Feeding relationships and energy flow

Lesson plan and teacher's notes · Form 2 Biology · 1 period of 40 minutes

School	(write school name)	**Teacher**	(write name)
Date	(date)	**Class**	Form 2
Subject	Biology	**Enrolment**	Boys ___ Girls ___ Total ___
Time	40 minutes	**Topic**	Feeding relationships and energy flow

Learners say what a feeding relationship is, name producers, consumers and decomposers, describe a food chain and a food web, explain how energy flows from the sun through living things, and name the six kingdoms. Examples come from grass and cattle in a village, the Luangwa river and a game park in the Luangwa valley.

Specific outcomes

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

1. Say what a feeding relationship is
2. Name producers, consumers and decomposers and give examples
3. Describe a food chain and a food web
4. Explain how energy flows from the sun through living things
5. Name the six kingdoms of organisms

Prior knowledge

- Green plants make food by photosynthesis
- Animals eat plants or other animals
- Living things need energy to grow, move and survive

Teaching and learning materials

- chalk and board
- exercise books
- pictures or names of local plants and animals written on the board

References

Ministry of Education (CDC) Form 2 Biology syllabus and module; 25Schools learners' note: Feeding relationships and energy flow.

Lesson development

Stage and time	Teacher activities	Learner activities
Introduction 5 min	Ask where the energy in our food really begins. Mention grass and cattle in a village and fish and the birds that catch them in the Luangwa river, and write the title and key words.	Suggest answers and copy the title and key words.
Development: producers, consumers and decomposers 10 min	Explain that the sun is the main source of energy and that green plants are producers. Define herbivore, carnivore, omnivore, primary, secondary and tertiary consumers and decomposers with examples.	Copy the definitions and give one local example of each group.
Development: food chains, food webs and energy flo 10 min	Draw the chain grass, rabbit, fox and fungi. Explain energy flow, food web and trophic level, and show how a food web joins many chains.	Draw the chain, label each organism and write how energy moves along it.
Development: six kingdoms 8 min	Explain that organisms are placed in six kingdoms based on cell type, structure and how they get food, and give one example of each.	List the six kingdoms with an example of each.
Conclusion 7 min	Work the Luangwa game park chain with the class. Set the homework.	Answer orally 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.

Source of energy

The main source of energy for most living things is the sun. Green plants use sunlight, water and air to make their own food by photosynthesis, so they are called producers.

Types of consumer

Animals cannot make their own food and are consumers. A herbivore eats only plants, a carnivore eats other animals and an omnivore eats both. A primary consumer eats plants, a secondary consumer eats animals that feed on plants and a tertiary consumer is a top predator that feeds on other carnivores.

Decomposers

Fungi and bacteria feed on dead plants and animals. They are decomposers and they return nutrients to the soil.

Food chain and food web

A food chain is a simple line that shows how energy moves from one living thing to another. A food web is a network of many connected food chains.

Energy flow and trophic level

Energy moves from one organism to the next when one eats the other, and this movement is called energy flow. The feeding position of an organism in a food chain is its trophic level.

Six kingdoms

Organisms are placed in six kingdoms based on their cell type, structure and how they get food: animals, plants, fungi, protists, Eubacteria and Archaebacteria. Archaebacteria live in extreme conditions like hot springs.

Questions to ask during the lesson

Question	Expected answer
A farmer in a village near Feira has grass in the field that cattle eat, and she asks where the energy in the cattle begins. (a) Name the main source of energy. (b) Name the producer in this chain. (c) Name the consumer and say whether it is a herbivore.	(a) The sun. (b) Grass. (c) The cattle, which are herbivores because they eat only plants.
Learners at a school near the Luangwa river watch fish eat small organisms and birds catch the fish. (a) What is the line showing this feeding called. (b) What is the movement of energy along it called. (c) What would a network of many such lines be called.	(a) A food chain. (b) Energy flow. (c) A food web.
A teacher at a school near Feira finds a dead animal on the school field, and after some weeks fungi grow on its body. (a) What are the fungi called in a food chain. (b) What do they return to the soil. (c) Say why this matters to plants.	(a) Decomposers. (b) Nutrients. (c) The nutrients return to the soil, which helps plants grow.

Worked examples for the board

Naming each organism in the chain grass, rabbit, fox and fungi

Grass grows in the field, a rabbit eats the grass, a fox eats the rabbit, and when the fox dies, fungi decompose its body and return nutrients to the soil. Grass makes its own food, so it is the producer. The rabbit eats plants, so it is the primary consumer and a herbivore. The fox eats an animal that feeds on plants, so it is the secondary consumer. The fungi break down the dead fox, so they are decomposers.

Following the energy from the sun to a person

Maize uses sunlight, water and air to make its own food by photosynthesis, so maize is a producer. A person who eats the maize gets energy from it, so the person is a consumer. The energy moves from the sun to the maize and then to the person, and this movement is called energy flow.

Board plan

Write the title and key words. Left: the food chain grass, rabbit, fox and fungi with arrows. Centre: a table of producers, consumers and decomposers. Right: the six kingdoms.

Group	How it gets energy	Example in the note
Producer	Makes its own food by photosynthesis	Green plants, maize, grass
Primary consumer	Eats plants	A herbivore such as a rabbit
Secondary consumer	Eats animals that feed on plants	A fox
Tertiary consumer	A top predator that feeds on other carnivores	A top predator
Decomposer	Feeds on dead plants and animals and returns nutrients to the soil	Fungi and bacteria

Producers, consumers and decomposers

Mistakes to expect

Learners often think	Put it right
Animals make their own food like plants do.	Animals cannot make their own food. They are consumers and depend on plants or other animals for energy.
Decomposers are not part of a food chain.	Fungi and bacteria feed on dead plants and animals and return nutrients to the soil, so they complete the chain.
A food chain and a food web are the same.	A food chain is a simple line of feeding. A food web is a network of many connected food chains.
The energy in food begins with the animal that is eaten.	The main source of energy for most living things is the sun, which green plants use to make their own food.

Differentiation

Learners who struggle

Give learners a drawing of the chain grass, rabbit, fox and fungi with blank labels, and let them write producer, primary consumer, secondary consumer and decomposer in the right places.

Learners who finish early

Ask learners who finish early to draw a food web with two chains from their own area and mark the trophic level of each organism.

Hearing or visual impairment

For learners with visual impairment, describe the chain aloud step by step and let them arrange real objects such as a leaf, a toy animal and a soil sample in order. For learners with hearing impairment, write each key word on the board and draw arrows to show the direction of energy.

No projector, no printing

Write the chain and the six kingdoms on the board and use local plants and animals from the school surroundings as examples. Learners copy the diagram in their exercise books.

If time is short

Skip the six kingdoms stage and set it as homework; keep the chain, the producer, consumer and decomposer groups and the Luangwa game park scenario.

Evaluation

Question or task	A correct answer shows
In a game park in the Luangwa valley, grass is eaten by an impala, the impala is eaten by a leopard, and when the leopard dies fungi break down its body. (a) Name the producer. (b) Name the primary and the secondary consumer. (c) Explain what the fungi do for the soil and the grass.	(a) Grass. (b) The impala is the primary consumer and the leopard is the secondary consumer. (c) The fungi decompose the body and return nutrients to the soil, which helps grass grow.
A farmer in a village near Feira says that the energy in her maize really begins with the sun. (a) Do you agree. (b) Explain how energy gets from the sun to a person who eats the maize. (c) Name the producer and the consumer in this chain.	(a) Yes. (b) The maize uses sunlight, water and air to make food by photosynthesis, and the person gets the energy by eating the maize. (c) The maize is the producer and the person is the consumer.
A learner at a school near Feira is asked to place a dog, maize, a mushroom, an amoeba and a bacterium found in hot springs into the six kingdoms. (a) Name the kingdom of the dog and of the maize. (b) Name the kingdom of the mushroom and of the amoeba. (c) Name the kingdom of the bacterium in hot springs.	(a) Animals and plants. (b) Fungi and protists. (c) Archaebacteria.

Homework

A learner near Feira draws a food chain showing grass, a rabbit, a fox and fungi in a field. (a) Say which organism is the producer and which is the decomposer. (b) Explain how energy moves from one organism to the next. (c) Say what the fungi return to the soil when the fox dies.

Extra practice with answers

Question	Answer

1. In a game park in the Luangwa valley, grass is eaten by an impala, the impala is eaten by a leopard, and when the leopard dies fungi break down its body. (a) Name the producer. (b) Name the primary and the secondary consumer. (c) Explain what the fungi do for the soil.	(a) Grass. (b) The impala is the primary consumer and the leopard is the secondary consumer. (c) The fungi decompose the body and return nutrients to the soil.
2. A farmer in a village near Feira says that the energy in her maize really begins with the sun. (a) Do you agree. (b) Explain how energy gets from the sun to a person who eats the maize. (c) Name the producer and the consumer in this chain.	(a) Yes. (b) The maize uses sunlight, water and air to make food by photosynthesis, and the person gets the energy by eating the maize. (c) The maize is the producer and the person is the consumer.
3. A learner near Feira says that a food chain and a food web are the same thing, and gives the chain grass, rabbit, fox and fungi as an example. (a) Do you agree. (b) Explain the difference. (c) Name the decomposer in the chain.	(a) No. (b) A food chain is a single line of feeding, while a food web is a network of many connected food chains. (c) The fungi.
4. A teacher near Feira asks a learner to name the six kingdoms and give an example of the kingdom that includes dogs and humans and the one that includes trees and maize. (a) Name the six kingdoms. (b) Name the kingdom of dogs and humans. (c) Name the kingdom of trees and maize.	(a) Animals, plants, fungi, protists, Eubacteria and Archaebacteria. (b) Animals. (c) Plants.

Answers to the learners' check-yourself questions

1. What is a producer? Give an example.
   An organism that makes its own food, usually a green plant such as maize.
2. What is a decomposer? Give an example.
   An organism that breaks down dead plants and animals and returns nutrients to the soil, such as a fungus or a bacterium.
3. What is the difference between a food chain and a food web?
   A food chain is a single line of feeding; a food web is a network of many connected food chains.
4. Name the six kingdoms of organisms.
   Animals, plants, fungi, protists, Eubacteria and Archaebacteria.
5. What is a secondary consumer?
   An animal that eats other animals which feed on plants.
6. In a game park in the Luangwa valley, grass is eaten by an impala, the impala is eaten by a leopard, and when the leopard dies fungi break down its body. (a) Name the producer. (b) Name the primary and the secondary consumer. (c) Explain what the fungi do for the soil and the grass.
   (a) Grass. (b) The impala is the primary consumer and the leopard is the secondary consumer. (c) The fungi decompose the body and return nutrients to the soil, which helps grass grow.

7. A farmer in a village near Feira says that the energy in her maize really begins with the sun. (a) Do you agree? (b) Explain how energy gets from the sun to a person who eats the maize. (c) Name the producer and the consumer in this chain.
   (a) Yes. (b) The maize uses sunlight, water and air to make food by photosynthesis, and the person gets the energy by eating the maize. (c) The maize is the producer and the person is the consumer.

Teacher's reflection

What went well:

What I will change next time:

Learners who need follow-up: