



# PiXL Science

## KS3 Application Interdependence

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# Food chains

Food chains can show the **energy** stored in the **biomass** at each trophic level.



Name the producer in this food chain.

Why has so little energy transferred from the rabbits to the fox?

Calculate the percentage of energy that transferred from the grass to the rabbit.

Calculate the efficiency of energy transfer between the rabbits and fox to 2 d.p.

## Food chains - answers



**Name the producer in this food chain.**

Grass.

**Why has so little energy transferred from the rabbits to the fox?**

The fox does not eat the whole of a rabbit; some of the energy will leave the body in faeces and urine; respiration; movement; heat.

**Calculate the percentage of energy that transferred from the grass to the rabbit.**

$$(780 \div 8500) \times 100 = 9\%$$

**Calculate the efficiency of energy transfer between the rabbits and fox to 2 d.p.**

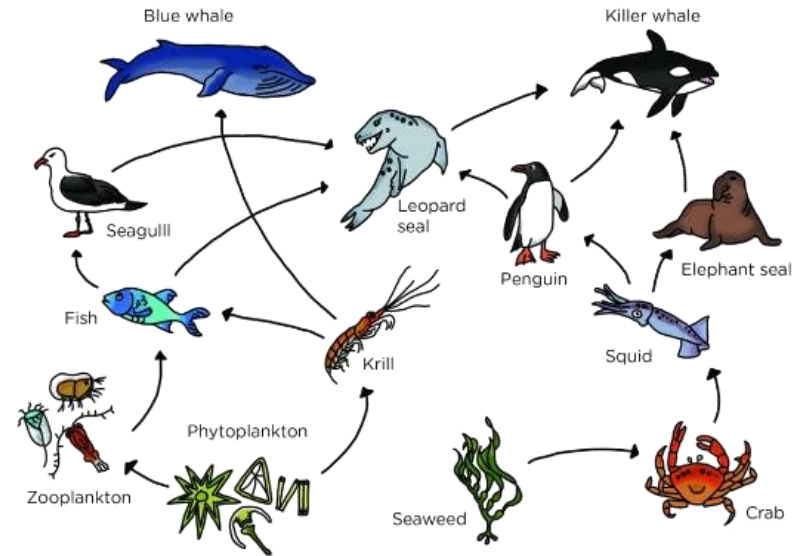
$$100 \div 780 = 0.13$$

# Food webs

Look at the food web. If the population of phytoplankton were to decrease, what would happen to the population of krill? Why?

If the population of seagulls were to decrease what would happen to the population of penguins? Why?

A new crab eating fish was introduced to the habitat. What impact would this have on the elephant seals?



Phytoplankton are producers. Only a small percentage of the Sun's energy captured by phytoplankton is incorporated into the body of the fish. Explain what happens to the rest.

## **Food webs - answers**

**If the population of phytoplankton were to decrease, what would happen to the population of krill?**

Decrease due to a lack of food.

**If the population of seagulls were to decrease what would happen to the population of penguins?**

Decrease; leopard seals would eat fewer seagulls as the population decreased; leopard seals would need to eat more penguins to replace the seagulls.

**A new crab eating fish was introduced to the habitat. What impact would this have on the elephant seals?**

Decrease in population; fewer crabs leads to fewer squid; fewer squid means less food for elephant seals.

## **Food webs - answers**

**Phytoplankton are producers. Only a small percentage of the Sun's energy captured by phytoplankton is incorporated into the body of the fish. Explain what happens to the rest.**

Some energy is transferred in animal's waste (faeces and urine); respiration; movement; heat; some will die and not be eaten.

## Estimating population size

A student carried a survey of a 100m by 80m field using a 1m x 1m quadrat in order to estimate the number of nettle plants.

**What is a quadrat?**

**Calculate the area of the field.**

**The student chose where the quadrat was to be placed. What should they have done instead?**



**The student placed only one quadrat. They counted 12 nettle plants inside the quadrat. Calculate the number of nettle plants in the field.**

**How could the method be altered to give a more accurate estimate?**

## Estimating population size - answers

**What is a quadrat?**

A frame used to sample an area.

**Calculate the area of the field.**

$$100 \times 80 = 8,000\text{m}^2$$

**The student chose where the quadrat was to be placed. What should they have done instead?**

Created a grid; randomly generated grid references.

**The student placed only one quadrat. They counted 12 nettle plants inside the quadrat. Calculate the number of nettle plants in the field.**

$$\text{Size of quadrat} = 1 \times 1 = 1\text{m}^2; (12 \div 1) \times 8,000 = 96,000 \text{ nettles.}$$

**How could the method be altered to give a more accurate estimate?**

Increase the number of quadrat samples; should be 10% of the area