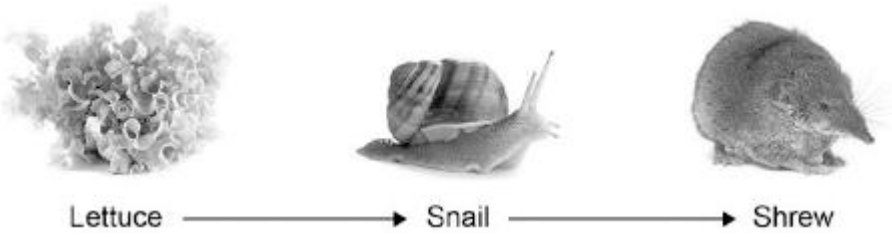
Q1. The diagram below shows a food chain in a garden.



Lettuce © destillat/iStock/Thinkstock; Snail ©Valengilda/iStock/Thinkstock; Shrew © GlobalT/iStock/Thinkstock

(a) Name **one consumer** shown in the diagram above.

.....

(1)

(b) Name **one carnivore** shown in the diagram above.

.....

(1)

(c) A disease kills most of the shrews in the garden.

Suggest why the number of snails in the garden may then increase.

.....

.....

(1)

(d) What is the name given to all the snails in the garden shown in the diagram above?

Tick **one** box.

Community ☐

Ecosystem ☐

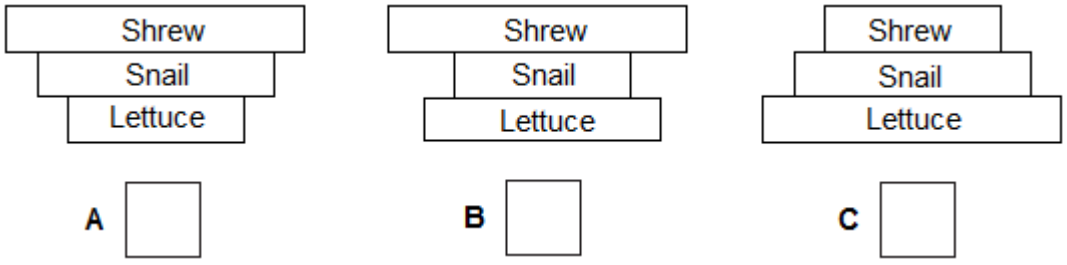
Population ☐

Territory ☐

(1)

(e) Which pyramid of biomass is correct for the food chain shown in the diagram above?

Tick **one** box.



(1)

(f) Some snails ate some lettuces.

The lettuces contained 11 000 kJ of energy.

Only 10% of this energy was transferred to the snails.

Calculate the energy transferred to the snails from the lettuces.

.....

Energy = ... kJ

(1)

(g) Give **one** reason why only 10% of the energy in the lettuces is transferred to the snails.

Tick **one** box.

The lettuces carry out photosynthesis ☐

The snails do not eat the roots of the lettuces ☐

Not all parts of a snail can be eaten ☐

(1)

(h) **Abiotic** factors can affect the food chain.

Wind direction is one abiotic factor.

Name **one other** abiotic factor.

.....

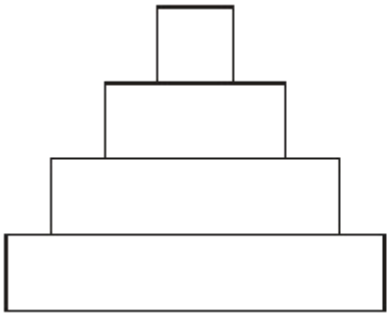
(1)

(Total 8 marks)

Q2. This is a simple food chain.

Lettuce plant → Slug → Frog → Heron

The diagram shows a pyramid of biomass for this food chain.



……

……

……

……

(a) Write the names of the organisms in the food chain on the correct lines next to the pyramid of biomass.

(1)

(b) (i) The slug obtains its energy from the lettuce plant. What is the source of energy for the lettuce plant?

.....

(1)

(ii) What is the function of chlorophyll in a lettuce plant?

.....

(1)

(iii) The slugs ate some lettuce plants which contained 1620 kJ of energy. Only 10 per cent of this energy is used by the slugs for growth. Use the formula to calculate how much energy can be used by the slugs for growth. Show clearly how you work out your final answer.

Amount of energy =

$$\frac{(\text{Percentage of energy used by slugs}) \times (\text{Amount of energy in lettuce})}{100}$$

.....

.....

.....

Amount of energy = ... kJ

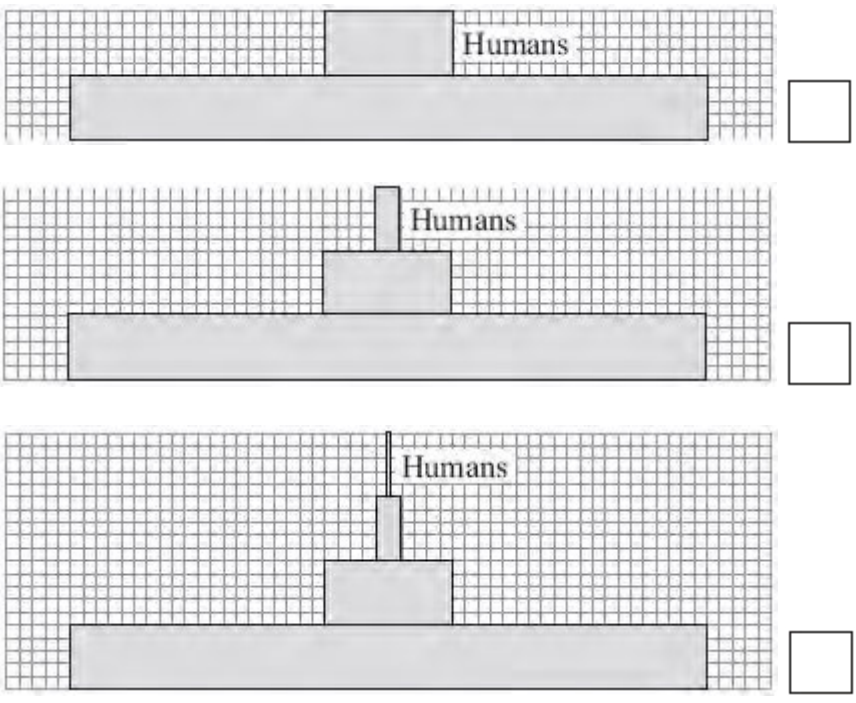
(2)

(Total 5 marks)

Q3. (a) The diagrams show three pyramids of biomass.

(i) Which pyramid would be the most efficient in providing food for humans?

Tick (✓) **one** box.



(1)

(ii) Give **one** reason for your choice.

.....

.....

(1)

(b) Pigs may be kept indoors or outdoors.

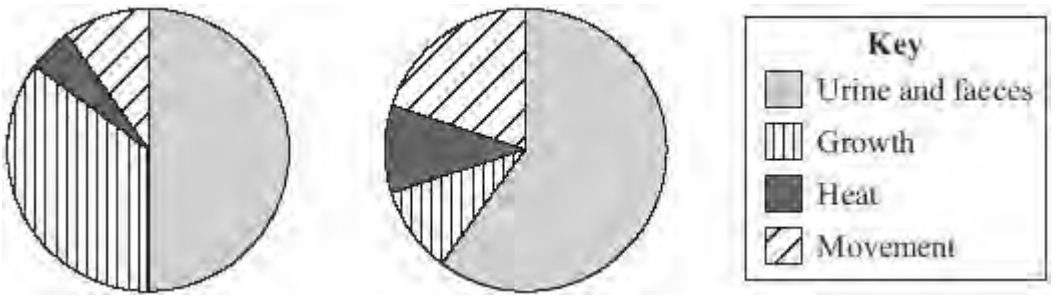
Pigs kept indoors **Pigs kept outdoors**





The pie charts show what happens to the energy in the food eaten by pigs kept indoors and pigs kept outdoors.

Pigs kept indoors **Pigs kept outdoors**



(i) Farmers make more profit from keeping pigs indoors than from keeping pigs outdoors.

Use information from the pie charts to explain why.

.....

.....

.....

.....

(2)

(ii) Meat from pigs kept outdoors may cost more than meat from pigs kept indoors.

Some people prefer to buy meat from animals that have been kept outdoors.

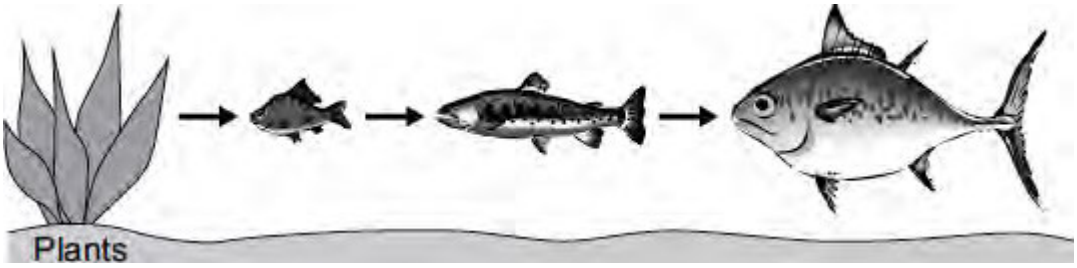
Suggest **one** reason why.

.....

.....

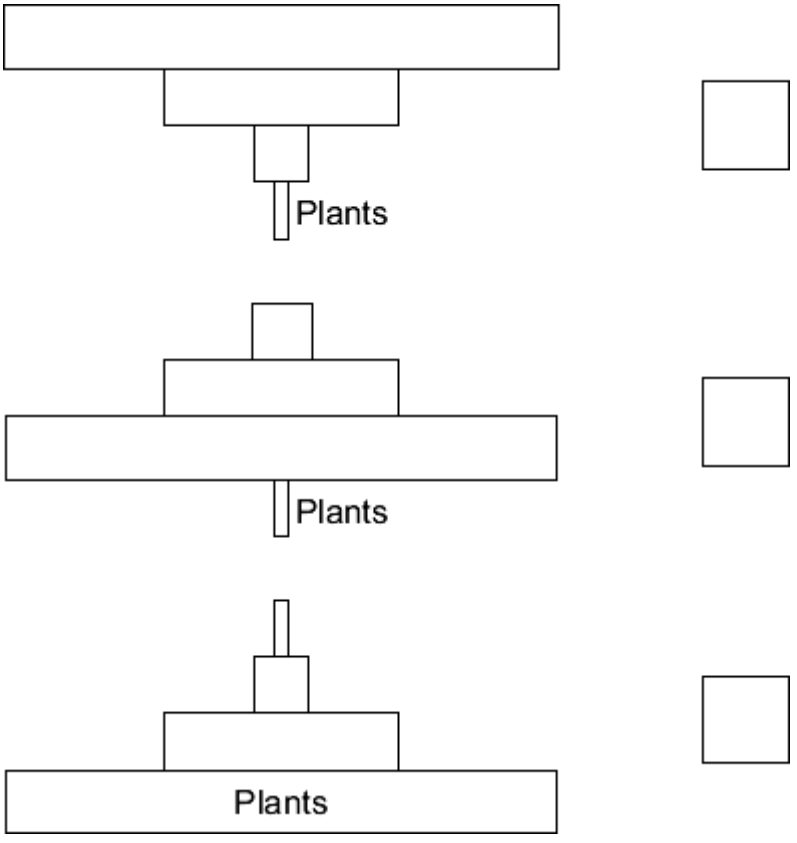
(1)
(Total 5 marks)

Q4. The picture shows a food chain.



(a) Which diagram shows a pyramid of biomass for the food chain in the picture?

Tick (✓) **one** box.



(1)

(b) The plants at the start of the food chain absorb energy.

Where does this energy come from?

Draw a ring around **one** answer.

the water **the sun** **minerals**

(1)

(c) Some energy is lost at each stage of the food chain.

Give **two** ways in which energy may be lost from the food chain.

1 .....

.....

2 .....

.....

(2)
(Total 4 marks)

Q5. There are plans for a 'cattle factory' to be built in the UK.

Information about the cattle factory and traditional cattle farming in the UK is given below.



Cattle factory



Traditional cattle farming

Cattle factory by Pirhan [CC BY-SA 2.0], via Flickr. Traditional cattle farming by Mat Fascione[CC-BY-SA-2.0], via W kimedia Commons

Cattle factory

- There will be over 8 000 cows in three large sheds.
- Each cow will be milked three times a day.
- Each cow will produce about 50 litres of milk every day.
- Waste will be collected and used to produce electricity for 2 000 homes.
- Cows are kept near to each other so disease can spread easily.

Traditional cattle farming

- Most farms have between 5 and 500 cows.
- The cows spend most of the time in fields.
- Cows are milked once or twice a day.
- Each cow produces up to 20 litres of milk a day.
- The waste is used as natural fertiliser for crops.

(a) Use the information to answer the questions.

(i) Give **two** reasons why some people think the cattle factory is a good idea.

1 .....

.....

2 .....

.....

(2)

(ii) Give **two** reasons why some people think traditional farming is better than the cattle factory.

1 .....

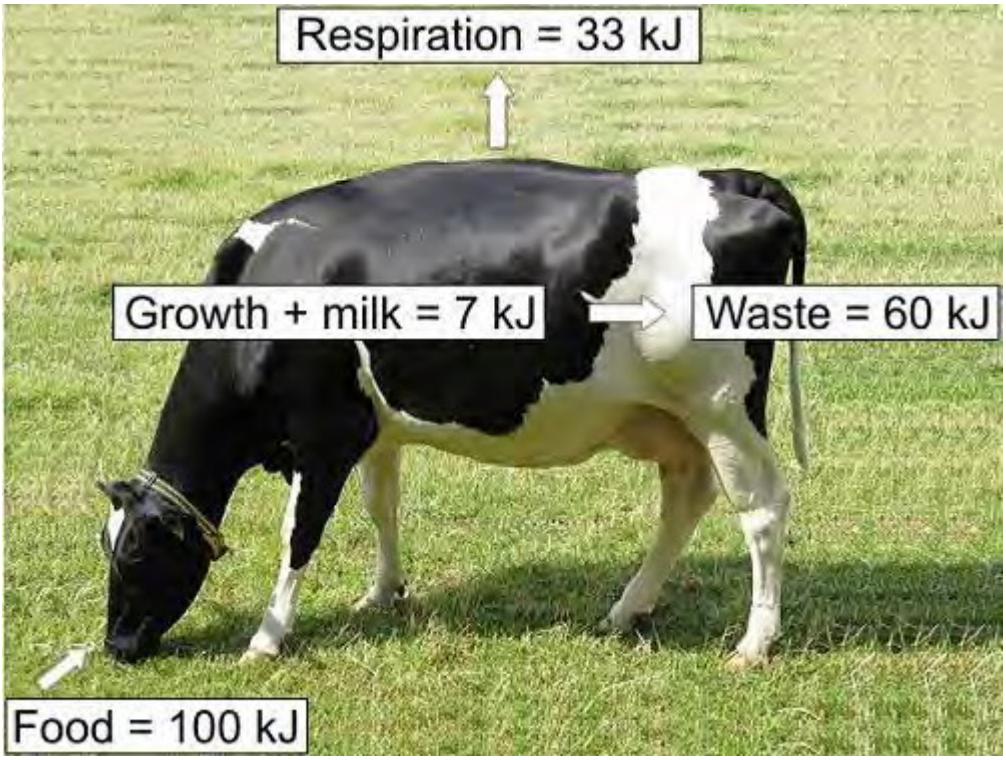
.....

2 .....

.....

(2)

(b) The diagram shows what happens to 100 kJ of energy in the food eaten by a cow on a traditional farm.



By Dohduhdah (Own work) [Public domain], via W kimedia Commons

Use your knowledge and the information in the diagram to answer this question.

Compare the transfer of energy from the food eaten by cows in the cattle factory

with the energy transferred by cows on a traditional farm.

Use words from the box to complete the table.

more	less	the same

Energy	Amount of energy transferred by cows in a cattle factory compared with cows on a traditional farm
transferred for growth and milk	
transferred in respiration	

(2)
(Total 6 marks)

Q6. Green plants are found at the start of all food chains.

(a) Complete the sentences.

(i) The source of energy for green plants is radiation from the .....

(1)

(ii) Green plants absorb some of the light energy that reaches them for a process called .....

(1)

(b) Draw a ring around the correct answer to complete each sentence.

(i) This process transfers light energy into

chemical
sound
electrical

energy.

(1)

(ii) The process uses the gas

carbon dioxide.
oxygen.
water.

(1)

(iii) The process produces carbon-containing compounds called

carbohydrates.
minerals.
salts.

(1)

(c) The amount of living material (biomass) at each stage in a food chain is less than at the previous stage.

The diagram shows a food chain.

oak tree → **caterpillar** → **blue-tit** → **hawk**

Give **two** ways in which biomass is lost in this food chain.

Tick (✓) **two** boxes.

As carbon dioxide from the caterpillar ☐

As food eaten by the hawk ☐

As oxygen from the oak tree ☐

As faeces (droppings) from the blue-tit ☐

(2)
(Total 7 marks)

Q7. There are two forms of peppered moth, dark and pale.
Birds eat the moths when the moths are resting on tree bark.

Pollution in the atmosphere may:

- kill lichens living on tree bark
- make the bark of trees go black.

(a) Draw a ring around the correct answer to complete the sentence.

Lichens are very sensitive to air pollution caused by

carbon dioxide.
nitrogen.
sulfur dioxide.

(1)

(b) The photographs show the two forms of peppered moth, on tree bark.



Tree bark covered with lichens Tree bark made black by pollution

© Kim Taylor/Warren Photographic

(i) The dark form of the peppered moth was produced by a change in the genetic material of a pale moth.

Use **one** word from the box to complete the sentence.

characteristic	**clone**	**mutation**

A change in genetic material is called a

.....

(1)

(ii) In the 19th century, pollution made the bark of many trees go black.

Explain why:

- the population of the pale form of the moth in forests decreased
- the population of the dark form of the moth in forests increased.

.....

.....

.....

.....

.....

.....

.....

.....

(3)

(c) (i) The larvae (young) of the peppered moths eat the leaves of birch trees.

The diagram shows the food chain:

birch trees → peppered moth larvae → birds

Draw a pyramid of biomass for this food chain.

Label the pyramid.

(2)

(ii) Which **two** reasons explain the shape of the pyramid you drew in part (c)(i)?

Tick (✓) **two** boxes.

Some material is lost in waste from the birds	☐
The trees are much larger than peppered moth larvae	☐
Peppered moth larvae do not eat all the leaves from the trees	☐
The trees do not use all of the Sun's energy	☐

(2)
(Total 9 marks)

Q8. The photographs show four ways of farming.

Growing wheat



Keeping sheep outside



Keeping pigs outside

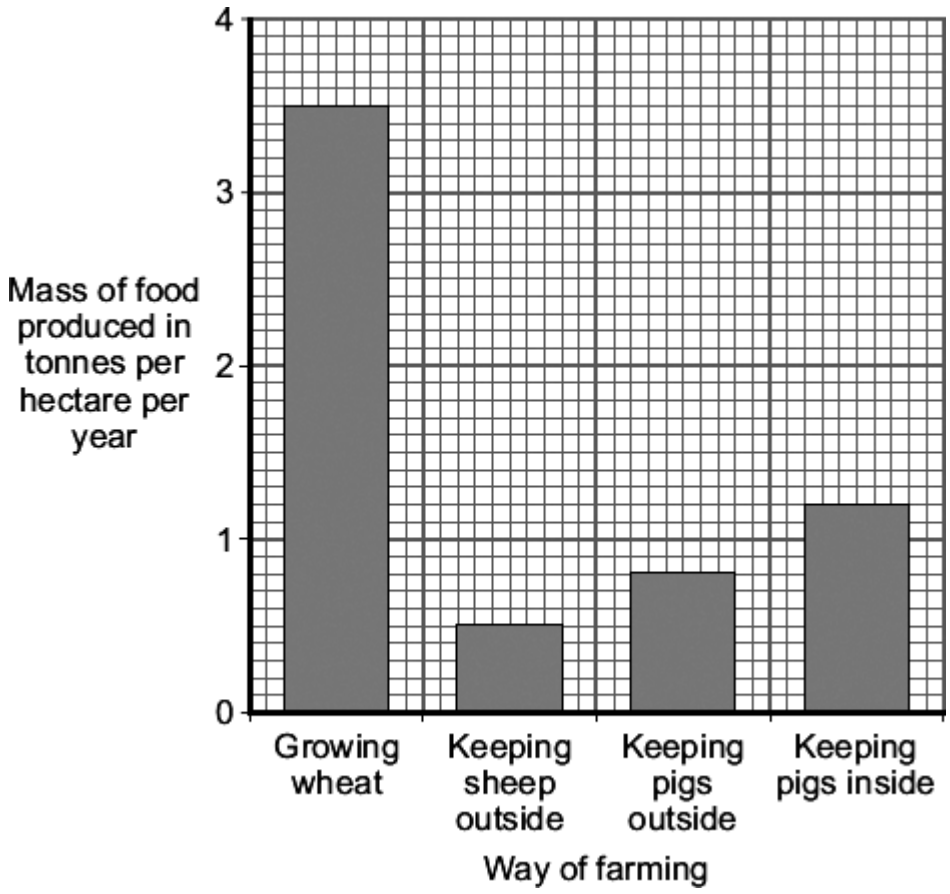


Keeping pigs inside



Growing wheat by Eileen Henderson [CC-BY-SA-2.0], via Wikimedia Commons. Keeping Sheep outside by Andrew Smith [CC-BY-SA-2.0], via W kimedia Commons. Keeping Pigs outside by David Williams [CC-BY-SA-2.0], via Wikimedia Commons. Keeping Pigs inside supplied by iStockphoto/ Thinkstock.

The bar chart shows the amount of food produced from these four ways of farming.



(a) How much extra food can be produced when farmers grow wheat, compared with keeping sheep outside?

Show clearly how you work out your answer.

.....

.....

Answer ..... tonnes per hectare per year

(2)

(b) Sheep eat grass.
For every 1000 g of grass eaten, a sheep increases in mass by only 50 g.
The other 950 g is lost.

How is the other 950 g lost?

Tick (✓) **two** boxes.

As oxygen from photosynthesis ☐

As faeces ☐

As meat ☐

As carbon dioxide from respiration ☐

(2)

(c) (i) Pigs kept inside lose less energy than pigs kept outside.

Why?

Tick (✓) **two** boxes.

Pigs kept inside are fed more. ☐

Pigs kept inside are kept in small pens. ☐

Pigs kept inside are kept warm in the winter. ☐

Pigs kept inside are healthier. ☐

(2)

(ii) Meat from pigs kept inside is usually cheaper than meat from pigs kept outside.

Give **one** reason why.

.....

.....

(1)
(Total 7 marks)