Mark scheme – Respiration (H)

Question			Answer/Indicative content	Marks	Guidance
1			B ✓	1 (AO2.1)	
			Total	**1**	
2			B	1 (AO 1.2)	
			Total	**1**	
3			A	1 (AO 1.1)	
			Total	**1**	
4			B	1 (AO 2.1)	**Examiner's Comments** **AfL** Very few candidates answered this challenging AO2.1 question correctly. Again, several did so by writing the number in the answer box rather than the letter. Candidates who wrote 2 were credited but it is something they should be encouraged to avoid and to only use letters A, B, C or D.
			Total	**1**	
5			Please refer to the marking instructions on page 4 of this mark scheme for guidance on how to mark this question. **Level 3 (5–6 marks)** Demonstrates a knowledge of the importance of the blood supply to the heart. **AND** Applies knowledge to explain why a failure of this blood supply can lead to heart disease. **AND** Analyses the information to explain the link between a lack of LDL protein and heart disease. *There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and*	6 (AO2 x 1.1) (AO2 x 2.1) (AO2 x 3.1a)	**AO1.1 Demonstrate knowledge and understanding of the importance of the blood supply to the heart muscle.** • blood in the coronary artery supplies heart muscle • oxygen / glucose is supplied to the muscle • this is needed for the muscle to contract/for respiration **AO2.1 Apply knowledge and understanding of the requirements of the heart muscle** • without oxygen / glucose the heart muscle cannot respire

			substantiated. **Level 2 (3–4 marks)** Demonstrates a knowledge of the importance of the blood supply to the heart. **AND** Applies knowledge to explain why a failure of this blood supply can lead to heart disease. **OR** Demonstrates a knowledge of the importance of the blood supply to the heart. **AND** Analyses the information to explain the link between a lack of LDL protein and heart disease. **OR** Applies knowledge to explain why a failure of this blood supply can lead to heart disease. **AND** Analyses the information to explain the link between a lack of LDL protein and heart disease. *There is a line of reasoning presented with some structure. The information presented is relevant and supported by some evidence.* **Level 1 (1–2 marks)** Demonstrates a knowledge of the importance of the blood supply to the heart. **OR** Applies knowledge to explain why a failure of this blood supply can lead to heart disease. **OR** Analyses the information to explain the link between a lack of LDL protein and heart disease. *There is an attempt at a logical structure with a line of reasoning. The information is in the most part relevant.* **0 marks** *No response or no response worthy of credit*		• <u>energy</u> from respiration is needed for the muscle to contract **AO3.1a Analyse information and ideas to interpret the effects of lack of LDL receptor protein.** • without LDL receptor protein there will be more cholesterol in the blood / cholesterol levels will be too high to be removed/broken down • increased build up of cholesterol in the coronary artery will increase the risk of heart disease / decrease blood flow to the heart muscle

			Total	**6**	
6	a		normal bin has holes to allow in air / oxygen ✓ (making normal compost) so aerobic respiration occurs ✓	2 (AO2.1) (AO1.1)	**ALLOW** converse arguments for bokashi bin **ALLOW** aerobic bacteria carry out respiration **IGNORE** bacteria work aerobically
	b		used the same pile of dead plant material for both composters / used same plant type / used equal mass in both composters ✓	1 (AO2.2)	**ALLOW** used the same time interval for both composters **ALLOW** used the same water/moisture content for both composters **ALLOW** idea of same external conditions e.g. put both in same place / external temperature kept the same / kept in the same environment **IGNORE** references to fair testing
	c	i	Axes – both correctly labelled, including units✓ Axes - even scales occupying more than half of the grid ✓ Plotting - all points correctly plotted ✓ Line - lines labelled or a key ✓ Line - points with curve of best-fit lines ✓	5 (AO5 x 2.2)	Must have time on x-axis and temperature on y-axis **ALLOW** +/- half a square at least 8 points correctly plotted **IGNORE** extrapolated lines
		ii	temperature increased as compost decomposed / bacteria released heat by respiration ✓ temperature starts to drop as decomposition slows down/complete / bacterial respiration slows ✓	2 (AO2 x 2.1)	**ALLOW** rise in temperature due to energy released by respiration ✓ **ALLOW** bacterial activity slows (if respiration already mentioned) **ALLOW** temperature starts to drop as enzymes in respiration denature at high temperatures
		iii	idea that decomposition in bokashi (method) bin much slower ✓ anaerobic respiration releases less heat/energy than aerobic respiration ✓	2 (AO2 x 2.1)	Enter text here.
	d	i	**FIRST CHECK THE ANSWER ON ANSWER LINE** **If answer = 27 (%) award 3 marks** 400 / 1500 x 100 ✓ 26.6 (%) ✓ = 27 (%) ✓	3 (AO2.2) (AO2.2) (AO1.2)	**If answer = 26.6 (%) award 2 marks** **ALLOW** ECF for correct rounding

		ii	idea that the gas given off is carbon dioxide ✓ less greenhouse gas produced / less likely to result in global warming / less contribution to greenhouse effect ✓	2 (AO2.2) (AO3.1b)	**ALLOW** for 2 marks less carbon dioxide produced which is a greenhouse gas **ALLOW** correct formula **ALLOW** explanations of the greenhouse effect **IGNORE** references to environmental damage/not environmentally friendly/pollution/not good for the environment
			Total	**17**	
7		i	polymers ✓ monomers ✓	2 (AO2 x 1.1)	
		ii	(**A** has) less ADH released/present ORA ✓ so less/no reabsorption of water / permeability of collecting duct is lower/has not changed ✓	2 (AO2 x 2.1)	**ALLOW** ADH release is inhibited in A / lack of ADH production in **A** **IGNORE** less movement of water out of the tubule (must state reabsorption)
		iii	**Any two from:** (low) water potential/(decreased) water levels are detected by hypothalamus ✓ will cause the release of ADH/ increased ADH levels ✓ increased permeability of collecting duct/kidney tubules / increased reabsorption of water (into blood) / decreased urine production / urine will become more concentrated ✓	2 (AO2 x 2.1)	**IGNORE** brain
			Total	**6**	
8			peak CO_2 level is close to the peak of ripening chemical level / CO_2 levels increasing as production of chemical increases ✓ process is respiration ✓	2 (AO2 x 3.2b)	**DO NOT ALLOW** there is a spike/peak in CO_2 as the chemical increases **ALLOW** fermentation
			Total	**2**	
9	a		alcohol / ethanol **and** carbon dioxide ✓	1 (AO 1.1)	**ALLOW** either order **ALLOW** correct formulae **Examiner's Comments**

					This question was well answered by the majority of candidates.
	b		**Any two from:** alcohol produced in yeast (not humans) / ORA✓ lactic acid produced by humans (not yeast) / ORA✓ carbon dioxide produced by yeast (not humans) / ORA✓	2 (AO 1.1)	If any incorrect product is stated, then max 1 mark. If yeast or humans are not stated assume answer refers to yeast **IGNORE** reference to oxygen debt / ATP production **Examiner's Comments** Although most candidates identified differences in the products formed, there were a number of incorrect references to the energy released by the two processes. One of these is seen in exemplar 2, which only scored one mark. **Exemplar 2** 1 Anaerobic respiration in humans produces lactic acid. 2 Yeast cells produce more energy anaerobically than human muscle cells do. [2]
	c	i	sucrose ✓	1 (AO 3.2a)	**Examiner's Comments** Most candidates correctly identified the sugar as sucrose.
		ii	**FIRST CHECK THE ANSWER ON ANSWER LINE** **If answer = 12 award 2 marks** 6.0 ÷ 0.5 ✓ = 12 ✓	2 (AO 2.2)	**Examiner's Comments** Most candidates could extract the correct data from the graph and complete the calculation.
		iii	glucose ✓	1 (AO 3.2a)	**Examiner's Comments** This question proved to be more challenging with both sucrose and fructose being chosen equally as incorrect answers.
		iv	(Yeast B) doesn't ferment fructose ✓ (Yeast B) produces some fermented products ✓	2 (AO 3.1a)	**ALLOW** (Yeast B) does not use up fructose / fructose levels decrease slightly / fructose levels remain high / higher yield of fructose / fructose levels remain constant **ALLOW** reverse arguments for Yeast A **DO NOT ALLOW** fructose is produced **ALLOW** fermented products increased**DO NOT ALLOW** fermented products produced

					from fructose **DO NOT ALLOW** produces high levels of fermented products **IGNORE** fermented product level stays the same / less fermented product than A **Examiner's Comments** The examiners were looking for an understanding that yeast B does not use up as much fructose but still produces some fermented product. A number of candidates stated that fructose is actually produced by yeast B and others claimed that it also produces high concentrations of fermented product. Exemplar 3 makes both of these errors and so does not score. **Exemplar 3** Yeast B produced 3.25 g/100ml of fructose in 24 hours which was more than an Yeast A did at only 0.4 g/100ml. Yeast B also produced 0.5 g/100ml of fermented product [2] which is still high.
			Total	**9**	
10	a	i	sucrose ✓	1 (AO 3.2a)	**Examiner's Comments** Candidates in the main were able to interpret the graph in this AO3.2 question.
		ii	**FIRST CHECK THE ANSWER ON ANSWER LINE** **If answer = 12 award 2 marks** 6.0 ÷ 0.5 ✓ = 12 ✓	2 (AO 2.2)	**Examiner's Comments** **AfL** This AO2.2 question was reasonably well answered. However, because candidates often did not include working out they often scored 2 marks or nothing. Several candidates did a subtraction, 6 - 0.5 rather than dividing. This is another example of where a candidate who is encouraged to show their working out may well obtain at least 1 mark rather than none.
		iii	glucose ✓	1 (AO 3.2a)	

					Examiner's Comments Candidates in the main were able to interpret the graph in this AO3.2 question.
		iv	(Yeast B) doesn't ferment fructose ✓ (Yeast B) produces some fermented products ✓	2 (AO 3.1a)	**ALLOW** (Yeast B) does not use up fructose / fructose levels decrease slightly / fructose levels remain high / higher yield of fructose / fructose levels remain constant **ALLOW** reverse arguments for Yeast A **DO NOT ALLOW** fructose is produced **ALLOW** fermented products increased **DO NOT ALLOW** fermented products produced from fructose **DO NOT ALLOW** produces high levels of fermented products **IGNORE** fermented product level stays the same / less fermented product than A **Examiner's Comments** Some candidates did not answer this AO3.1 question. This may be due to it being the last question but could be that they were unsure how to respond. Many candidates who did respond had the right ideas but did not articulate clearly enough, saying that there was more fermented product in yeast B or similar.
	b		alcohol / ethanol **and** carbon dioxide ✓	1 (AO 1.1)	**ALLOW** either order **ALLOW** correct formulae **Examiner's Comments** In this AO1.1 recall question, candidates seemed to either know this or got both products incorrect.
	c		**Any two from:** alcohol produced in yeast (not humans) / ORA✓ lactic acid produced by humans (not yeast) / ORA✓ carbon dioxide produced by yeast (not humans) / ORA✓	2 (AO 1.1)	If any incorrect product is stated, then max 1 mark. If yeast or humans are not stated assume answer refers to yeast **IGNORE** reference to oxygen debt / ATP production **Examiner's Comments** In general, if candidates had scored a mark on (a), they often scored marks for this AO1.1 question as well. Some candidates managed to write enough to score 1 mark, as they knew humans produced lactic acid.

					However, quite a few thought yeast was a plant, or that oxygen was produced.
			Total	**9**	