

Q1. A gardener pulled up weeds and used them to start a compost heap. The compost heap soon became colonised by large numbers of earthworms and slugs. The gardener then noticed a hedgehog rooting through the compost heap, eating the earthworms and slugs. Every so often the hedgehog stopped to scratch itself. This was because it had large numbers of fleas which fed by sucking the hedgehog's blood.

(a) Use **only** information from the passage to answer the following.

Construct and label a pyramid of **biomass** for your food chain.

(2)

(b) Gardeners put plant material onto compost heaps so that it will decay. They then put the decayed compost onto soil where they are growing their plants.

Give **three** conditions which are needed for plant material to decay rapidly.

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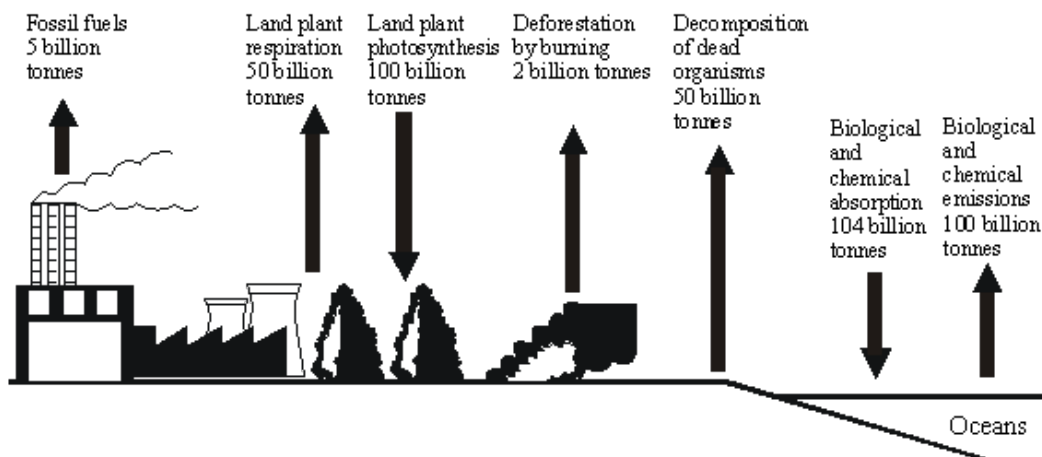
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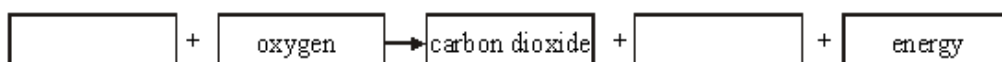
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(Total 5 marks)

Q2. The diagram below shows the mass of carbon involved each year in some of the processes in the carbon cycle.



(a) Complete the equation for plant respiration.



(2)

- (b) (i) Calculate the mass of carbon removed from the atmosphere each year. (*Show your working.*)

Answer billion tonnes

(1)

- (ii) Calculate the percentage of this total which is removed by the photosynthesis of land plants. (*Show your working.*)

Answer %

(2)

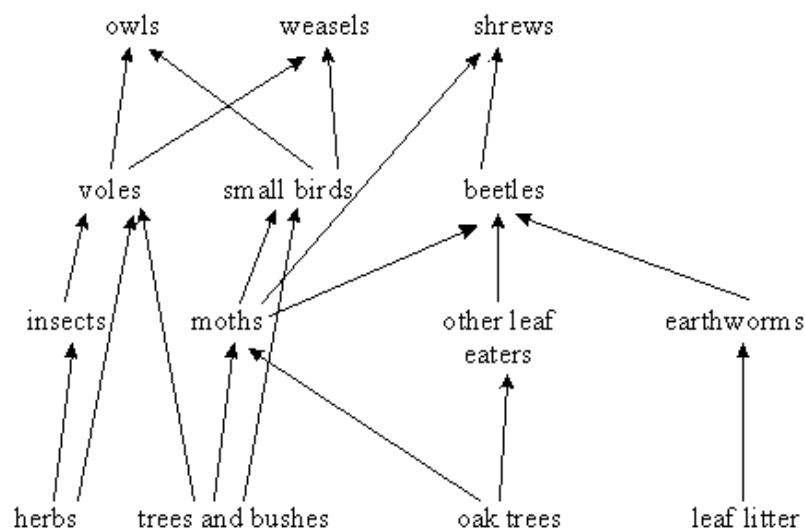
- (iii) Calculate the net gain of carbon by the atmosphere in one year. (*Show your working.*)

Answer billion tonnes

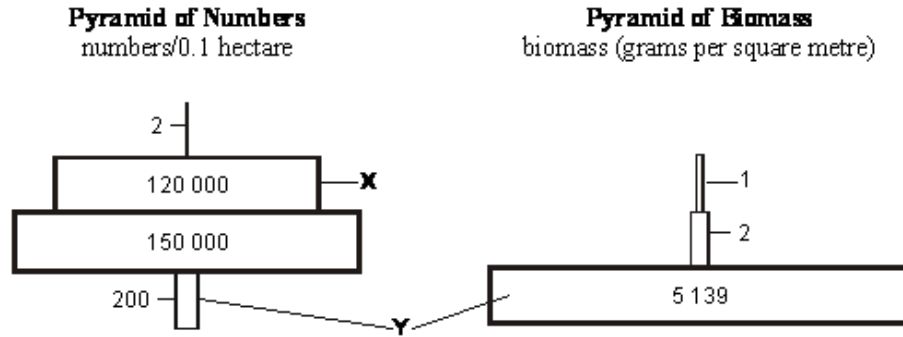
(2)

(Total 7 marks)

Q3. 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.

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(1)

- (ii) Explain, as fully as you can, why the level labelled Y is such a different width in the two pyramids.

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(3)

- (b) Explain, as fully as you can, what eventually happens to energy from the sun which is captured by the plants in the wood.

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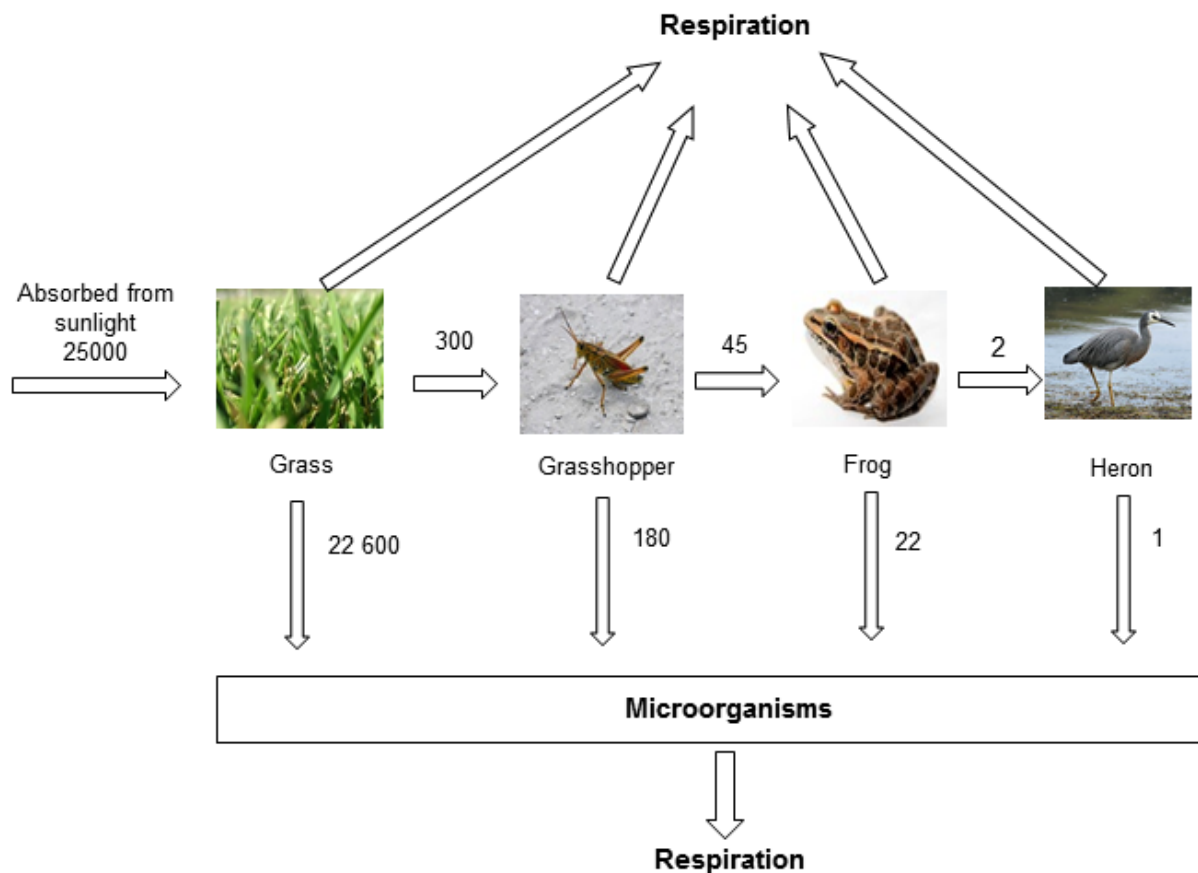
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(10)
(Total 14 marks)

Q4. 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.

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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?

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(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.

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(2)

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

Explain how.

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(3)

(Total 8 marks)

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