OCR GCSE GATEWAY BIOLOGY A · J247

BIOLOGY



EXAM QUESTION PACK

M3 ALGEBRA

SCORE	PERCENTAGE
/19	%

STEMUP

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Gateway Biology A (9-1)

Maths 3: Algebra

Please note that you may see slight differences between this paper and the original.

Candidates answer on the Question paper.

OCR supplied materials:
Additional resources may be supplied with this paper.

Other materials required:
- Pencil
- Ruler (cm/mm)

Duration: Not set

Candidate forename		Candidate surname	

Centre number						Candidate number				

INSTRUCTIONS TO CANDIDATES

- Write your name, centre number and candidate number in the boxes above. Please write clearly and in capital letters.
- Use black ink. HB pencil may be used for graphs and diagrams only.
- Answer **all** the questions, unless your teacher tells you otherwise.
- Read each question carefully. Make sure you know what you have to do before starting your answer.
- Where space is provided below the question, please write your answer there.
- You may use additional paper, or a specific Answer sheet if one is provided, but you must clearly show your candidate number, centre number and question number(s).

INFORMATION FOR CANDIDATES

- The quality of written communication is assessed in questions marked with either a pencil or an asterisk. In History and Geography a *Quality of extended response* question is marked with an asterisk, while a pencil is used for questions in which *Spelling, punctuation and grammar and the use of specialist terminology* is assessed.
- The number of marks is given in brackets **[ ]** at the end of each question or part question.
- The total number of marks for this paper is **19**.
- The total number of marks may take into account some 'either/or' question choices.

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1 Scientists can estimate the number of insects on a tree using capture-recapture.

First, they collect some insects from the tree.

Fig. 18.2 shows the equipment they use.

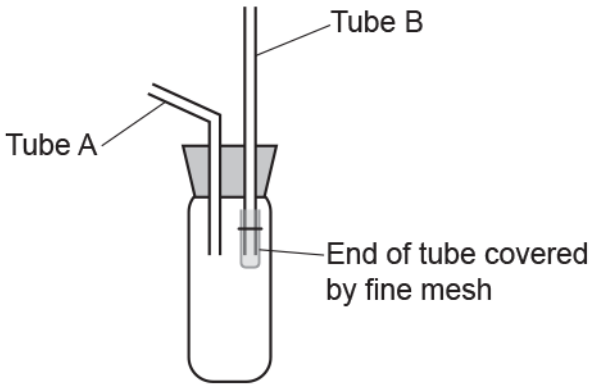


Fig. 18.2

They capture 25 insects from a tree and then mark them. This is their first sample.

They then release the insects and sample the tree again two days later. In this second sample there were 30 insects and 3 had been marked.

(i) Estimate the population size of insects on the tree.

Use this formula:

$$\text{Estimated population size} = \frac{\text{Number in first sample} \times \text{Number in second sample}}{\text{Number in second sample previously marked}}$$

Estimated population size = ... **[2]**

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(ii) To mark each insect the scientists put a small spot of paint on the underside of the insect.

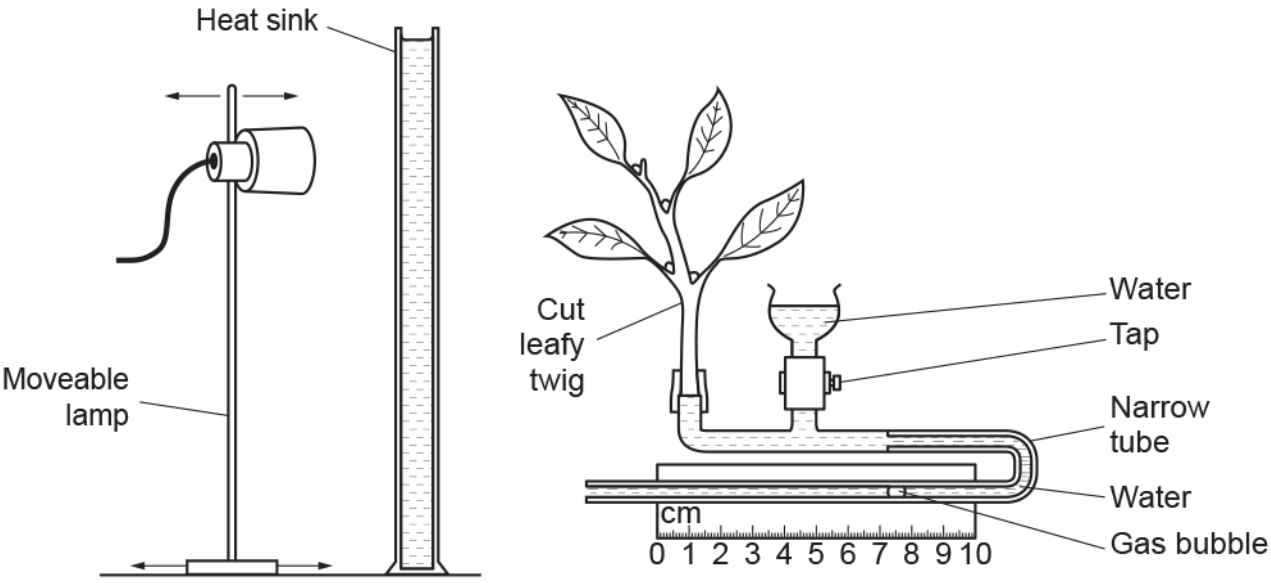
Explain why they marked the underside of the insects and not the top.

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[2]

2(a) The diagram shows a simple potometer.

The apparatus can be used to investigate the effect of light intensity on transpiration rates.



(i) Describe what happens during transpiration.

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[2]

(ii) Describe how the apparatus can be used to investigate the effect of light on transpiration rates.

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[3]

(iii) The heat sink is a transparent tube of cold water.

Explain why a heat sink is used in this experiment.

[2]

(b) The table shows the results from using the potometer.

Distance of potometer from the light (cm)	Distance gas bubble moved in one minute (mm)		
	Trial 1	Trial 2	Trial 3
10	70	74	72
20	73	75	71
30	52	49	51
40	42	30	31
50	12	14	13

(i) The mean distance the gas bubble moved along the tube at 10 cm from the light was 72 mm.

The diameter of the narrow tube was 1 mm.

Calculate the volume of water taken up by the plant.

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Use the equation: volume = $\pi r^2 l$
where r is the radius of the tube and l is the distance the bubble moves
$\pi = 3.14$

Give your answer to **2** significant figures.

Volume of water = ... mm^3 / minute **[3]**

(ii) Identify the anomalous reading in their recorded results and suggest a possible reason for this.

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[2]

(iii) How should the scientists deal with this anomalous reading when they process the data?

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[1]

(iv) The scientists described their results for **20 cm** as 73 ± 2.
Explain why they did this.

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[2]

END OF QUESTION PAPER

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