Introduction to biology

Lesson plan and teacher's notes · Form 1 Biology · 1 period of 40 minutes

School	(write school name)	**Teacher**	(write name)
Date	(date)	**Class**	Form 1
Subject	Biology	**Enrolment**	Boys ___ Girls ___ Total ___
Time	40 minutes	**Topic**	Introduction to biology

Learners find out what biology is, test things against the seven characteristics of living things, and tell unicellular from multicellular organisms. The lesson uses things learners see every day: maize, goats, mosquitoes and a toy car.

Specific outcomes

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

1. Define biology, organism, cell, species and habitat
2. State the seven characteristics of living things using MRS GREN
3. Decide whether a thing is living by testing it against all seven characteristics
4. Tell unicellular from multicellular organisms and name the main branches of biology

Prior knowledge

- Living and non-living things in the home and school surroundings
- Names of common plants and animals
- That plants and animals grow

Teaching and learning materials

- chalk and board
- a leaf, a stone and a small toy from the classroom or school ground
- exercise books

References

Ministry of Education (CDC) Form 1 Biology syllabus and module; 25Schools learners' note: Introduction to biology.

Lesson development

Stage and time	Teacher activities	Learner activities
Introduction 5 min	Hold up a stone, a leaf and a toy. Ask which of them is alive and how learners know. Take answers without correcting them yet and write the word organism on the board.	Vote on each object and give one reason for their choice.
Development: seven characteristics 12 min	Write MRS GREN down the board and build each word with an example from the village: movement, respiration, sensitivity, growth, reproduction, excretion, nutrition. Stress that respiration happens inside cells and is not the same as breathing.	Copy MRS GREN and write one example for each letter from what they see at home.
Development: testing a thing 8 min	Test the toy car with the class against all seven words. Tick or cross each one on the board. Conclude that a living thing must show all seven.	Call out yes or no for each characteristic and give the reason.
Development: cells and branches 10 min	Draw one cell and a group of many cells. Explain unicellular and multicellular with Amoeba and a goat as examples. Name botany, zoology, microbiology and ecology in one line each.	Sort a list of organisms into unicellular and multicellular. Match each branch to what it studies.
Conclusion 5 min	Ask two learners to explain, in their own words, why a toy car is not alive and why biology matters to a farmer. Set the homework.	Answer and copy the homework.

Teacher's content notes

Read these before the lesson. They are what you need to know, not what to copy onto the board.

Biology and its basic words

Biology is the scientific study of living things, and a living thing is called an organism. Every organism is made of cells, and the cell is the smallest unit of life. A species is a group of organisms of the same kind that can breed together, and a habitat is the place where an organism finds food, water and shelter.

The seven characteristics

MRS GREN: movement, respiration, sensitivity, growth, reproduction, excretion and nutrition. Only living things show all seven. A non-living thing may show one or two. Respiration is the release of energy from food inside cells, which is why it differs from breathing.

Testing a toy car

A battery toy car shows movement only. It releases no energy from food in cells, does not detect and respond on its own, does not grow, does not reproduce, makes no waste from cell reactions and takes in no food. It is not living.

Unicellular and multicellular

A unicellular organism has one cell that carries out all seven life processes, as in bacteria, yeast and Amoeba. A multicellular organism has many cells that do different jobs. Similar cells form a tissue and tissues form an organ, such as a leaf or a heart.

Branches and importance

Botany studies plants, zoology studies animals, microbiology studies organisms too small to see without a microscope, and ecology studies how organisms live together and depend on their surroundings. Biology helps farmers grow food, helps doctors prevent and treat disease, and teaches everyday habits such as washing hands.

Questions to ask during the lesson

Question	Expected answer
A boy in the village finds a stone, a goat and a mushroom near the river and asks which are alive. (a) Say which of the three are organisms. (b) Say how you know the stone is not. (c) Name the word for the place where the goat finds food and shelter.	(a) The goat and the mushroom. (b) It does not show the seven characteristics. (c) Habitat.
A learner touches a mimosa plant and its leaves fold up at once, and a friend says plants cannot respond to anything. (a) Name the characteristic the mimosa shows. (b) Say what the touch is called. (c) Say why the friend is wrong.	(a) Sensitivity. (b) A stimulus. (c) Plants detect changes and respond to them.
A learner runs hard in a game of football, and her teacher says energy is being released in her cells. (a) Name the process in the cells. (b) Say how it differs from breathing. (c) Name one use of the energy.	(a) Respiration. (b) Breathing moves air in and out of the lungs; respiration happens inside cells. (c) Movement, growth or keeping warm.
A farmer wants to know which branch of biology would help her study the insects that eat her maize and the way they depend on the field. (a) Name the branch that studies animals. (b) Name the branch that studies how organisms depend on their surroundings. (c) Say which one is more useful here.	(a) Zoology. (b) Ecology. (c) Either can be defended; ecology fits best because it studies the insects and their surroundings together.

Worked examples for the board

Example 1: is the toy car alive?

A battery toy car moves across the floor. Test each characteristic: it moves, but it releases no energy from food in cells, does not respond on its own, does not grow, does not reproduce, makes no waste and takes in no food. It shows one of seven, so it is not living.

Example 2: sorting organisms

A learner lists a bacterium, a goat, yeast and a fish. The bacterium and yeast have one cell each, so they are unicellular. The goat and the fish have many cells, so they are multicellular.

Example 3: a malaria net

A treated mosquito net stops mosquitoes from biting. Biology explains that malaria is carried by the female Anopheles mosquito, so a net and clearing standing water prevent it. This is biology applied in medicine.

Board plan

Write the title and the word organism. Left: MRS GREN down the page with one village example beside each letter. Centre: a table comparing unicellular and multicellular. Right: the four branches of biology with a one-line meaning each. Leave a corner to tick and cross the toy car.

	Unicellular	Multicellular
Number of cells	One	Many
Examples	Bacteria, yeast, Amoeba	Plant, fish, goat, human
Size	Usually very small	Usually larger

Unicellular and multicellular organisms as drawn on the board

Mistakes to expect

Learners often think	Put it right
Respiration is the same as breathing.	Breathing brings air in and out of the lungs. Respiration happens inside cells, where energy is released from food.
Anything that moves is alive.	Test a battery toy car against all seven characteristics. It moves but fails the other six.
Plants are not alive because they do not move.	Show that a sunflower turns towards the sun and roots grow downwards. Plants move, but slowly.

Differentiation

Learners who struggle

Give struggling learners the seven words on a strip of paper and let them match each word to an example before they write their own. Test the leaf first, because it is easier than the car.

Learners who finish early

Ask learners who finish early to test a mushroom or a termite mound against the seven characteristics and decide whether each is living.

Hearing or visual impairment

For learners with hearing impairment, write each characteristic on the board and face the class when explaining it. For learners with visual impairment, let them handle the leaf, the stone and the toy and describe each aloud, and read the MRS GREN list slowly.

No projector, no printing

Everything needed is on the school ground: a leaf, a stone and any small object. The examples come from home, and all drawings are done on the board.

If time is short

Keep MRS GREN and the toy car test, which carry the main idea. Move unicellular and multicellular to the next lesson and set the branches of biology as reading for homework.

Evaluation

Question or task	A correct answer shows
A learner at the school pond finds a small green ball that floats, and she wants to know whether it is living. (a) Name three characteristics she could look for. (b) Say what she must observe to show it grows. (c) Say what the ball must show before she can call it a living thing.	(a) Any three of movement, respiration, sensitivity, growth, reproduction, excretion, nutrition. (b) That it gets bigger over time. (c) All seven characteristics.
A farmer looks at a drop of pond water under a microscope and sees one tiny creature, Amoeba, moving, and a water plant nearby. (a) Say whether Amoeba is unicellular or multicellular. (b) Say whether the water plant is unicellular or multicellular. (c) Say which branch of biology studies tiny organisms.	(a) Unicellular. (b) Multicellular. (c) Microbiology.
A nurse at a rural clinic tells a mother that malaria is carried by the female Anopheles mosquito and advises a treated net and clearing standing water. (a) Name the area of biology the nurse is using. (b) Say how the net helps. (c) Say how clearing standing water helps.	(a) Biology in medicine. (b) It stops mosquitoes biting people at night. (c) It removes places where mosquitoes breed.

Homework

A learner takes a toy car, a maize plant and a goat and tests each against the seven characteristics of living things. (a) Write the seven characteristics in order. (b) Say which of the three are living. (c) Explain why the toy car is not living.

Extra practice with answers

Question	Answer

1. A learner plants a maize seed and measures the seedling each week, noting that it grows taller and its roots go down. (a) Name the characteristic of living things shown. (b) Name another characteristic shown by the roots. (c) Say what the learner should compare with a stone left beside it.	(a) Growth. (b) Sensitivity or movement, because roots grow downwards. (c) That the stone does not grow or change.
2. A chicken in a village yard lays eggs, eats grain and passes waste. (a) Name the characteristic shown by the eggs. (b) Name the characteristic shown by eating grain. (c) Name the characteristic shown by the waste.	(a) Reproduction. (b) Nutrition. (c) Excretion.
3. A pond holds Amoeba, yeast and a large water lily. (a) Say which are unicellular. (b) Say which is multicellular. (c) Explain why the lily needs tissues and organs.	(a) Amoeba and yeast. (b) The lily. (c) Its cells do different jobs, such as roots taking in water and leaves making food.
4. A learner says that biology is only about animals because the teacher showed a goat. (a) Name the branch that studies plants. (b) Name the branch that studies bacteria. (c) Say why the learner is wrong.	(a) Botany. (b) Microbiology. (c) Biology studies all living things, including plants and microscopic organisms.
5. A school garden group wants better maize that resists drought and gives more grain. (a) Name the area of biology that helps them. (b) Give one way biology helps farmers keep livestock healthy. (c) Give one way biology helps them protect crops.	(a) Biology in agriculture. (b) Knowing how animals feed and reproduce. (c) Knowing how pests and diseases spread.
6. A boy says that a flame is living because it moves, grows bigger and needs oxygen. (a) Name two characteristics a flame seems to show. (b) Name two it does not show. (c) Say why it is not living.	(a) Movement and growth. (b) Any two of sensitivity, reproduction, excretion, nutrition or respiration in cells. (c) A living thing must show all seven.

Answers to the learners' check-yourself questions

1. Define biology and organism.
   Biology is the scientific study of living things. An organism is any living thing.
2. List the seven characteristics of living things.
   Movement, respiration, sensitivity, growth, reproduction, excretion and nutrition.
3. What is the difference between breathing and respiration?
   Breathing is moving air in and out of the lungs. Respiration is the process in cells that releases energy from food.
4. A mimosa plant folds its leaves when touched. Which characteristic is this?
   Sensitivity. Touch is the stimulus and the folding of leaves is the response.
5. Give two differences between unicellular and multicellular organisms.
   Unicellular organisms have one cell and are usually microscopic; multicellular organisms have many cells that do different jobs and are usually larger. Any two such differences are correct.

6. Give one example of a unicellular and one of a multicellular organism.
   Unicellular: Amoeba, bacteria or yeast. Multicellular: maize, goat, fish or human.
7. Name the branch of biology that studies plants and the branch that studies animals.
   Botany studies plants and zoology studies animals.
8. State two ways biology helps a farmer.
   It helps the farmer choose fertiliser, control pests and diseases, grow better crop varieties and keep healthy livestock. Any two are correct.

Teacher's reflection

What went well:

What I will change next time:

Learners who need follow-up: