of natural lens and replacement with an artificial lens or laser surgery.

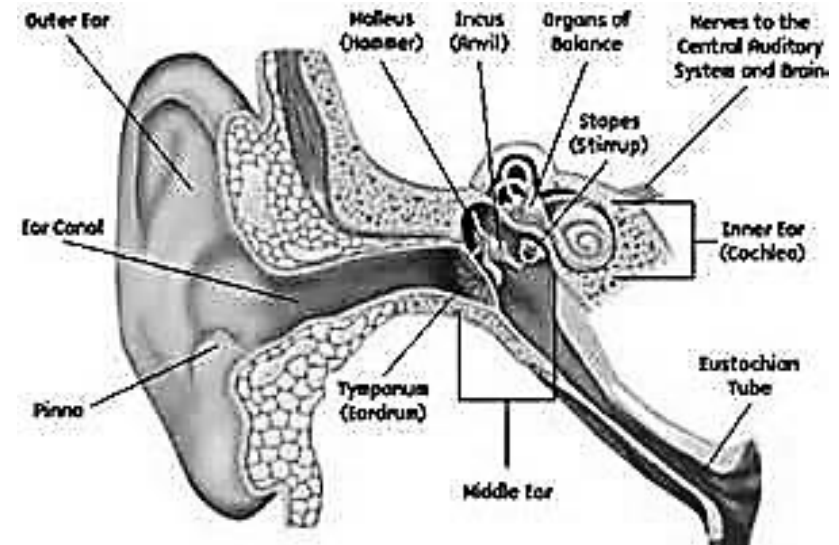
HOW CAN WE CARE FOR OUR EYES?

DIET: Vitamin A helps make the chemical *visual purple* in the eye. This helps you see well at night. Without it you would suffer from night blindness.

SUN GLASSES: These help protect your eyes from harmful UV (ultra violet) rays.

PROTECTIVE GEAR: Appropriate goggles with filters if necessary should be used while welding or doing an activity where there is flying debris which could damage your eye.

THE EAR



FUNCTIONS OF PARTS OF THE EAR AND HOW WE HEAR

- The outer ear or pinna helps to collect sound waves and channel them down the ear drum.
- The ear drum or tympanic membrane responds to the sound waves by vibrating.
- The ossicles in the middle ear transmit the vibrations to the inner ear. The ossicles are as follows: hammer, anvil and stirrup.
- The cochlea in the inner ear has liquid and nerves which detect vibrations in the liquid and send signals to the auditory nerves.
- The auditory nerves send the signals to the brain.
- The semicircular canal is responsible for balance.
- The Eustachian tube connects the middle ear to the throat and helps keep the air pressure the same on both sides of your ear drum.

Humans can hear sound between 25 – 18,000 vibrations per second.

CLASS DISCUSSION

1. Discuss the importance of proper ear care.
2. Discuss the role of senses of sound in the food lab

SENSE OF TASTE AND SMELL

PRACTICAL ACTIVITY

TITLE: Sense of Taste

Aim: To map the areas of taste on the tongue.

Materials/Apparatus: 4 plastic cups, 4 cotton swab, lime solution, mauby solution, sugar solution, salt solution, one volunteer.

Method: Dip the cotton swab in one of the solutions, touch it on the four areas shown in the diagram above. Let the person tell you which area he/she tasted the solution. Repeat the process with each solution.

Observations: Draw a diagram of the human tongue and label it with the correct areas of taste.

Discussion: Why do you think taste is an important sense? What are the sources of error in the experiment?

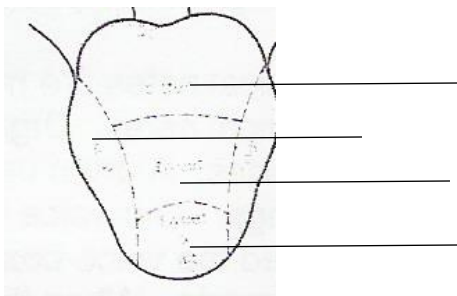
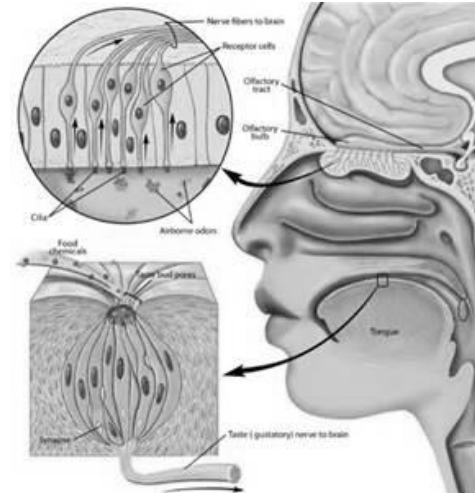


DIAGRAM SHOWING THE TONGUE

DIAGRAM SHOWING TASTE AND SMELL RECEPTORS



ACTIVITY

Read the following passage and answer the questions below.

SMELL

The receptors responsible for our sense of smell consist of groups of sensory cells in the root of the nasal cavity. The cells have tiny hairs that are stimulated by molecules which float in the air. The nasal cavity is covered with a thin layer of fluid so that the molecules dissolve first. Even though we can smell many things, our sense of smell is not as well developed as in other animals.

TASTE

Look at your tongue in a mirror. The short hair-like structures in the front of your tongue and the tiny bumps in the back have receptors called taste buds. These are sensitive to four kinds of stimuli – sweet, sour, bitter and salt. The sense of smell helps to enhance our taste experience

QUESTIONS

1. Explain how smells and odours are detected.
2. Based on the activity the class carried out on taste, explain why our sense of taste is diminished when we suffer from colds.

Discuss the importance of the senses in the science laboratory and the kitchen.

MODULE 3: THE MYSTERIES OF LIFE

Characteristics of Living Organisms

CLASSIFICATION

This is the process of dividing things into groups with similar characteristics. Our environment can be divided into living and non living things. The living things are biotic and the non living things are abiotic.

THE IMPORTANCE OF CLASSIFICATION

Classification of living and non living things makes it easier for scientist to study a wide range of things, for example, Biologists divide living organisms into smaller groups with each group sharing certain characteristics. Imagine going into a supermarket to shop only to find that the toilet paper is next to the juice which is next to the dog food! It would be very confusing indeed.

ACTIVITY

In your note book describe two examples where classification is used to bring about order.

CHARACTERISTICS OF LIVING THINGS

You can use the acronym MRS GREN to remember the characteristics of living things.

1. Movement (partial and/or total displacement to look for food or escape danger)
2. Respiration (releasing energy from carbohydrates)
3. Sensitivity (sensing and responding to changes in the environment)
4. Growth and Development (increase in size and complexity of an organism)
5. Reproduction (to carry on the species)
6. Excretion (getting rid of metabolic wastes)
7. Nutrition (making or eating food)

ACTIVITY

Discuss the following with your teacher.

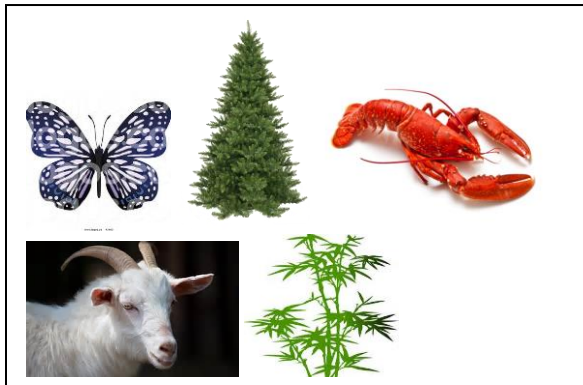
1. What is the difference between movement in animals and movement in plants?
2. Do plants breathe? Does this mean that they do not respire?
3. Animals often move in response to changes in their environment. (a) What do plants respond to? (b) How do plants respond to changes in their environments?
4. Which life process can only occur after the growth and development of an organism?
5. Does reproduction always require two organisms?
6. Metabolic wastes are produced by chemical reactions occurring in the body, for example carbon-dioxide and water. How do we get rid of metabolic wastes?
7. Plants are capable of making their food by a process called photosynthesis. Animals need to use foods made by other organisms.

ACTIVITY

Match each of the pictures below with one of the characteristics of living processes.



Look at the living things below and classify them into plants and animals. What features made you decide to classify each one as an animal or plant?



COMPARISON OF ANIMALS AND PLANTS

ACTIVITY

Copy and complete the table below.

Table showing differences between plants and animals

CHARACTERISTIC	ANIMALS	PLANTS
MOVEMENT		Many plants stay in one place, held down by roots
NUTRITION	Animals must eat plants, animals or both.	
RESPIRATION	Some animals breathe to get oxygen for respiration	Plants do not breathe to get oxygen for respiration
SENSITIVITY		Plants usually respond more slowly to stimuli.
GROWTH	Animals grow and stop	

CLASSIFICATION OF ANIMALS

KINGDOMS

These are the largest categories of living organisms. The kingdoms are as follows: prokaryotes, protists, fungi, plants and animals.

ACTIVITY

- Place the following organisms into groups based on their similarity. Name the groups, and say what features you used to put the organisms into the groups.

Algae, alligator, bamboo, bear, bee, centipede, chicken, cow, crocodile, cucumber, deer, elephant, fern, fish, frog, fungus, goat, grapevine, hyena, iguana, jellyfish, kelp, lime, mango, millipede, moss, octopus, periwinkle, pigeon, pineapple, rabbit, rose, scorpion, snake, toad, virus, worm, yam, zebra.

- Name the five features that you share with another member of your family. Describe these features. Are the features exactly alike?

DIFFERENCES BETWEEN INVERTEBRATES AND VERTEBRATES

Animals can be divided into two subdivisions, invertebrates and vertebrates. Invertebrates have no back bones and vertebrates do.

Table showing examples of some Invertebrate groups

INVERTEBRATE GROUP	EXAMPLES
CNIDARIA	Jelly fish, Portuguese-Man-of-War
WORMS	Earth worms, leeches, round worms
ARTHROPODS	Insects, spiders, crabs, millipedes
MOLLUSCS	Snails, slugs, octopi, squids

- Unscramble the letters to find the names of some well-known invertebrates.
 a cehle b ktci c lsani d omwr
 e dctneiep
- List five invertebrates which are useful to humans. State their uses.

ARTHROPODS

All arthropods have exoskeletons and jointed limbs.

Myriapods – Ten or more segmented legs, antennae, no eyes

Crustaceans – Aquatic, gills, heavy exoskeleton, two pairs of antennae; more than 4 and less than 20 pairs of legs

Insects - Three body sections, antennae, six legs

Arachnids – Two body sections, eight legs, no antennae

INSECTS

FEATURES OF INSECTS

Insects are arthropods i.e. they have a hard outer covering and they have jointed limbs. Their outer covering is made of chitin. The insect body is divided into three main sections.

- The head has the mouthparts, compound eyes and antennae
- The thorax has six legs and wings
- The abdomen contains the reproductive structures

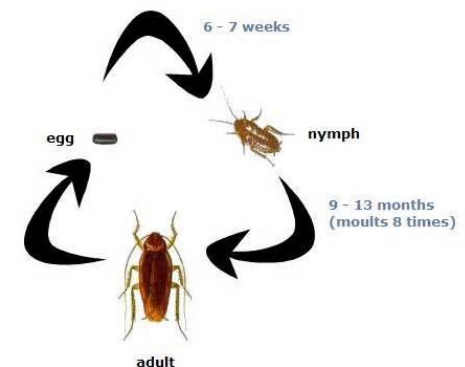
LIFE CYCLES

INCOMPLETE METAMORPHOSIS

The young insect or nymph looks like a smaller version of the adult without wings.

CYCLE: Egg → Nymph → Adult

Cockroaches develop this way.

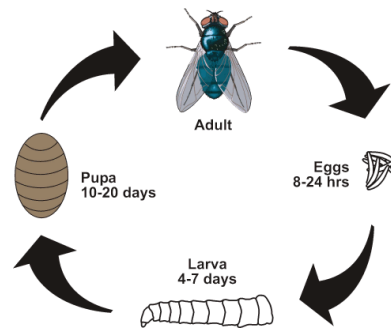


COMPLETE METAMORPHOSIS

The young insect looks worm like and usually eats different things than the adult. The larva must then go through a metamorphosis which changes it into an adult.

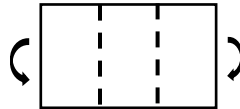
CYCLE: Egg → larva → pupa → adult

For example flies and butterflies.



CCSLC ASSIGNMENT

Create a brochure on household pests.



Take a piece of letter size paper and fold it twice as shown below. Your information can be written on the both sides of the paper but it should be in three.

1. Define the term pest.
2. List examples of common household pests, including roaches, mosquitoes, flies, mice, rats and ants.
3. Name the disease or type of destruction associated with the named pests, include dengue, malaria, dysentery, leptospirosis.
4. Discuss the effects of household pests on man, include illness, loss of income, and destruction of belongings.
5. Evaluate methods by which pests are controlled.

USEFUL INSECTS

Many insects can be useful.

1. They eat harmful insects e.g. ladybugs.
2. They make useful products e.g. honeybees and silkworms
3. They pollinate flowers e.g. butterflies and honeybees.
4. They clean up the environment e.g. ants

ACTIVITY *From Text book 1 pg 51*

1. You find a strange organism on your bed. What features would you look for to identify it as an insect.
2. Select the correct word from the list below to fill in the words missing from the following statements:
pupa, eggs, larva
Houseflies lay their _____ on faeces or garbage. The _____ of a housefly are small and white, they are called maggots. Flies go through a transformation in the _____ stage.
3. Katy said that all bugs are insects therefore spiders are not bugs. Do you agree with her statement? Explain your answer.

CLASSIFICATION OF VERTEBRATES

ACTIVITY

Copy the table below into your notebook and tick the boxes which fit the features of each of the animals (from *Integrated Science for Caribbean Schools, 1989*)

		cow	Black bird	crocodile	turtle	frog	shark	dog
BODY COVERING	Hair							
	Feathers							
	Scales							
	None of these							
APPENDAGES	Wings							
	Legs							
	Fins							
	None of these							
MOUTH	Teeth easily seen							
	Teeth small							
	Beak present							

Based on your table and the table of vertebrate characteristics, classify the animals into vertebrate groups.

Table showing features of Vertebrate Groups

VERTEBRATE GROUP	FEATURES	EXAMPLES
Fish	Cold Blooded (poikilotherms) covered with scales, and fins; breathe with gills, lay shell-less eggs	Shark, flying fish
Amphibians	Cold blooded, covered with skin, breathe with gills when young and lungs are adults	Frogs and toads
Reptiles	Cold blooded; scaly outer covering, breathe with lungs, lays eggs with leathery shells	Snakes, alligators, turtles
Birds	Warm blooded (homeotherms), feathers, beak, lays eggs with hard shells	Chicken, pigeon
Mammals	Warm blooded, covered with skin and hair, possess mammary glands	Human, rabbit, whale, dolphin

DICHOTOMOUS KEYS

A dichotomous key is a way of classifying organisms using a diagram. A spider key is a type of dichotomous key. Look at the keys found on page 42 and 43 of your reference text 1.

Read and do the activity on page 19 of text book 2.

Your teacher will give you a exercise to construct spider keys.

LIVESTOCK

Livestock are animals reared to provide food and raw materials for human beings.

Table classifying Livestock

ANIMAL	PRODUCT(S)
Cows	Meat, milk, leather, glue
Goats	Meat, milk, leather
Chickens	Meat, eggs
Turkeys	Meat, eggs
Pigs	Meat
Sheep	Meat, wool, milk
Rabbits	Meat, fur

CLASSIFICATION OF PLANTS

Plants can be divided into two main groups, non-flowering and flowering plants. Non-flowering plants include algae, mosses, ferns and conifers.

Table showing differences between monocotyledonous and dicotyledonous plants

MONOCOTYLEDONOUS PLANTS	DICOTYLEDONOUS PLANTS
Have jointed stems	Have no joints in their stems
Have one cotyledon in their seeds	Have two cotyledons in their stems
Have fibrous root systems	Have tap root systems
Examples: grass, bamboo, cor n	Examples: hibiscus, golden apple tree

TABLE CLASSIFYING FOOD CROPS

TYPE OF FOOD CROP	EXAMPLES
Root crops	Sweet potatoes, yams
Leafy crops	Lettuce, cabbage
Fruits	Oranges, mangoes
Running Crops	Grapes, squash
Beverage	Grapes, citrus fruit
Cereals	Corn, wheat, rye
Vegetables	Lettuce, cabbage, potatoes

PLANT STRUCTURE

Both monocotyledonous and dicotyledonous plants are made up of a stem with leaves, flowers, fruit and a root system.

TABLE SHOWING THE FUNCTIONS OF VARIOUS PARTS OF A PLANT

PLANT PART	FUNCTIONS
Root	Anchors plant, absorbs water and mineral salts from soil, transports water and mineral salts to stem, may store food in some species
Stem	Transports water and minerals from root to leaves, transports foods from leaves to roots, supports leaves and holds them out to receive sunlight, supports flowers, may store food in some species.
Leaf	Makes food by the process of photosynthesis, transpiration occurs here (loss of water), may store food.
Flower	The sexual reproductive structure of the plant, this produces the fruit and seeds after fertilization that will make the next generation.

ACTIVITY Chose a plant from home or school and draw it in the area below. Label the diagram, including the root, stem leaf and flower.

PRACTICAL ACTIVITY – DRAWING EXERCISE

Make a drawing a large labelled drawing of a leaf.

Rules for Biological Drawings

1. Use a HB pencil
2. Do not use sketchy lines, do use clean continuous lines.
3. There should be no shading on your drawing.
4. Write your title underneath your drawing.
5. Work out the magnification of your drawing by dividing your drawing length by the real length.
6. Write your magnification as follows:
Magnification x drawing length/real length.

PHOTOSYNTHESIS

Photosynthesis is the process by which green plants make food from water and carbon dioxide. They need sunlight to provide energy for this reaction and chlorophyll, a green pigment which absorbs the sunlight.

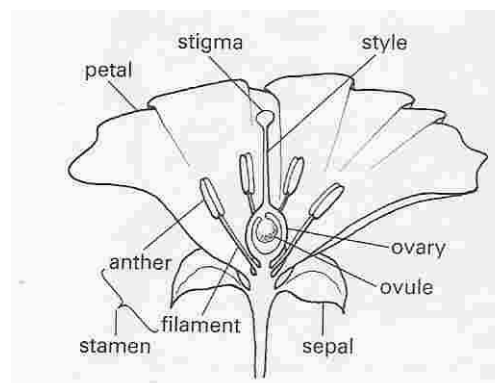
FLOWERS

IMPORTANCE OF FLOWERS

Flowers are the reproductive structures of plants. They are responsible for the formation of fruit and seeds. Seeds germinate into the next generation of the plant.

PLEASE NOTE

You should be able to label the diagram of the flower and state the functions of all its parts. You should also be able to label a diagram of a seed and state the functions of all its parts.



POLLINATION

Pollination is the process by which pollen grains are transferred from an anther to a compatible stigma. It is essential in agriculture as the consequence of pollination is fruit formation. Without pollination there would be no fruit!

PRACTICAL ACTIVITY – PARTS OF A FLOWER

1. Carefully pull the sepals and petals off of a flower.
2. Make a drawing of the following: a sepal, a petal, filaments with anther, style and stigma.

FRUIT

FERTILIZATION

This is the fusion of the male and female cells. In plants, this occurs in the ovary. The wall of the ovary becomes the wall of the fruit, the inside of the ovary called the ovule becomes the seed. These are called *true fruits*. If a fruit is formed from the receptacle, the area around the ovary, it is known as a *false fruit*. Imported apples e.g. Delicious apples and Gala apples are false fruits.

STRUCTURE OF FRUITS

The wall of a fruit may be simple and dry, this is called a pericarp. In some fruits the pericarp develops into three layers called the epicarp (outer layer), mesocarp (middle layer) and endocarp (inner layer). The diagrams below show different types of fruit.

CLASSIFICATION OF FRUIT

TYPE OF FRUIT	DESCRIPTION OF FRUIT
Succulent (Fleshy)	Pericarp is divided into layers. The mesocarp is juicy or succulent, the endocarp may be woody. Drupes – only have one seed e.g. mango Berries – have multiple seeds e.g. grapes
Dry Fruit	Have a dry pericarp e.g. beans

DISPERSAL

If a seedling begins to grow under its parent plant, it has to compete for minerals, water and sunlight. Fruits are moved away from their parent plants by dispersal. The wind, animals, water and mechanical methods can be used to do this.

SEED STRUCTURE

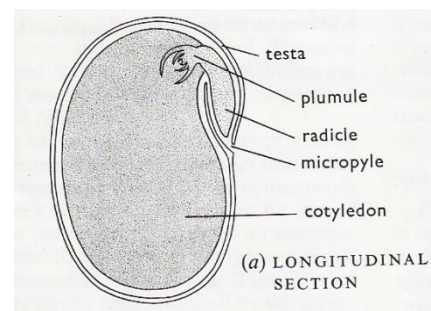
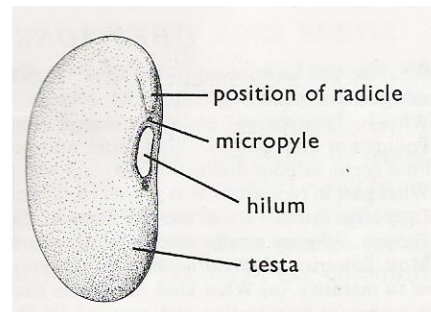


Table showing functions of the parts of a seed

STRUCTURE	FUNCTION
Testa	Protects the seed
Cotyledon	Stores food
Plumule	Grows into new leaf
Radicle	Grows into new root
Embryo	Plumule and radicle
Micropyle	Hole through which water enter

GERMINATION

This is when the seed begins to grow into a new plant. It requires the right temperature, water and oxygen. Without germination, farmers would not be able to grow plants from seeds. A lot of important crops are grown from seeds. Can you think of any?

KEY WORDS AND REVIEW QUESTIONS

Animals – invertebrates, exoskeleton, insects, head, abdomen, thorax
Vertebrates, fish, amphibians, reptiles, birds, mammals,
poikilotherms, homeotherms

Plants – root, stem, leaf, flower, fruit, seed, pollination, fertilization,
dispersal, germination, stigma, style, ovary, anther, filament, petal,
sepal, receptacle, testa, embryo, plumule, radicle, cotyledon, micropyle.

1. List the characteristics of living things
2. Compare the characteristics of animals and plants.
3. What are the differences between vertebrates and invertebrates?
4. Describe the characteristics of the five types of vertebrates.
5. What is the difference between insects and other arthropod groups?
6. Describe the life cycle of a butterfly.
7. Distinguish between complete and incomplete metamorphosis.
8. List the types of livestock.
9. Why is livestock important to man?
10. Compare monocotyledonous and dicotyledonous plants.
11. List the types of food crops.

12. Define the following words: pollination, fertilization, germination, dispersal
13. State the functions of the following parts of a flower: petal, sepal, stigma, style, filament, anther
14. What is fruit formed from?
15. Why is pollination important to Agriculture?
16. Why should seeds be dispersed away from their parent plants?
17. Describe how can be seeds be dispersed.
18. What are the functions of the following parts of a seed: testa, cotyledon, plumule, radicle, and micropyle?
19. Why is germination important to farmers?