

Exercise walk-through

Energy flow ■ 19.1

eXercise

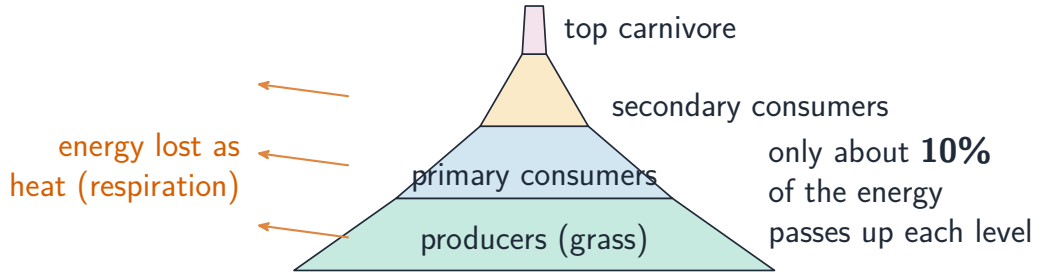
You must be able to

- describe how energy enters and flows through a food chain
- explain why only $\sim 10\%$ of energy passes up each level
- interpret pyramids of numbers, biomass and energy

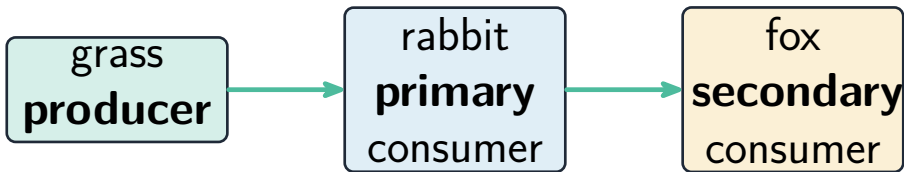
Method — Energy loss

- the rest is lost as heat (respiration), in movement and in waste.
- so chains have fewer than ~5 levels; eating plants directly wastes less energy.

Method — Energy loss



An energy pyramid: ~10% passes up each level



each arrow shows energy flowing to the next organism

Energy flows along a food chain

Practice 2.1 ■ 1 mark

State the main source of energy for almost all food chains.

Solution 2.1

Method: Energy loss

Worked steps

the Sun **B1**.

Practice 2.2 ■ 1 mark

State the form in which most energy is lost at each trophic level.

Solution 2.2

Method: Energy loss

Worked steps

as heat (from respiration) **B1**.

Exam-style 3.1 ■ 1 mark

Roughly what percentage of energy passes from one trophic level to the next?

A 1%

B 10%

C 50%

D 90%

Solution 3.1

Method: Energy loss

A 1%

B 10% 

C 50%

D 90%

Worked steps

B. About 10% passes up each level.

Exam-style 3.2 ■ 2 marks

Energy is lost along a food chain.

- (a) Explain why food chains usually have fewer than five trophic levels.
- (b) Explain why it is more efficient for people to eat crop plants than meat.

Solution 3.2

Method: Energy loss

Worked steps

- (a) energy is lost at each level **M1**, so after a few levels too little is left to support another **A1**.
- (b) eating plants directly is one trophic level **M1**; eating meat adds a level, where energy is lost, so it is less efficient **A1**.