

# Foundation

**GCSE**

**Biology A Gateway**

**J247/02: Paper 2 (Foundation Tier)**

General Certificate of Secondary Education

**Mark Scheme for June 2022**

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This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which marks were awarded by examiners. It does not indicate the details of the discussions which took place at an examiners' meeting before marking commenced.

All examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes should be read in conjunction with the published question papers and the report on the examination.

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**MARKING INSTRUCTIONS****PREPARATION FOR MARKING****RM ASSESSOR**

1. Make sure that you have accessed and completed the relevant training packages for on-screen marking: *RM Assessor Online Training*; *OCR Essential Guide to Marking*.
2. Make sure that you have read and understood the mark scheme and the question paper for this unit. These are available in RM Assessor.
3. Log-in to RM Assessor and mark the **required number** of practice responses (“scripts”) and the **required number** of standardisation responses.

**MARKING**

1. Mark strictly to the mark scheme.
2. Marks awarded must relate directly to the marking criteria.
3. The schedule of dates is very important. It is essential that you meet the RM Assessor 50% and 100% (traditional 50% Batch 1 and 100% Batch 2) deadlines. If you experience problems, you must contact your Team Leader (Supervisor) without delay.
4. If you are in any doubt about applying the mark scheme, consult your Team Leader by telephone, email or via the RM Assessor messaging system.

5. Work crossed out:
- where a candidate crosses out an answer and provides an alternative response, the crossed out response is not marked and gains no marks
  - if a candidate crosses out an answer to a whole question and makes no second attempt, and if the inclusion of the answer does not cause a rubric infringement, the assessor should attempt to mark the crossed out answer and award marks appropriately.
6. Always check the pages (and additional objects if present) at the end of the response in case any answers have been continued there. If the candidate has continued an answer there then add a tick to confirm that the work has been seen.
7. There is a NR (No Response) option. Award NR (No Response)
- if there is nothing written at all in the answer space
  - OR if there is a comment which does not in any way relate to the question (e.g. 'can't do', 'don't know')
  - OR if there is a mark (e.g. a dash, a question mark) which isn't an attempt at the question.

Note: Award 0 marks – for an attempt that earns no credit (including copying out the question).

8. The RM Assessor **comments box** is used by your Team Leader to explain the marking of the practice responses. Please refer to these comments when checking your practice responses. **Do not use the comments box for any other reason.**

If you have any questions or comments for your Team Leader, use the phone, the RM Assessor messaging system, or email.

9. Assistant Examiners will send a brief report on the performance of candidates to their Team Leader (Supervisor) via email by the end of the marking period. The report should contain notes on particular strengths displayed as well as common errors or weaknesses. Constructive criticism of the question paper/mark scheme is also appreciated.

10. For answers marked by levels of response:

Read through the whole answer from start to finish, using the Level descriptors to help you decide whether it is a strong or weak answer. The indicative scientific content in the Guidance column indicates the expected parameters for candidates' answers, but be prepared to recognise and credit unexpected approaches where they show relevance. Using a 'best-fit' approach based on the skills and science content evidenced within the answer, first decide which set of level descriptors, Level 1, Level 2 or Level 3, best describes the overall quality of the answer.

Once the level is located, award the higher or lower mark:

**The higher mark** should be awarded where the level descriptor has been evidenced and all aspects of the communication statement (in italics) have been met.

**The lower mark** should be awarded where the level descriptor has been evidenced but aspects of the communication statement (in italics) are missing.















**In summary:**

**The skills and science content determines the level.**

**The communication statement determines the mark within a level.**

Level of response question on this paper is **18(d)**.

## 11. Annotations available in RM Assessor

Annotation	Meaning
	Correct response
	Incorrect response
	Omission mark
	Benefit of doubt given
	Contradiction
	Rounding error
	Error in number of significant figures
	Error carried forward
	Level 1
	Level 2
	Level 3
	Benefit of doubt not given
	Noted but no credit given
	Ignore

12. Abbreviations, annotations and conventions used in the detailed Mark Scheme (to include abbreviations and subject-specific conventions).

<b>Annotation</b>	<b>Meaning</b>
/	alternative and acceptable answers for the same marking point
✓	Separates marking points
<b>DO NOT ALLOW</b>	Answers which are not worthy of credit
<b>IGNORE</b>	Statements which are irrelevant
<b>ALLOW</b>	Answers that can be accepted
( )	Words which are not essential to gain credit
—	Underlined words must be present in answer to score a mark
<b>ECF</b>	Error carried forward
<b>AW</b>	Alternative wording
<b>ORA</b>	Or reverse argument

### 13. Subject-specific Marking Instructions

#### INTRODUCTION

Your first task as an Examiner is to become thoroughly familiar with the material on which the examination depends. This material includes:

- the specification, especially the assessment objectives
- the question paper
- the mark scheme.

You should ensure that you have copies of these materials.

You should ensure also that you are familiar with the administrative procedures related to the marking process. These are set out in the OCR booklet **Instructions for Examiners**. If you are examining for the first time, please read carefully **Appendix 5 Introduction to Script Marking: Notes for New Examiners**.

Please ask for help or guidance whenever you need it. Your first point of contact is your Team Leader.



The breakdown of Assessment Objectives for GCSE (9-1) in Biology:

	<b>Assessment Objective</b>
<b>AO1</b>	<b>Demonstrate knowledge and understanding of scientific ideas and scientific techniques and procedures.</b>
AO1.1	Demonstrate knowledge and understanding of scientific ideas.
AO1.2	Demonstrate knowledge and understanding of scientific techniques and procedures.
<b>AO2</b>	<b>Apply knowledge and understanding of scientific ideas and scientific enquiry, techniques and procedures.</b>
AO2.1	Apply knowledge and understanding of scientific ideas.
AO2.2	Apply knowledge and understanding of scientific enquiry, techniques and procedures.
<b>AO3</b>	<b>Analyse information and ideas to interpret and evaluate, make judgements and draw conclusions and develop and improve experimental procedures.</b>
<b>AO3.1</b>	Analyse information and ideas to interpret and evaluate.
AO3.1a	Analyse information and ideas to interpret.
AO3.1b	Analyse information and ideas to evaluate.
<b>AO3.2</b>	Analyse information and ideas to make judgements and draw conclusions.
AO3.2a	Analyse information and ideas to make judgements.
AO3.2b	Analyse information and ideas to draw conclusions.
<b>AO3.3</b>	Analyse information and ideas to develop and improve experimental procedures.
AO3.3a	Analyse information and ideas to develop experimental procedures.
AO3.3b	Analyse information and ideas to improve experimental procedures.

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**For answers to Section A if an answer box is blank ALLOW correct indication of answer e.g. circled or underlined.**

Question	Answer	Marks	AO element	Guidance
1	A✓	1	2.1	
2	C✓	1	1.1	
3	D✓	1	1.1	
4	C✓	1	2.2	
5	A✓	1	1.1	
6	B✓	1	2.1	
7	C✓	1	1.1	
8	B✓	1	1.1	
9	D✓	1	1.1	
10	C✓	1	2.2	
11	B✓	1	1.1	
12	C✓	1	1.1	
13	A✓	1	2.2	
14	D✓	1	2.2	
15	C✓	1	1.1	

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Question		Answer	Marks	AO element	Guidance								
16	(a)	Fat ✓ Oxygen ✓ Attack ✓	3	1.1									
	(b)	<table border="1"> <tr> <td>eating vegetables</td> <td></td> </tr> <tr> <td>inheriting certain genes</td> <td>✓</td> </tr> <tr> <td>regular exercise</td> <td></td> </tr> <tr> <td>smoking cigarettes</td> <td>✓</td> </tr> </table>	eating vegetables		inheriting certain genes	✓	regular exercise		smoking cigarettes	✓	1	1.1	Both boxes correct for one mark.
eating vegetables													
inheriting certain genes	✓												
regular exercise													
smoking cigarettes	✓												
	(c)	Idea that the blood bypasses the blockage / can reach the heart (muscle) ✓  (Heart muscle) can respire / contract / obtain oxygen/glucose ✓	2	2 x 2.1	<b>IGNORE</b> flow/volume of blood unless qualified <b>IGNORE</b> replace vessel <b>DO NOT ALLOW</b> unblock the vessel								
	(d) (i)	<b>FIRST CHECK THE ANSWER ON ANSWER LINE</b> <b>If answer = 125 000 award 2 marks</b>  500 x 250 ✓  125 000 ✓	2	2 x 2.1	<b>ALLOW</b> 0 or 1175000 – 1200000 for 1 mark								

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Question		Answer	Marks	AO element	Guidance
	(ii)	Fewer people (at risk) of heart attacks ✓ More angioplasty (operations done instead) ✓	2	2 x 3.1b	<b>IGNORE</b> references to reasons why there are fewer people at risk of heart attacks
	(e)	(Stem cells) can differentiate/specialise into muscle/heart cells/tissue ✓  The heart will then beat more efficiently ✓  Idea that more oxygen/glucose supply to the body (cells) ✓	3	3 x 2.1	<b>ALLOW</b> they can replace damaged cells / develop into/change/divide/become muscle cells/tissue <b>IGNORE</b> fix/repair muscle cells <b>IGNORE</b> replace scar tissue  <b>ALLOW</b> idea of stronger heartbeat <b>IGNORE</b> pump more blood

Question		Answer	Marks	AO element	Guidance
17	(a)	Idea cost of pesticide is less ✓  Cost of growing GM (wheat) is lower / cost saving 18 (euros per hectare) ✓	2	2 x 3.1b	<b>ASSUME</b> taking about GM crops if not stated  <b>IGNORE</b> less pesticide  <b>IGNORE</b> more profitable/sell/production of wheat <b>ALLOW</b> costs 210 (euros per hectare) rather than 228 <b>DO NOT ALLOW</b> government costs/seeds cost less
	(b)	DNA ✓	1	1.1	
	(c)	<b>Any two from:</b>  Concern that they may be harmful to humans if eaten ✓  Plants may escape into the wild ✓  Useful /pollinating insects might be harmed ✓  Disrupt food chains ✓  Ethically wrong ✓	2	2 x 2.1	<b>ALLOW</b> harmful effects not discovered to humans <b>IGNORE</b> dangerous  <b>ALLOW</b> resistance / resistance gene could get into other plants  <b>IGNORE</b> harmful to insects/pests  <b>ALLOW</b> harm the environment / reduce biodiversity  <b>ALLOW</b> morally / religiously wrong <b>IGNORE</b> playing God / not natural / disrupt nature  <b>IGNORE</b> may not taste good <b>IGNORE</b> reduce gene pool / genetic variation / susceptible to the same disease

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Question			Answer	Marks	AO element	Guidance
18	(a)		Bulbs will grow much faster than seeds ✓ The gardener will know the colour of the flowers from bulbs ✓	2	2 x 1.2	More than 2 boxes ticked then each additional incorrect box negates a mark <b>ALLOW</b> numbers instead of ticks
	(b)		Pathogen ✓ Mutation ✓ Gene ✓	3	3 x 1.1	More than 1 answer for each line negates the mark
	(c)		Microscopes didn't have the magnification/resolution / could not see the virus which was very small ✓	1	2.2	<b>ALLOW</b> microscopes were not developed enough to see viruses <b>ALLOW</b> need an electron microscope / cannot be seen with a light microscope <b>ALLOW</b> ORA for modern day microscopes <b>IGNORE</b> technology

Question	Answer	Marks	AO element	Guidance
(d)*	<p>Please refer to the marking instructions on page 4 of this mark scheme for guidance on how to mark this question.</p> <p><b>Level 3 (5–6 marks)</b> Provides an explanation of how each control method works <b>AND</b> Provides an evaluation of each method</p> <p><i>There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated.</i></p> <p><b>Level 2 (3–4 marks)</b> Provides an explanation of a control method <b>AND</b> Provides an evaluation of a method <b>OR</b> Provides an explanation how each control method works <b>OR</b> Provides an evaluation of each method</p> <p><i>There is a line of reasoning presented with some structure. The information presented is relevant and supported by some evidence.</i></p> <p><b>Level 1 (1–2 marks)</b> Provides an explanation of a control method <b>OR</b> Provides an evaluation of a method.</p>	6	3 x 1.2 3 x 3.2a	<p><b>AO1.2 Demonstrate knowledge and understanding of the methods of control for the disease.</b></p> <ul style="list-style-type: none"> <li>- Digging/burning the plants will destroy/kill the virus/infection / prevent the insects from feeding on the infected tulips</li> <li>- Spraying fields with insecticide will kill the insects</li> <li>- Insects cannot spread infection</li> </ul> <p><b>AO3.2a Analyse information to make judgements on the methods of control.</b></p> <p>Digging up and burning advantages:</p> <ul style="list-style-type: none"> <li>- Only kill the infected bulbs</li> <li>- Does not involve paying for insecticide</li> <li>- Will not cause bioaccumulation by insecticide</li> <li>- Will not kill harmless/useful insects</li> </ul> <ul style="list-style-type: none"> <li>• Digging up and burning disadvantages: <ul style="list-style-type: none"> <li>- Will not stop further spread by insects</li> <li>- Time consuming / may have to pay for labour</li> <li>- Will not be able to eliminate the virus</li> <li>- Contribute to greenhouse effect / global warming / CO<sub>2</sub> produced / harmful gasses / pollution</li> </ul> </li> </ul>

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Question	Answer	Marks	AO element	Guidance
	<p><i>There is an attempt at a logical structure with a line of reasoning. The information is in the most part relevant.</i></p> <p><b>0 marks</b> <i>No response or no response worthy of credit</i></p>			<ul style="list-style-type: none"> <li>- Less tulips/crop</li> <li>- Detection of disease maybe too late</li> </ul> <ul style="list-style-type: none"> <li>• Insecticide advantages:               <ul style="list-style-type: none"> <li>- Faster method</li> <li>- Less labour/ time investment</li> <li>- Does not contribute to greenhouse effect / global warming / CO<sub>2</sub> production</li> <li>- don't destroy the crops</li> </ul> </li> <li>• Insecticide disadvantages:               <ul style="list-style-type: none"> <li>- Repeat application</li> <li>- Cost involved</li> <li>- Cause bioaccumulation</li> <li>- Kill useful/harmless insects</li> <li>- Disrupt food chains/webs</li> <li>- Reduce biodiversity</li> <li>- Promote insecticide resistance</li> </ul> </li> </ul>



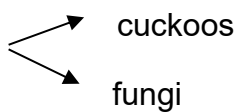
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Question			Answer	Marks	AO element	Guidance															
Question			Answer	Marks	AO element	Guidance															
19	(a)	(i)	<table border="1"> <thead> <tr> <th></th> <th>Number of people in the family</th> </tr> </thead> <tbody> <tr> <td>Number of males</td> <td>6</td> </tr> <tr> <td>Number of people who are homozygous recessive for the gene</td> <td>5 ✓</td> </tr> <tr> <td>Number of people who have amyloidosis</td> <td>6 ✓</td> </tr> </tbody> </table>		Number of people in the family	Number of males	6	Number of people who are homozygous recessive for the gene	5 ✓	Number of people who have amyloidosis	6 ✓	2	2.1 3.1a								
	Number of people in the family																				
Number of males	6																				
Number of people who are homozygous recessive for the gene	5 ✓																				
Number of people who have amyloidosis	6 ✓																				
		(ii)	<table border="1"> <thead> <tr> <th colspan="2"></th> <th colspan="2">Person 1</th> </tr> <tr> <th colspan="2"></th> <th>a</th> <th>a</th> </tr> </thead> <tbody> <tr> <th rowspan="2">Person 2</th> <th>A</th> <td>Aa</td> <td>Aa</td> </tr> <tr> <th>a</th> <td>aa</td> <td>aa</td> </tr> </tbody> </table> <p style="text-align: right;">✓</p> <p>Probability = 0.5 / ½ / 50% / 1 in 2 / 1:1 ✓</p>			Person 1				a	a	Person 2	A	Aa	Aa	a	aa	aa	2	2.1 3.2b	<b>ALLOW</b> 50:50, 2/4 <b>ALLOW</b> ecf for correct interpretation of probability from diagram drawn <b>DO NOT ALLOW</b> correct probability from incorrect diagram
		Person 1																			
		a	a																		
Person 2	A	Aa	Aa																		
	a	aa	aa																		
	(b)		(Person 2 has) the dominant allele (A) ✓  Unable to control their blood glucose levels / have diabetes ✓  Would not be able to feel stimuli / slower responses/reactions/reflexes ✓	3	3.1a 2.1 2.1	<b>ALLOW</b> person 2 is heterozygous  <b>ALLOW</b> reference to a specific symptom of diabetes <b>IGNORE</b> low blood sugar  <b>ALLOW</b> reference to a specific stimulus															

Question			Answer	Marks	AO element	Guidance

Question			Answer	Marks	AO element	Guidance
20	(a)		<p>pine trees → caterpillars </p> <p>Pine trees to caterpillars correctly drawn ✓ Caterpillars to cuckoos and fungi correctly drawn ✓</p>	2	2 x 2.1	<p><b>ALLOW</b> birds instead of cuckoos</p> <p><b>IGNORE</b> pyramids of biomass/numbers</p> <p><b>DO NOT ALLOW</b> lines without arrows</p>
	(b)	(i)	<p><b>D</b>   <b>C</b>   <b>B</b>   <b>A</b>   <b>E</b></p>	3	3 x 2.1	<p>D before C ✓ C before B ✓ B before A ✓</p>
		(ii)	(Charles) Darwin ✓	1	1.1	<b>ALLOW</b> Wallace
	(c)	(i)	(Use living organism/fugus) to kill a pest/caterpillars ✓	1	1.1	<b>ALLOW</b> using natural predator/natural parasites to kill pests/caterpillar
		(ii)	1000 (times) ✓	1	1.2	<b>ALLOW</b> 1x10 <sup>3</sup> / thousand
		(iii)	<p><b>Any three from:</b></p> <p>Kills more caterpillars than water/control ✓</p> <p>(Concentration used on the soil) contain more spores (than tree tops) ✓</p> <p>Lasts longer (than tree tops) ✓</p>	3	3.1a  3.1a  3.2a	<p><b>ALLOW</b> kills more caterpillars when sprayed on tree tops and soil</p> <p><b>IGNORE</b> quote numbers unless qualified</p> <p><b>ALLOW</b> higher concentration (of spores)</p>

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Question			Answer	Marks	AO element	Guidance
			Not much difference between caterpillars killed for soil and trees ✓			<b>ALLOW</b> (soil) lasts many years but tree tops only a few months <b>IGNORE</b> lasts many years

Question			Answer	Marks	AO element	Guidance
21	(a)		HIV ✓	1	1.1	<b>ALLOW</b> flu <b>ALLOW</b> Covid/Corona <b>ALLOW</b> any other credit worthy virus
	(b)	(i)	(Use of a) tissue/handkerchief ✓	1	1.2	<b>ALLOW</b> wear a face mask / cover mouth (when sneezing) <b>ALLOW</b> idea of self-isolation / avoid close contact / wash hands <b>IGNORE</b> vaccination / protective clothing
		(ii)	<b>Any two from:</b> Mucus released from goblet cells ✓ Mucus will trap the virus ✓ Cilia will waft the mucus away from the lungs ✓	2	2 x 1.1	<b>IGNORE</b> nose hairs / other defence barriers
	(c)		Weakened or dead virus ✓	1	1.2	<b>AW</b> pathogen/microbe/measles for virus <b>ALLOW</b> virus antigen/attenuated virus
	(d)	(i)	(Number of cases) decreased ✓  (More) people were immune/vaccinated ✓	1  1	2 x 3.2b	<b>ALLOW</b> idea of herd immunity

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Question		Answer	Marks	AO element	Guidance
	(ii)	(Number of cases) increased ✓  Less children were vaccinated due to risk of autism ✓	1  1	2 x 3.2b	

Question		Answer	Marks	AO element	Guidance
22	(a)	<p><b>Any two from:</b></p> <p>Use a quadrat ✓</p> <p>Positioned at random / use of several (quadrats) ✓</p> <p>Count the number (of thistle in a quadrat) ✓</p> <p><b>AND</b></p> <p><b>Any one from:</b></p> <p>Idea of scaling up a smaller area of quadrat to the number in 1m<sup>2</sup> ✓</p> <p>Work out the mean (of the 1m<sup>2</sup> quadrat) ✓</p>	3	3 x 1.2	<p><b>DO NOT ALLOW</b> transect line. Max 1 mark from this section.</p> <p><b>IGNORE</b> quadrant</p> <p><b>ALLOW</b> random number generator/use co-ordinates to generate positions</p> <p><b>IGNORE</b> count the organisms/percentage cover</p> <p><b>ALLOW</b> work out the average/divide number of thistle plants by number of quadrats</p>
	(b)	<p><b>FIRST CHECK THE ANSWER ON ANSWER LINE</b></p> <p><b>If answer = 1.8 award 2 marks</b></p> <p>36/20 ✓</p> <p><b>OR</b></p>	2	2 x 2.2	<p><b>ALLOW</b> rounding to 2 for 2 marks</p>

			Answer	Marks	AO element	Guidance
			$\frac{36}{(1/2 \times 10 \times 4)} \checkmark$ <p>1.8 ✓</p>			
	(c)		<p>Will receive more light ✓</p> <p>Will be able to photosynthesise more/faster ✓</p> <p>Produce more sugars/glucose/raw material (for growth) ✓</p>	3	<p>2.1</p> <p>1.1</p> <p>2.1</p>	<p>Assume answer refers to thistles after mowing</p> <p><b>ALLOW</b> ORA for before mowing  <b>ALLOW</b> less competition for light  <b>IGNORE</b> less competition for space/water/minerals  <b>IGNORE</b> sun</p> <p><b>ALLOW</b> more sunlight for photosynthesis = 2 marks  <b>IGNORE</b> respire faster</p> <p><b>IGNORE</b> produce more food</p> <p>At least one marking point must be comparative to score any marks</p>

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			Answer	Marks	AO element	Guidance
Question			Answer	Marks	AO element	Guidance
23	(a)		To allow oxygen gas into the bottle ✓	1	1.2	
	(b)	(i)	<p><b>FIRST CHECK THE ANSWER ON ANSWER LINE</b>  <b>If answer = 16.3 award 3 marks</b></p> <p>300-235 / 4 ✓  <b>or</b>  65/4 ✓</p> <p>16.25 ✓  = 16.3 ✓</p>	3	2 x 2.2  1.2	<p><b>ALLOW</b> 16.2 without working for 1 mark</p> <p><b>ALLOW</b> Clear evidence of correct conversion of incorrect answer to 3 significant figures</p>
		(ii)	<p>Greater the number of (air) holes, the faster the rate (of decomposition) ✓</p> <p>Idea that the relationship is not linear  e.g. the rate of decomposition is not increasing at the same rate that the number of air holes are ✓</p>	2	2 x 2.2	<p><b>ALLOW</b> ORA for less number of (air) holes  <b>IGNORE</b> air flow  <b>IGNORE</b> more air holes more mass lost</p> <p><b>ALLOW</b> the relationship is not directly proportional</p>
		(iii)	(Easier) to compare (the amount of mass that had been lost) ✓	1	2.2	<b>ALLOW</b> no need to calculate the percentage change

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			Answer	Marks	AO element	Guidance
						<b>IGNORE</b> to make it a fair test/is more accurate/is more reliable/is a control variable/fewer calculations
		(iv)	Number of (air) holes ✓	1	2.2	<b>IGNORE</b> air holes unqualified
		(v)	Idea that it/water would not have been weighed / the mass would have been lower ✓  (Collect the water) and measure its mass / pour it back into the bottle ✓	2	2.2  3.3b	<b>ALLOW</b> not all mass lost would have been due to decomposition <b>IGNORE</b> references to loss of plant waste reducing the mass <b>IGNORE</b> mass affected by loss of water <b>DO NOT ALLOW</b> block up the drain holes <b>ALLOW</b> at the end of the experiment measure the plant wastes dry mass

## Need to get in touch?

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