

Mark scheme – Monitoring & Maintaining the Environment (H)

Question		Answer/Indicative content	Marks	Guidance
1		C	1 (AO 1.1)	
		Total	1	
2		D ✓	1 (AO2.2)	
		Total	1	
3		C ✓	1 (AO2.2)	
		Total	1	
4		C ✓	1 (AO1.2)	
		Total	1	
5	a	number of seeds that germinated ✓	1 (AO 3.1a)	IGNORE the number of seeds
	b	to keep the total volume constant / to dilute the acid by different amounts ✓	1 (AO 3.1a)	<p>ALLOW so volume adds up to 20cm³</p> <p>ALLOW change/investigate the concentration of acid</p> <p>ALLOW make it more/less acidic / vary acidity</p> <p>Examiner's Comments</p> <p>In this AO3 question many candidates found difficulty in communicating that the same volume overall was needed, or to change the concentration of acid. Where candidates did gain marks, it was often for stating 'so volume adds up to 20cm³'.</p>
	c	idea that germination is affected by temperature ✓	1 (AO 3.1a)	<p>ALLOW higher level answers such as references to rate of diffusion or enzyme action correctly linked to temperature change</p> <p>IGNORE to make it a fair test</p> <p>Examiner's Comments</p> <p>This AO3 interpretation question provided challenge for most candidates. Often responses were seen referencing prevention of evaporation, which did not gain marks. Few candidates correctly linked the temperature to its effect on germination</p>

					rate. Some higher ability candidates did give correct references to enzyme action.
	d		<p>Any two from: acid rain will reduce the number of seeds that germinate ✓</p> <p>reference to addition of small volumes of acid having little effect / rapid drop in germination between third and fourth flask ✓</p> <p>germination at the highest volume of acid is still possible / acid concentration would have to be higher to stop germination ✓</p>	<p>2 (AO 2 × 3.1b)</p>	<p>ALLOW ORA</p> <p>ALLOW indication of correct flasks from table data</p> <p>Examiner's Comments</p> <p>This question assessed AO3 evaluation. Most candidates correctly identified the effect of acid on germination, but none commented on the pattern in the data. On the very rare occasion that a second mark was obtained, it was for identifying that germination still did happen with highest concentration stating that 'the higher acid concentration reduces germination rate, but it doesn't stop it altogether' which got maximum marks.</p>
	e	i	<p>First check answer on answer line If answer = 100 award 2 marks</p> <p>correct calculation of 10% ✓</p> <p>VI = 100 ✓</p>	<p>2 (AO 2 × 2.2)</p>	<p>Examiner's Comments</p> <p>This AO2 question assessed mathematical skills in a practical context. Many candidates did well and scored both marks. Some had an incorrect answer but scored the working out mark for getting 10%. Again, this emphasises the advantage of candidates ensuring that they show their working out in the space provided for them to put their response.</p>
		ii	<p>takes into account how well the seeds are growing ✓</p> <p>also better to use percentage germination than number germinated ✓</p>	<p>2 (AO3.3b)</p>	<p>ALLOW shows seeds growing roots/shoots / shows seeds growing above/below soil</p> <p>Examiner's Comments</p> <p>This AO3 question linked to improving experimental procedures was looking for the idea that VI, by measuring length of roots/shoots, looked at growth not just germination. However, candidates simply repeated the question (just referencing about the length of shoot/roots) and used terms such as accurate, precise and reliable to try and cover the improvement aspect of the question. Very few were able to identify that percentage germinated was a better</p>

					value to use than number of seeds germinated.
			Total	9	
6			<p>shows that over the years the birds are laying eggs earlier (in May) ✓</p> <p>this could be because temperatures are increasing (year on year) ✓</p> <p>however, the data shows a lot of variation ✓</p> <p>there could be other factors involved ✓</p>	<p>4 (AO 3.1a)</p> <p>(AO 3.2b)</p> <p>(AO 3.1a)</p> <p>(AO 3.2b)</p>	<p>ALLOW shows downward trend</p> <p>ALLOW because Earth is getting warmer</p> <p>ALLOW examples of variation in data from the graph</p> <p>ALLOW data shows lots of fluctuations / erratic data / spikes in the data</p> <p>ALLOW examples of factors such as predator/prey relationship may be different</p> <p>Examiner's Comments</p> <p>In this AO3 question, most higher ability candidates scored well. Most candidates were able to appreciate and describe the fluctuations. Some lower ability candidates wrote about climate change without mentioning an increase in temperature, for example, 'due to climate change eggs were laid earlier'. Some referred to the number of eggs laid rather than the timing, and many that didn't lost track that eggs were laid earlier. Some candidates thought climate change might not be the cause but then didn't suggest that another factor could be involved.</p>
			Total	4	
7	a		<p>normal bin has holes to allow in air / oxygen ✓</p> <p>(making normal compost) so aerobic respiration occurs ✓</p>	<p>2</p> <p>(AO2.1)</p> <p>(AO1.1)</p>	<p>ALLOW converse arguments for bokashi bin</p> <p>ALLOW aerobic bacteria carry out respiration</p> <p>IGNORE bacteria work aerobically</p>
	b		<p>used the same pile of dead plant material for both composters / used same plant type / used equal mass in both composters ✓</p>	<p>1</p> <p>(AO2.2)</p>	<p>ALLOW used the same time interval for both composters</p> <p>ALLOW used the same water/moisture content for both composters</p> <p>ALLOW idea of same external conditions e.g. put both in same place / external temperature kept the same / kept in the same environment</p> <p>IGNORE references to fair testing</p>
	c	i	<p>Axes – both correctly labelled, including units✓</p> <p>Axes - even scales occupying more than</p>	<p>5</p> <p>(AO5 x 2.2)</p>	<p>Must have time on x-axis and temperature on y-axis</p>

		<p>half of the grid ✓</p> <p>Plotting - all points correctly plotted ✓</p> <p>Line - lines labelled or a key ✓</p> <p>Line - points with curve of best-fit lines ✓</p>		<p>ALLOW +/- half a square at least 8 points correctly plotted</p> <p>IGNORE extrapolated lines</p>
	ii	<p>temperature increased as compost decomposed / bacteria released heat by respiration ✓</p> <p>temperature starts to drop as decomposition slows down/complete / bacterial respiration slows ✓</p>	<p>2 (AO2 x 2.1)</p>	<p>ALLOW rise in temperature due to energy released by respiration ✓</p> <p>ALLOW bacterial activity slows (if respiration already mentioned)</p> <p>ALLOW temperature starts to drop as enzymes in respiration denature at high temperatures</p>
	iii	<p>idea that decomposition in bokashi (method) bin much slower ✓</p> <p>anaerobic respiration releases less heat/energy than aerobic respiration ✓</p>	<p>2 (AO2 x 2.1)</p>	<p>Enter text here.</p>
d	i	<p>FIRST CHECK THE ANSWER ON ANSWER LINE</p> <p>If answer = 27 (%) award 3 marks</p> <p>400 / 1500 x 100 ✓</p> <p>26.6 (%) ✓</p> <p>= 27 (%) ✓</p>	<p>3 (AO2.2) (AO2.2) (AO1.2)</p>	<p>If answer = 26.6 (%) award 2 marks</p> <p>ALLOW ECF for correct rounding</p>
	ii	<p>idea that the gas given off is carbon dioxide ✓</p> <p>less greenhouse gas produced / less likely to result in global warming / less contribution to greenhouse effect ✓</p>	<p>2 (AO2.2) (AO3.1b)</p>	<p>ALLOW for 2 marks less carbon dioxide produced which is a greenhouse gas</p> <p>ALLOW correct formula</p> <p>ALLOW explanations of the greenhouse effect</p> <p>IGNORE references to environmental damage/not environmentally friendly/pollution/not good for the environment</p>
		Total	17	
8		<p>correctly chosen axes, labelled with units ✓</p> <p>suitable scale on both axes ✓</p> <p>all points correctly plotted ✓ ✓</p>	<p>5 (AO 5 x 2.2)</p>	<p>place ticks on right hand side of grid</p> <p>minimum 50% of grid used</p> <p>scale must be in ascending order</p> <p>ALLOW +/- half a square</p> <p>0 to 5 correct points plotted = 0 mark</p> <p>6 or 7 correct points plotted = 1 mark</p> <p>All 8 correct points plotted = 2 marks</p>

			line of best fit through most points ✓		<p>DO NOT ALLOW dot to dot line ALLOW line of best fit for their plotting IGNORE any extrapolation of line</p> <p><u>Examiner's Comments</u></p> <p>This question assessed candidates' ability to apply knowledge and understanding of scientific enquiry, techniques and procedures in graphing skills. Many candidates scored 4 marks and missed out on the mark for the line of best fit as they drew straight lines that did not go through or near any of the points. The mark scheme looked for the line through most of the points and this was best achieved by a curved line. There were a significant number of candidates who plotted the variables on the wrong axes. This did lose them a mark, but they were able to score the other marking points if all points were plotted accurately, to a suitable scale and a suitable line of best fit was drawn.</p>
			Total	5	