

Objective :

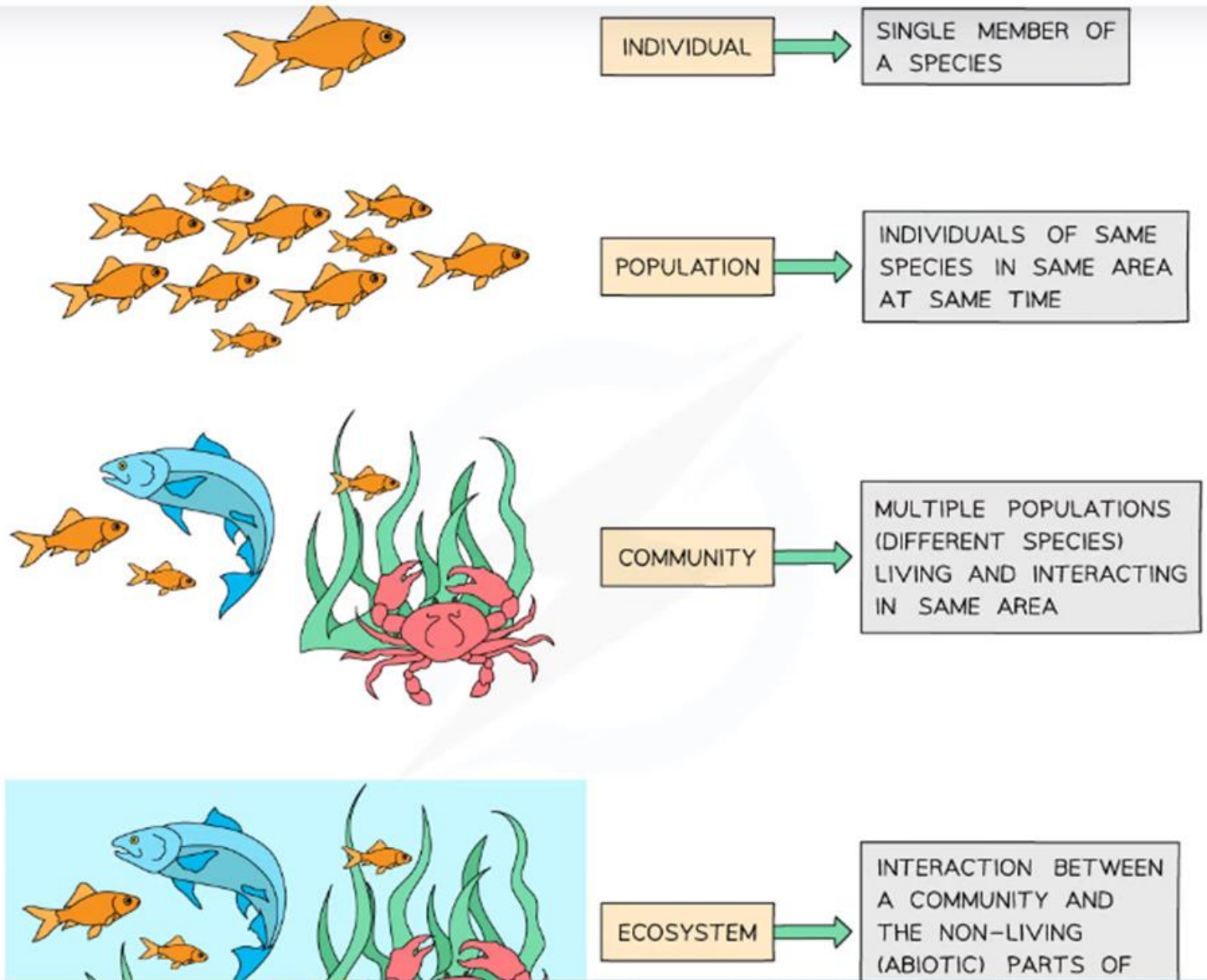
- Explain what food chains and food webs show.
- Model energy flow through food chains.

Resources : Power point

https://www.youtube.com/watch?v=eGG7hyx_HlA video ecosystem

https://www.liveworksheets.com/worksheets/en/Science/Food_chain/Food_chain_se548131kf2

Key terms

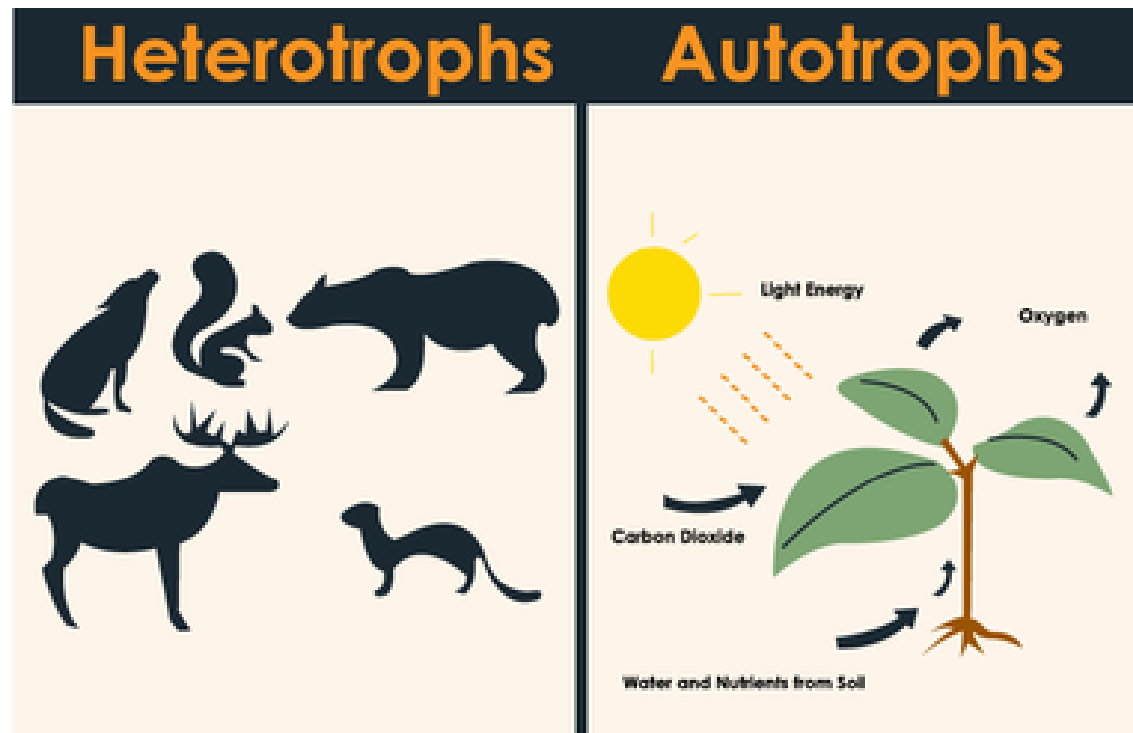


An ecosystem consists of:

- **Abiotic factors**, which are the non-living things such as soil, atmosphere, heat, sunlight and water
- **Biotic factors**, which are the different living organisms interacting with those abiotic factors.

Living organisms can be divided into two main categories, autotrophs and heterotrophs, based on the way they obtain their food.

- ✓ Autotrophs are producers.
- ✓ Heterotrophs are consumers and decomposers .



Animals are classified according to their feeding styles into:

- ▶ **Herbivore:** an animal that only eats plants.
- ▶ **Carnivore:** an animal that only eats other animal.
- ▶ **Omnivore:** an animal that eats both plants and animals.

- ▶ **Food chain:** a diagram that shows the way some organisms in a habitat are linked to each other through feeding.
- ▶ **The arrows** represent **the flow of energy**, the producers absorb light energy and produce biomass (the energy in living organisms).

In a food chain, organisms are classified according to their role into:

- ▶ **Producer:** an organism that produces food at the beginning of a food chain (usually a plant)
- ▶ **Consumer:** an animal that eats plants, other animals or both.
- ▶ **Primary consumer:** an animal that eats plants (this maybe a herbivore or an omnivore)
- ▶ **Secondary consumer:** an animal that eats primary consumers (this maybe a carnivore or an omnivore)
- ▶ **Tertiary consumer:** an animal that eats secondary consumers (this maybe a carnivore or an omnivore)
- ▶ **Quaternary consumer:** an animal that eats tertiary consumers.
- ▶ **Top carnivore:** an animal at the end of the food chain.



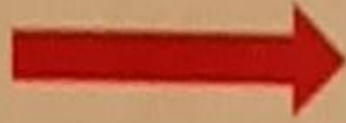
producers



primary consumers



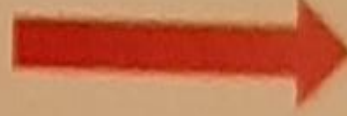
herbivores



secondary consumers



carnivores



tertiary consumer



carnivore

- ▶ In any habitat, the producers absorb light energy and produce biomass (the energy in living organisms).
- ▶ When consumers eat this biomass, only 10% of the energy will be stored in the second level and the rest of the energy will be wasted or consumed for life processes.
- ▶ **Energy is lost at each level in a food chain or a food web as shown in the figure below: (observe the change in size of the arrows)**

energy lost as waste heat



energy trapped by photosynthesis



a lot of grass

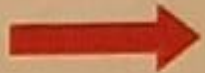
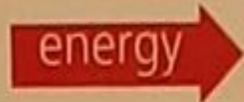


many impala

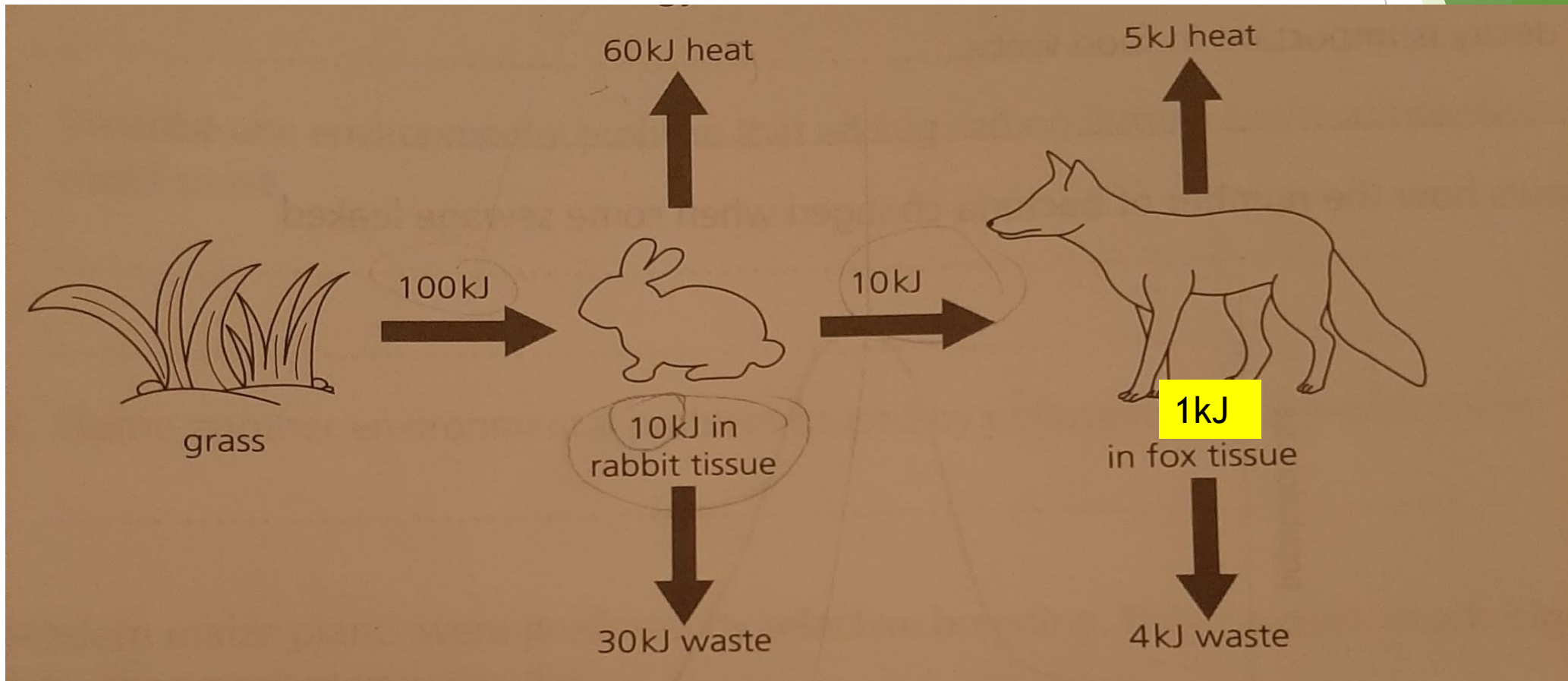


1 cheetah

energy lost in waste products

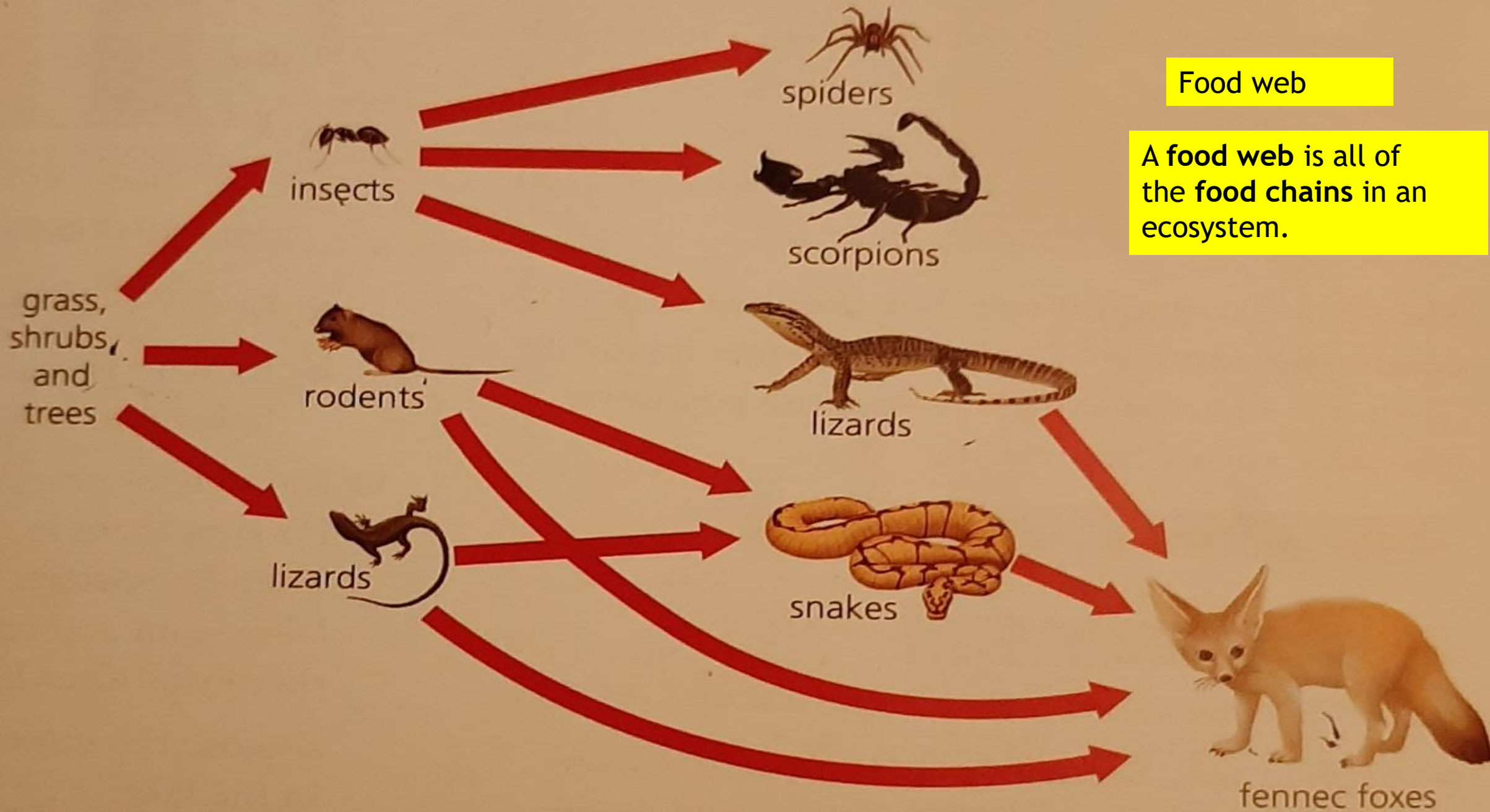


Example :The diagram below shows the energy transfer in a food chain :
Calculate how much energy the fox uses to build new tissues .



Food web

A food web is all of the food chains in an ecosystem.



Example : Look at the food web below then answer the questions:

1. Which of the animals are primary consumers?

snails , woodlice and millipedes

2. Which of the animals are secondary consumers?

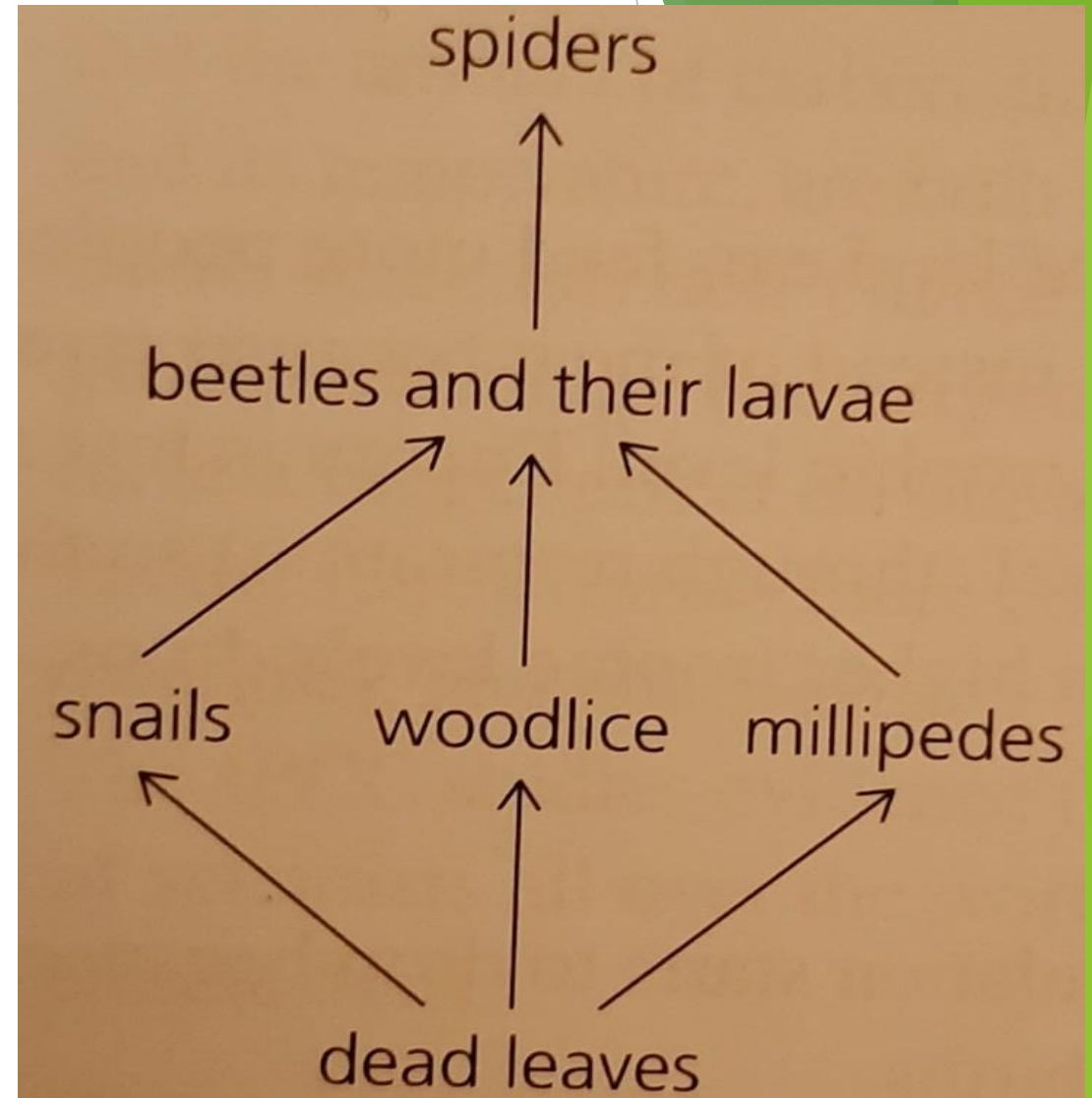
beetles and their larvae

3. What types of living thing are the producers at the start of food chains?

dead leaves

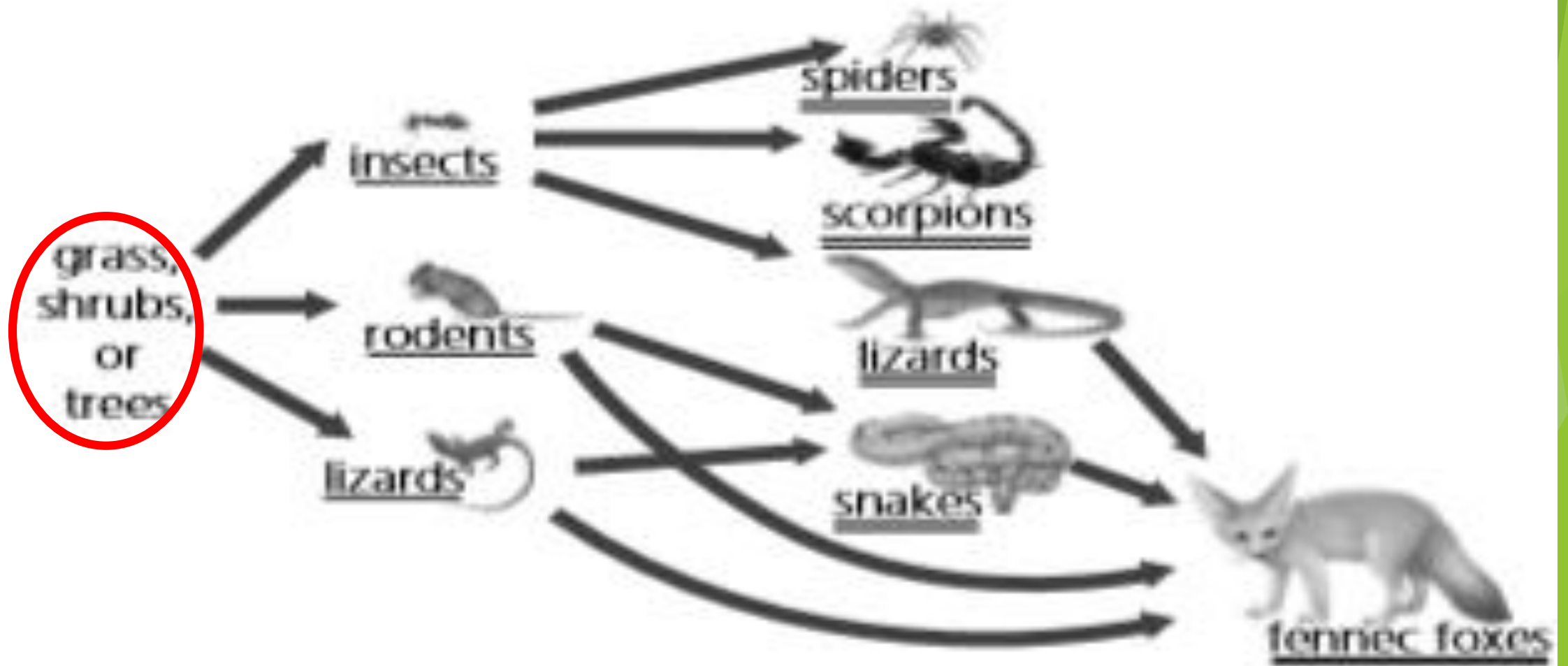
4. Explain what the arrows in a food web represent ?

the energy flow



Workbook page 79 ,question 1 :

The diagram shows part of a desert food web:



a. Add a producer to the food web.

b. Name all the consumers :

insects , rodents , lizards ,spiders ,scorpions , lizards ,snakes ,foxes

c. Underline all the primary consumers.

d. Double underline all the secondary consumers.

e. What type of consumer is a fennec fox? circle the correct answer

Tertiary consumer

Secondary consumer

Both of them

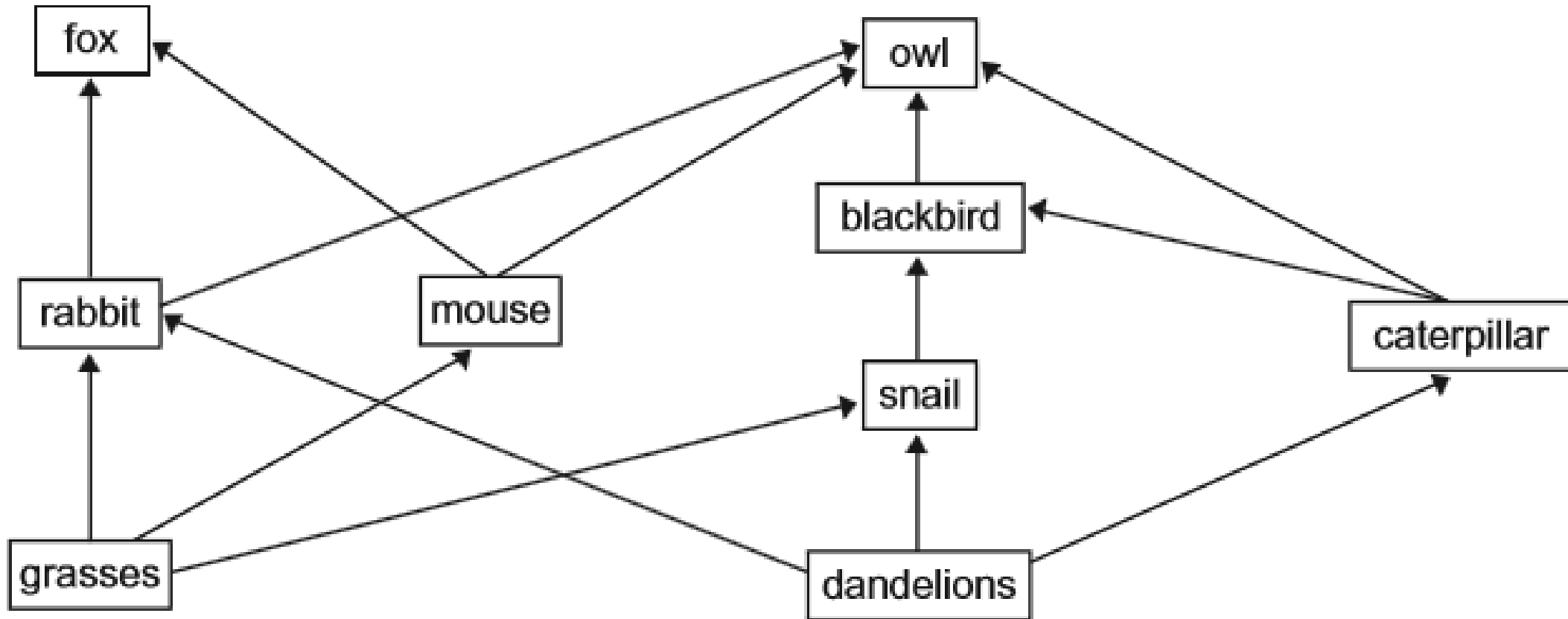
f. Some lizard species are herbivores, others are carnivores. Write two food chains, one for each type of lizard.

Grass shrubs or trees → lizards → foxes (herbivore)

Grass shrubs or trees → insects → lizards → foxes (carnivore)

Extra practice 1 :

The diagram shows a food web in areas of grassland.



a. Classify the organisms in the table below.

Producers	herbivores	carnivores
Grasses	Rabbit	Fox
	Mouse	Owl
Dandelions	Snail	Blackbird
	Caterpillar	

b. Write three food chains from this food web.

Grasses → **rabbit** → **fox**

Dandelions → **caterpillar** → **owl**

grasses → **mouse** → **fox**

c. One year the snail population increased in the grassland area.

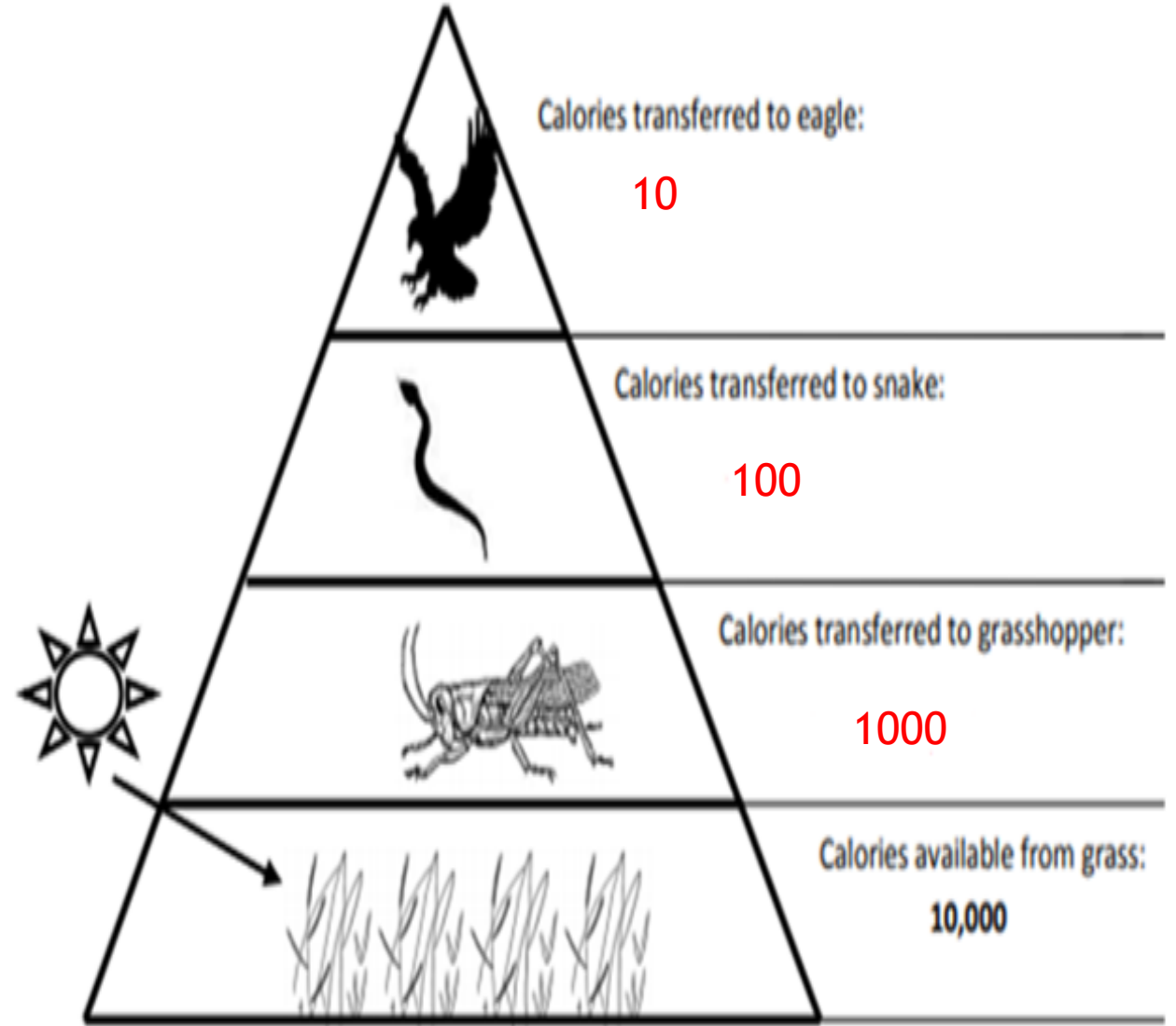
How could an increase in the number of snails cause the caterpillar population to change?

The caterpillar population will decrease because both of them feed on dandelions

Extra practice 2 :

The diagram shows an energy pyramid which represents the amount of energy available at each trophic level in this food chain .

1. Name the producer: **Grass**
2. Name the animal in the 3rd trophic level : **snake**
3. Name the top carnivore : **eagle**
4. Calculate the amount of energy that will be transferred in each level ?
on the diagram



15.1

Food webs

Objective

- Construct food chains and webs and explain what they show

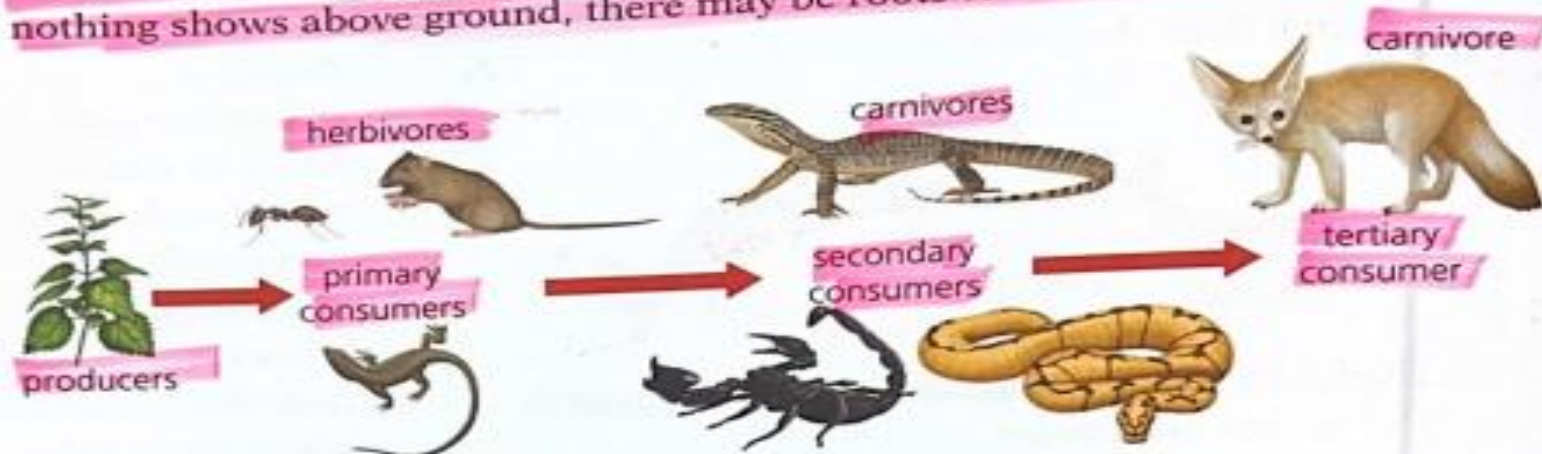
Life in the Sahara

Camels have adapted to life in the desert. They can walk all day, surviving high temperatures and lack of water. Most smaller desert animals rest underground or in shadows during the day.



Camels have adapted to life in the desert.

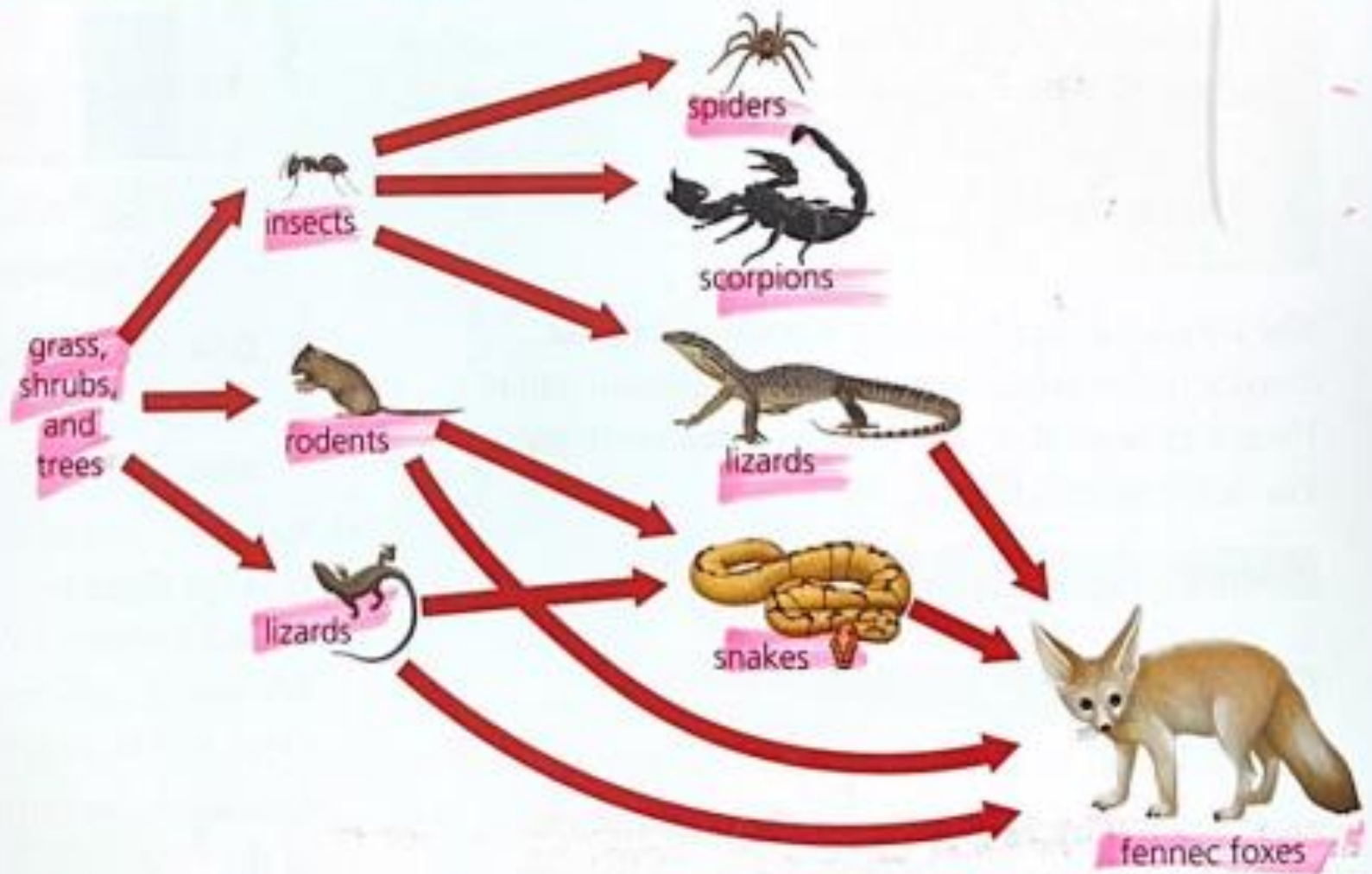
In the desert there are many herbivore species of insect, lizard, and rodent. **They are primary consumers, feeding on the desert grasses, shrubs, and trees. Even when nothing shows above ground, there may be roots to feed them underground.**



All animals are consumers – they cannot make their own food.

Carnivorous lizards, spiders, snakes, and scorpions prey on the herbivores. They are **secondary consumers**. Fennec foxes eat a mixture of herbivores and carnivores. When they consume other carnivores, they are **tertiary consumers**.

Passing on energy



↑ Food chains link to form food webs.

Food chains link to form food webs. Most animals have more than one source of food.

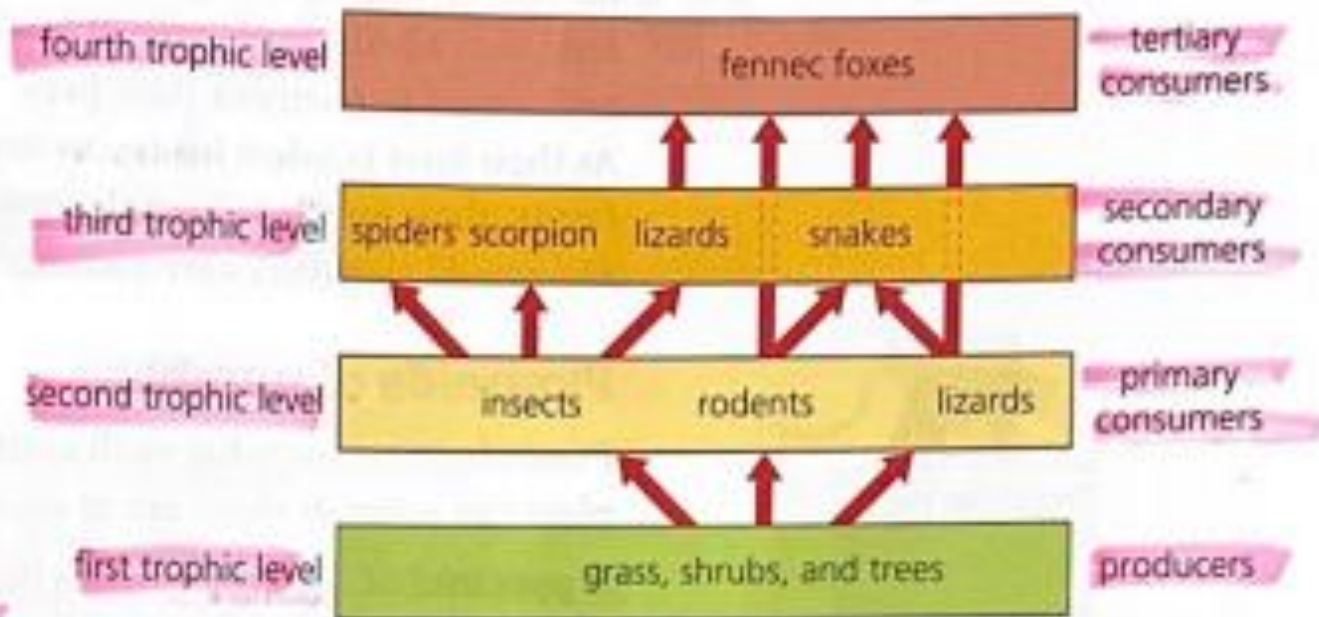
In a food web each image represents not just one organism but the whole **population** of that type of plant or animal. Scientists often compare the total biomass of each population in a food web.

There may be many different species present in a food web. **The arrows represent the flow of energy through the web.** The producers absorb light energy and produce biomass. When consumers eat this biomass, some of the energy the producers took in passes to them.

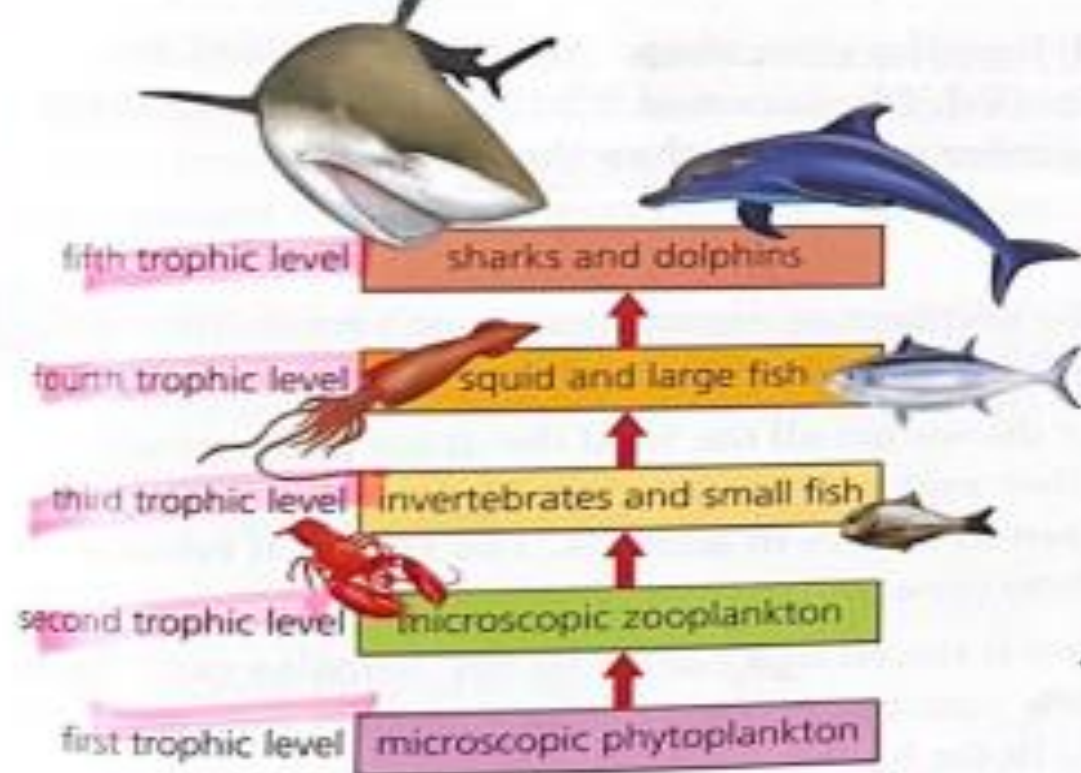
Trophic levels

The position of a living thing in a food chain is called its **trophic level**. The producers at the beginning of a food chain represent trophic level 1. Primary consumers (herbivores) make up trophic level 2, and all the animals at higher trophic levels are carnivores.

Fennec foxes feed at the third trophic level when they eat primary consumers such as rodents. They feed at the fourth trophic level when they eat secondary consumers such as snakes. So their trophic level is somewhere between 3 and 4.



Each step in a food chain represents a trophic level.



Ocean food webs

Most of the producers in the oceans are microscopic living things called phytoplankton. These grow and reproduce quickly. They support huge populations of tiny herbivores called zooplankton. These in turn feed larger invertebrates and small fish.

Small fish are eaten by squid and larger fish, and these are eaten by larger predators like sharks and dolphins.

The food webs in the ocean usually have more trophic levels than those on land.

← Ocean food webs usually have more trophic levels than those on land.

Q Use the following information to construct a food web:

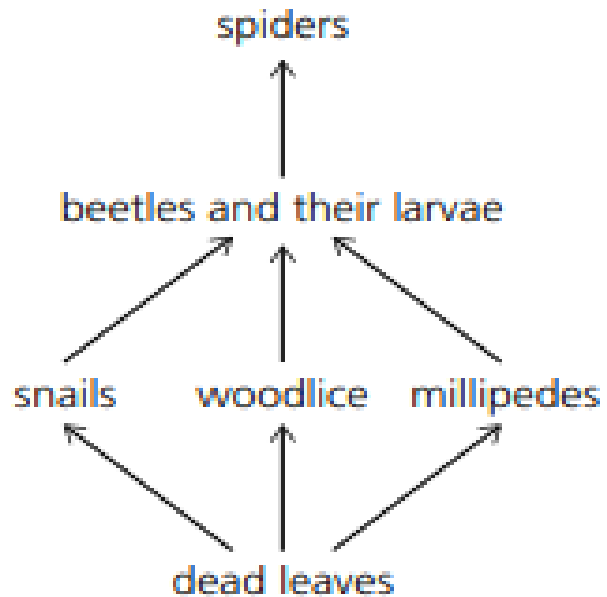
- 1 Snails, woodlice, and millipedes feed on dead leaves. Beetles eat millipedes and beetle larvae eat snails and woodlice. Spiders are also carnivorous. They eat both beetles and their larvae.
- 2 Which of the animals in question 1 are secondary consumers?
- 3 Which of the animals in question 1 make up the second trophic level?
- 4 What types of living thing are the producers at the starts of food chains?
- 5 Explain what the arrows in a food web represent.

- Energy is passed along food chains from producers to consumers.
- Each step in a food chain represents a trophic level.
- Food chains link to form food webs.

Questions 1,2,3,4,5 page 185

15.1 Food webs

1



2

The secondary consumers are beetles and their larvae.

3

Snails, woodlice, and millipedes make up the second trophic level.

4

The producers at the starts of food chains are plants (algae or phytoplankton). / autotrophs

5

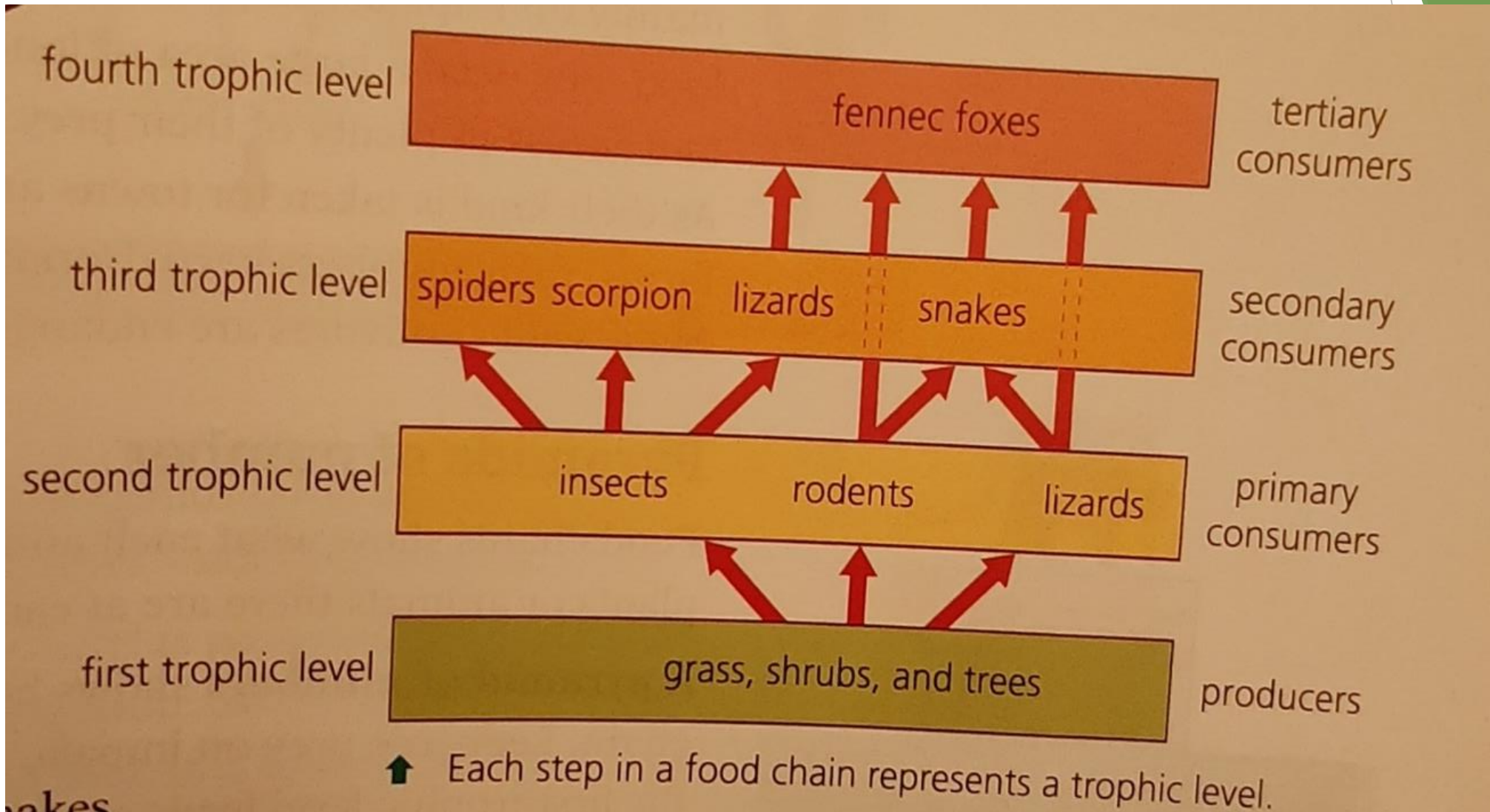
The arrows in a food web represent the flow of energy

Trophic levels :

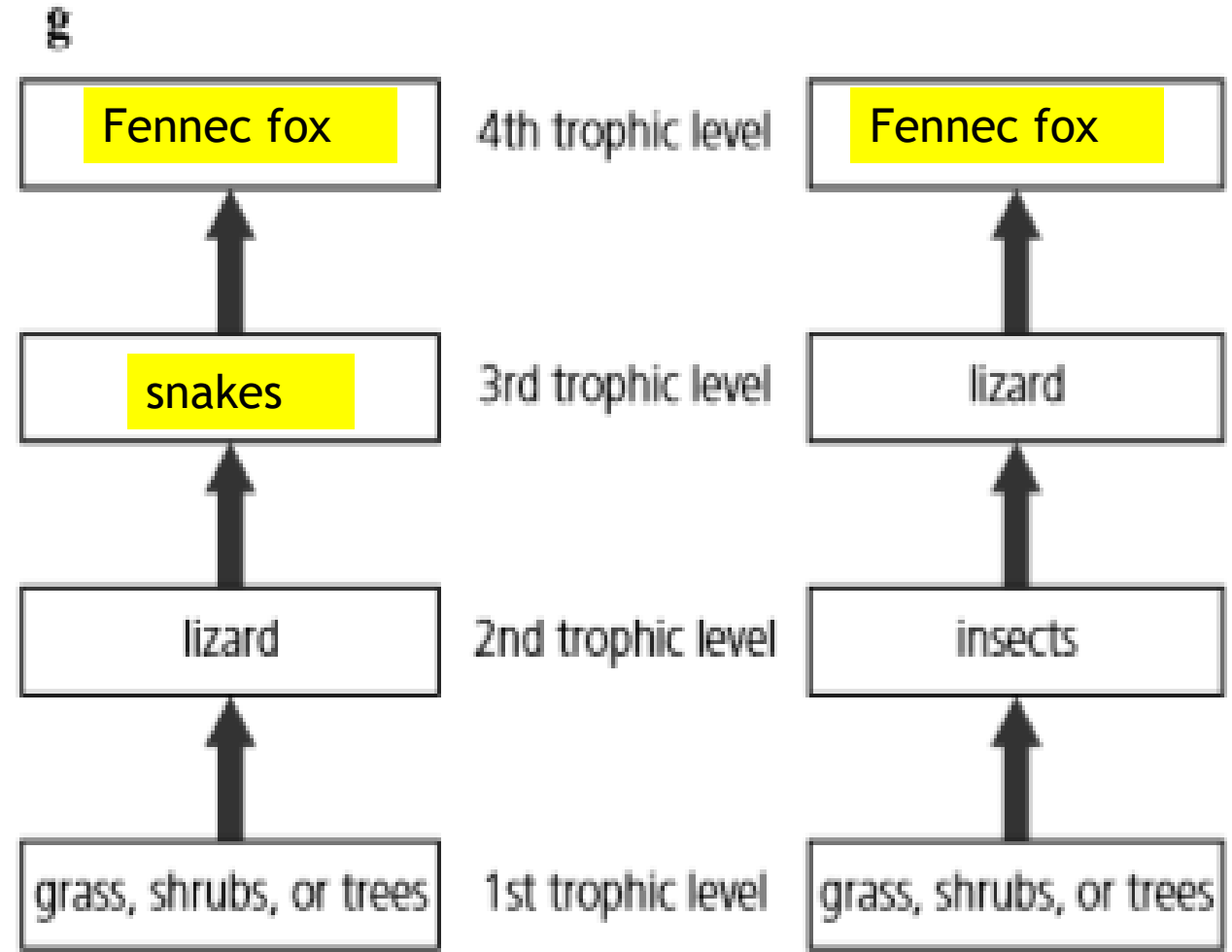
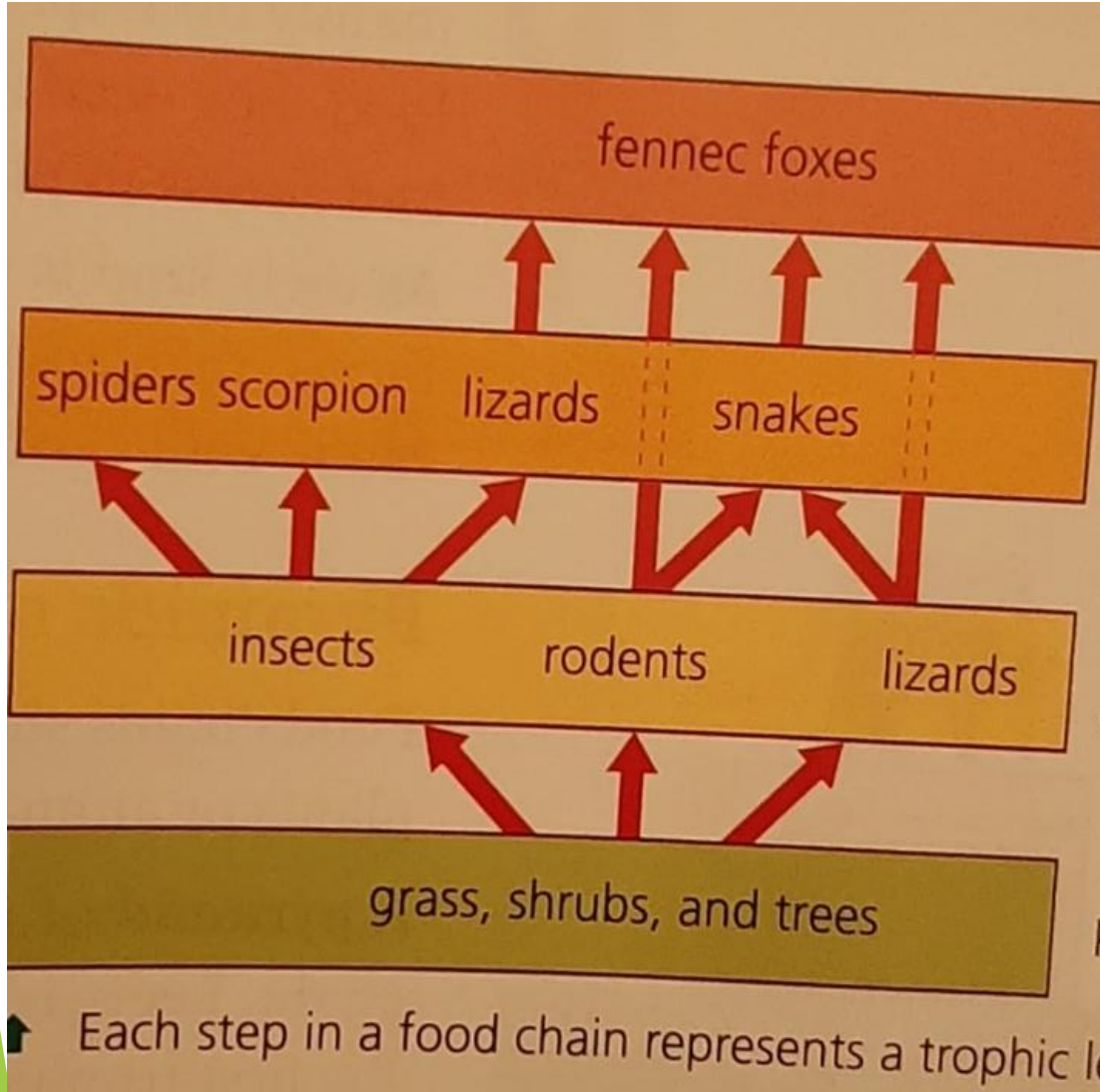
The position of a living thing in a food chain is called a trophic level.

- ▶ The producers \longrightarrow 1st trophic level
- ▶ Primary consumers (herbivores) \longrightarrow 2nd trophic level
- ▶ *All the animals at higher trophic levels are carnivores.*
- ▶ *Biomass decreases with each trophic level. There is always more biomass (stored energy) in lower trophic levels than in higher ones.*

Trophic levels



Question : Complete the diagram below by putting each organism in each lizard's food chain in the correct trophic level.



TROPHIC LEVEL 1
(PRODUCER)

TROPHIC LEVEL 2
(PRIMARY CONSUMER)

TROPHIC LEVEL 3
(SECONDARY CONSUMER)

TROPHIC LEVEL 4
(TERTIARY CONSUMER)

TROPHIC LEVEL 5
(QUATERNARY CONSUMER)



GRASS

GRASSHOPPER

FROG

PYTHON

EAGLE

APEX PREDATOR



- 1 In the desert, insects eat plants and foxes eat lizards. Most of the insects are eaten by lizards.



- a Draw a sketch that links these animals to form a food chain. [1]
- b How would the number of lizards change if the foxes all died? [1]

- 1a Students should produce a sketch to illustrate the following food chain: plant → insect → lizard → fox.
- b The number of lizards would increase if the foxes all died.

Review question 2 page 196

2 This food chain is found in the Antarctic:

Phytoplankton → krill → squid → penguin → seal

Name an organism from the food chain that fits each of these categories:

- a predator [1]
- b prey [1]
- c herbivore [1]
- d tertiary consumer [1]
- e primary consumer [1]
- f in the first trophic level [1]
- g in the highest trophic level. [1]

- 2a Any one from: squid; penguin; seal.
- b Any one from: krill; squid; penguin.
- c Krill.
- d Penguin
- e Krill.
- f Phytoplankton
- g Seal.