0 1

A student did an experiment to determine the biomass of a sample of plants from a small section of a field. Plant tissue contains water.

0 1 . 1 What is meant by the term biomass? **[1 mark]**

mass of living tissue [1]

The student used the following method to measure the biomass.

1. Cut all plant material from one square metre of the field.
2. Measure the mass using a balance.
3. Place plant material in an oven at 45^{o} C for 20 minutes.
4. Repeat step 2 and 3 until two identical readings achieved.

Her results are shown in the table below.

Reading	1st	2nd	3rd	4th
Mass (kg)	0.9	0.5	0.4	0.4

0 1 . 2 Explain why the student warmed the plant material in the oven until two identical reading were achieved. **[2 marks]**

Heated to remove or evaporate water. [1]

Two identical readings mean all water has been lost/evaporated [1] because no more drop in mass. [1]

0 1 . 3 The student measured the amount of energy released from the collected biomass. The total energy content of the plant material was found to be 5000 J.

The amount of biomass was 0.4 kg.

Calculate the energy release per kilogram of the plant material.

Show your working clearly

[2 marks]

1 / 0.4 x 5000 [1] or (5000 / 4) x 10 [1]

Energy content = 12500 [2] J/kg

0 1 . 4 The diagram below shows a simple food chain and pyramid of biomass for that food chain.

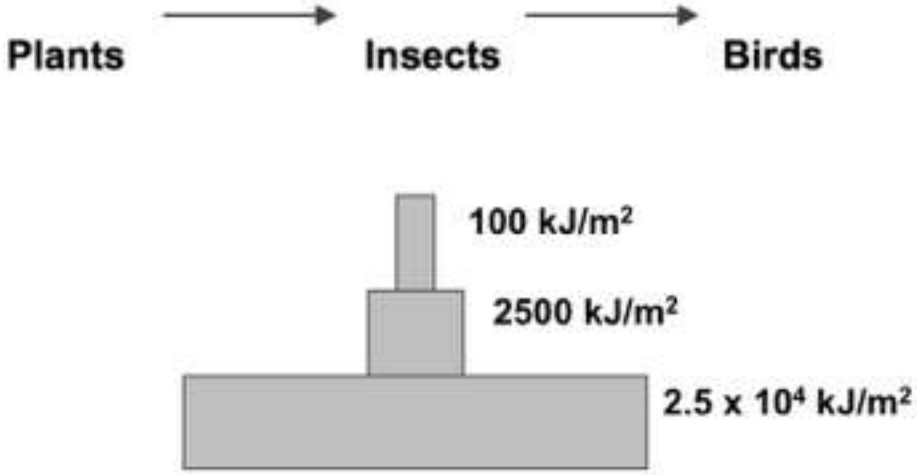
The energy of the biomass is also shown for each level.

Calculate the percentage of energy of the plants that is passed onto the insects.
Show your working clearly. **[2 marks]**

(2500 / 25000) x 100 [1]

Percentage = 10 % [2]

WARNING : Always show your working



0 1 . 5 Suggest why all of the energy in the insects is not passed on to the birds. **[4 marks]**

Energy lost via faeces / not digested / waste / excreted [1]
energy loss via respiration [1]
Energy loss from movement / muscle contraction [1]
Energy lost as heat [1]
Some parts of insects not eaten [1]

WARNING : A common mistake is that students say energy is *used* for respiration. You will not get a mark for saying that as it is technically incorrect. Say energy *lost* through respiration, as respiration produces heat which is given to the surroundings.