

Name:

Date:

B7- Test 6
ECOLOGY
Advanced

GCSE

BIOLOGY

AQA - Triple Science

Mark

Grade

Materials

For this paper you must have:

- Ruler
- Pencil and Rubber
- Scientific calculator, which you are expected to use when appropriate

Instructions

- Answer all questions
- Answer questions in the space provided
- All working must be shown

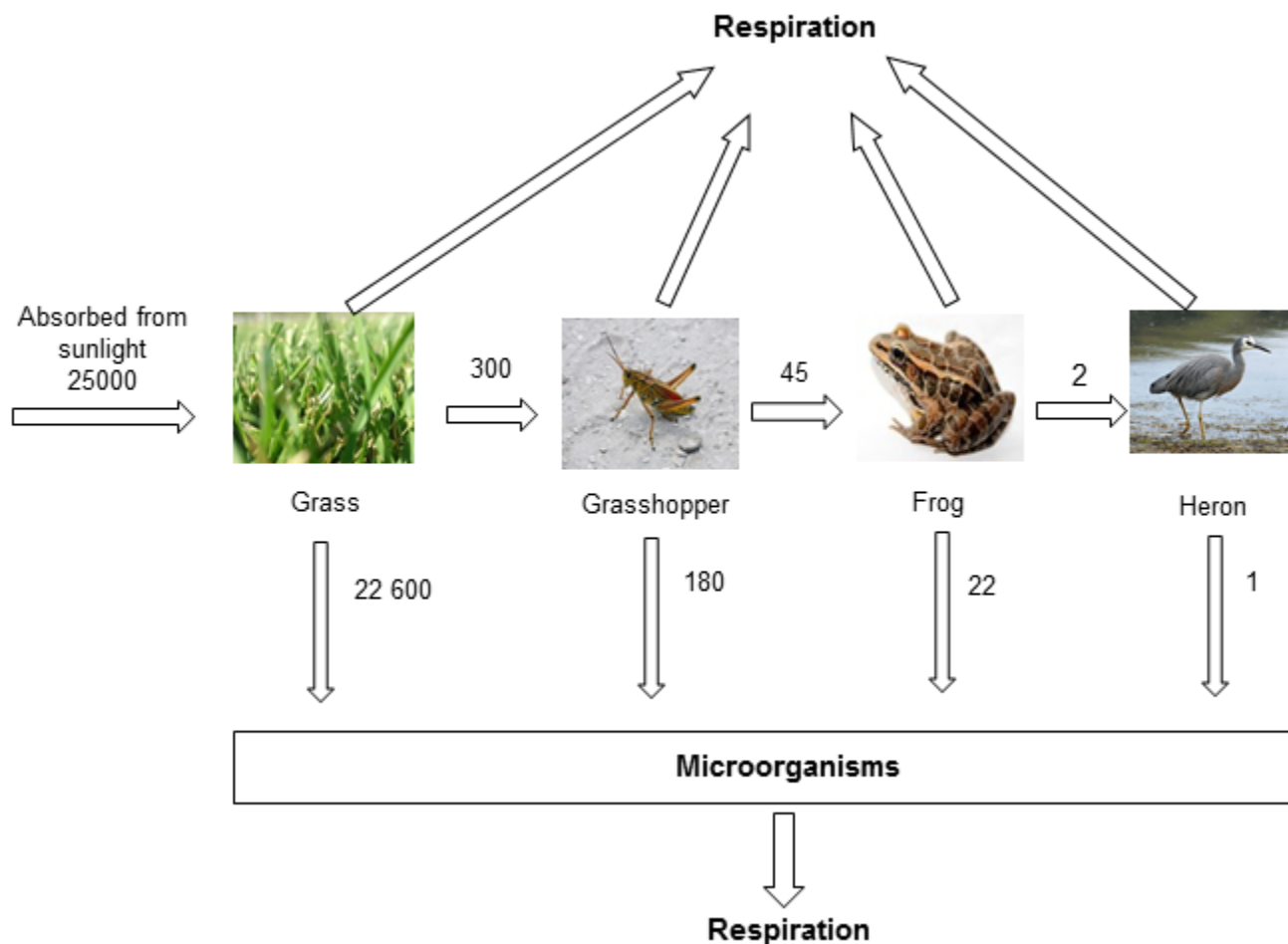
Information

- The marks for the questions are shown in brackets

1.

The diagram shows the annual energy flow through 1 m² of a habitat.

The unit, in each case, is kJ per m² per year.



- (a) Calculate the percentage of the energy absorbed by the grass from sunlight that is transferred to the frog.

Show clearly how you work out your answer.

Answer _____ %

(2)

- (b) All of the energy the grass absorbs from the sun is eventually lost to the surroundings.

In what form is this energy lost?

(1)

(c) Food chains are usually **not** more than five organisms long.

Explain why.

To gain full marks you must use data from the diagram.

(2)

(d) In this habitat microorganisms help to recycle materials.

Explain how.

(3)

(Total 8 marks)

Grass by Catarina Carvalho from Lisboa, Portugal (Flickr) [CC-BY-2.0], via Wikimedia Commons. Grasshopper by I, Daniel Schwen [GFDL, CC-BY-SA-3.0], via Wikimedia Commons. Frog by Brian Gratwicke (Pickerel Frog) [CC-BY-2.0], via Wikimedia Commons. Heron by Glen Fergus (Own work, Otago Peninsula, New Zealand) [CC-BY-SA-2.5], via Wikimedia Commons.

2.

Scientists have discovered that curry spices affect sheep and cattle. Curry spices can reduce the amount of methane that grazing animals give off.

'Bad' bacteria in the animal's stomach produce methane. About 12% of the animal's food is changed into methane.

The curry spice coriander works like an antibiotic. Adding coriander to animal food reduces methane production by about 40%.

(a) (i) Why does adding coriander to an animal's food reduce methane production?

(1)

(ii) Explain **one** advantage to a farmer of adding coriander to the animal's food.

(2)

(b) Farm animals give off large amounts of methane.

Explain the effects of adding large amounts of methane to the atmosphere.

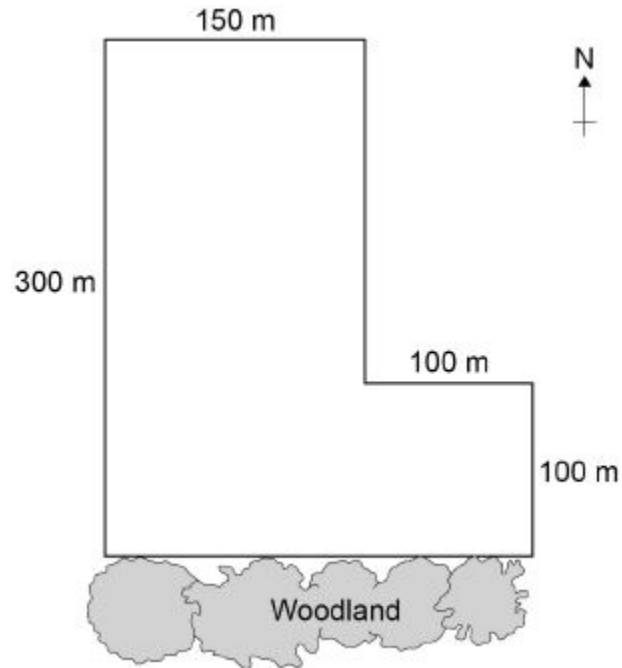
(3)

(Total 6 marks)

3.

Some students investigated the size of a population of dandelion plants in a field.

The diagram below shows the field.



The students:

- placed a 1 m × 1 m square quadrat at 10 random positions in the field
- counted the number of dandelion plants in each quadrat.

The table below shows the students' results.

Quadrat number	Number of dandelion plants
1	6
2	9
3	5
4	8
5	0
6	10
7	2
8	1
9	8
10	11

(a) Why did the students place the quadrats at random positions?

(1)

(b) Estimate the total number of dandelion plants in the field.

Calculate your answer using information from the diagram and the table above.

Give your answer in standard form.

Total number of dandelion plants = _____

(5)

(d) Light is an environmental factor that affects the growth of dandelion plants.

Give **two** other environmental factors that affect the growth of dandelion plants.

1. _____

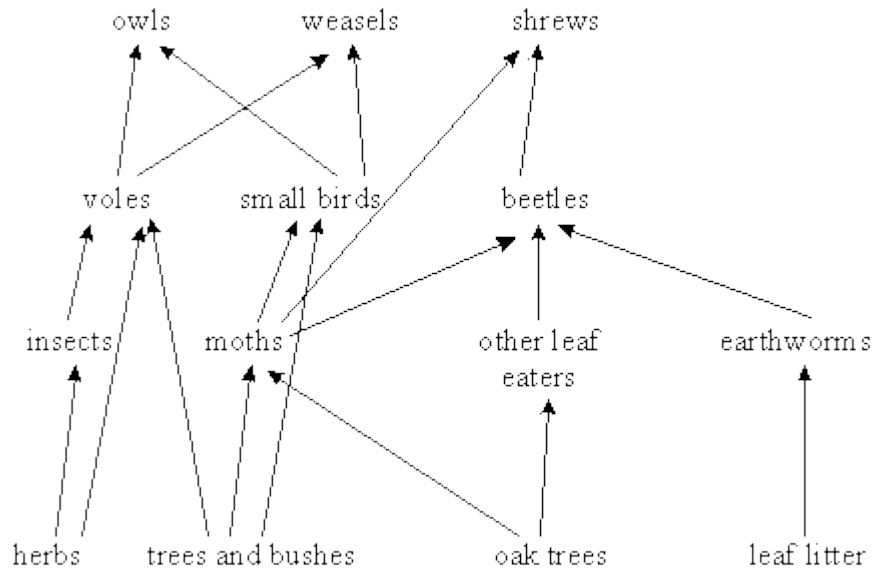
2. _____

(2)

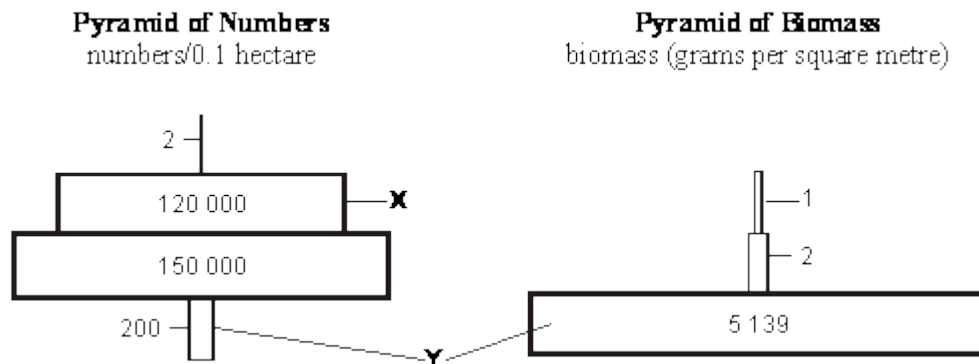
(Total 14 marks)

4.

The diagram below shows a food web for a wood.



(a) The diagrams below show a pyramid of the numbers and a pyramid of the biomass for 0.1 hectare of this wood.

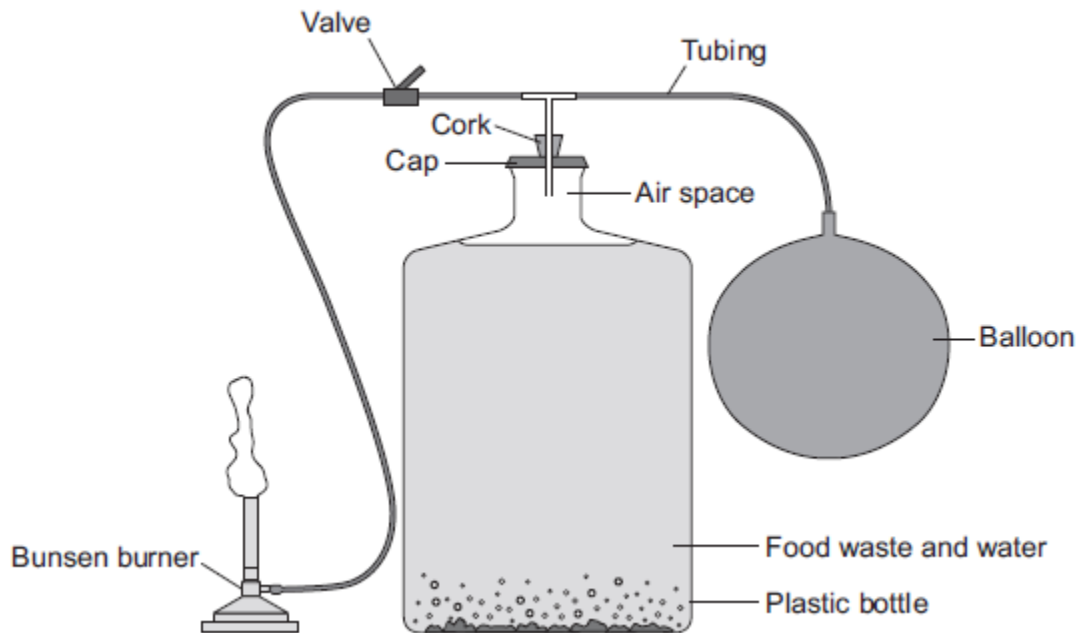


(i) Name **one** organism from the level labelled X.

(1)

5.

The image below shows a model biogas generator.



Students used the model biogas generator to investigate which type of food waste produces the greatest yield of biogas.

Gas collects in the balloon. The gas is then released through the valve and is burned at the Bunsen burner.

The students:

- put 500 g of potato peelings in the plastic bottle with some water and sealed the apparatus
- released the gas from the balloon after day two and timed how long the gas burned for
- released the gas that had collected in the balloon from day two to day four and timed how long the gas burned for
- repeated the investigation using 500 g of cooked rice, then 500 g of cabbage leaves and then 500 g of cooked pasta.

(a) **Table 1** shows the students' results.

Table 1

Type of food waste	Length of time the gas burned in seconds	
	After day two	From day two to day four
Potato peelings	0	175
Cooked rice	0	100
Cabbage leaves	0	150
Cooked pasta	0	160

(i) Suggest why the gas collected in the balloon and released after day two did not burn.

(3)

(ii) Suggest why potato peelings produced the most biogas.

(1)

(b) Scientists investigated the production of biogas from different types of animal manure.

Table 2 shows the scientists' results.

Table 2

Type of manure	Volume of biogas produced in m ³ per kg of manure	Methane in the biogas as % of total volume
Cow	0.34	65
Pig	0.58	68
Hen	0.62	60
Horse	0.30	66
Sheep	0.61	67

(i) Calculate the volume of methane produced from 1 kg of cow manure.

Volume of methane = _____ m³

(2)

(ii) One scientist concluded that it would be better to use sheep manure in a biogas generator than to use cow manure.

What is the evidence for this conclusion?

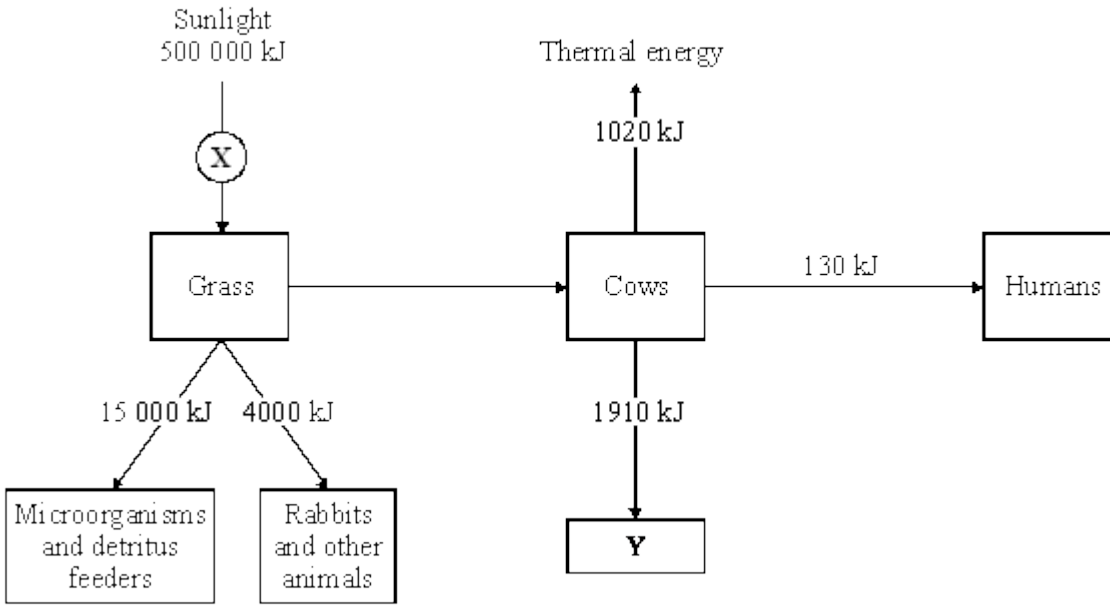
Use information from **Table 2** in your answer.

(2)

(Total 8 marks)

6.

The diagram shows the amounts of energy that are transferred, over a period of time, through some living things in a grassland habitat.



(a) Calculate the amount of energy transferred from the grass to the cows.

Amount of energy = _____ kJ

(1)

(b) X is a process in plants.

(i) Calculate the amount of energy usefully transferred by process X.

Amount of energy = _____ kJ

(1)

(ii) Name process X.

(1)

(c) Give **two** ways in which energy is 'lost' from the cows at Y.

1. _____

2. _____

(2)

(d) Describe how hormones can be used to improve the efficiency of producing food from plants.

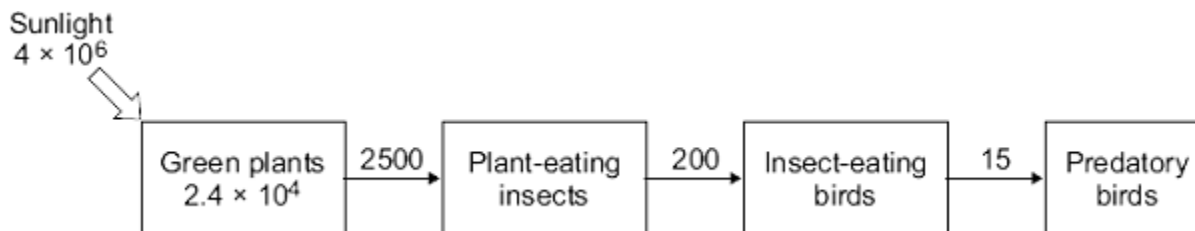
(2)

(Total 7 marks)

7.

The diagram shows the annual flow of energy through a habitat.

The figures are in kJ m^{-2} .



(a) (i) Calculate the percentage of the energy in sunlight that was transferred into energy in the green plants.

Show clearly how you work out your answer.

Answer = _____ %

(2)

- (ii) Suggest reasons why the percentage energy transfer you calculated in part (a)(i) was so low.

(2)

- (b) Compare the amount of energy transferred to the insect-eating birds with the amount transferred to the predatory birds.

Suggest explanations for the difference in the amount of energy transferred to the two types of bird.

(3)

(Total 7 marks)