OCR GCSE GATEWAY BIOLOGY A · J247

BIOLOGY



MARK SCHEME

M4 GRAPHS

SCORE	PERCENTAGE
/44	%

STEMUP

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Question			Answer/Indicative content	Marks	Guidance
1			B ✓	1 (AO2.2)	
			Total	1	
2		i	FIRST CHECK THE ANSWER ON ANSWER LINE If answer = 32 award 2 marks 34 + 29 + 33 = 96 ✓ 96 ÷ 3 = 32 ✓	2 (AO2.2)	ALLOW answer in the space under the table but answer on answer line in table takes preference ALLOW ECF for mean calculation
		ii	temperature ✓	1 (AO2.1)	
		iii	identifies variability in each point plot / gives an estimate of level of uncertainty ✓	1 (AO1.2)	ALLOW can plot range/error bars ALLOW large error bars variability is high/ORA ALLOW high variability then reliability is low/ORA ALLOW idea of the spread of data at each point and possibly identify/eliminate outlier/anomaly ALLOW ranges overlap the data at those 2 points isn't significantly different
		iv	Any two from: as temperature increases enzyme activity increases ✓ optimum enzyme activity between 25^0C and 35^0C enzyme activity ✓ but somewhere between 30^0C and 35^0C enzyme activity starts to decrease ✓ idea decrease in rate (after 35^0C) due to denaturing ✓	2 (AO3.1a)	ALLOW idea that as temperature increases/gets higher so does rate of (enzyme) reaction / gas release / ORA ALLOW higher temperature the faster the enzyme activity ALLOW enzyme starts to denature above 30^0C/between 30^0C and 35^0C
			Total	6	

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Question			Answer/Indicative content	Marks	Guidance
3		i	axes correctly labelled, including units ✓ all points correctly plotted ✓ ✓ suitable line of best fit drawn ✓	4 (AO4 x 2.2)	 ALLOW +/- half a square all points correctly plotted 0 to 1 correct point plotted = 0 mark 2 to 4 correct points plotted = 1 mark All 5 correct points plotted = 2 marks ALLOW line of best fit based on plotted points IGNORE dot to dot line
		ii	further lamp is from the plant photosynthesis reduced / ORA ✓ example of a decrease from data e.g. at 10cm 30 bubbles given off and at 40cm only 2 bubbles ✓ OR photosynthesis stops in very low light ✓ by 50 cm there are no bubbles ✓ OR idea that rate of photosynthesis decrease is a non-linear relationship ✓ e.g. nearly double the number of bubbles at 10cm compared to 20cm but not double elsewhere ✓	2 (AO3.2b)	 IGNORE type of gas mentioned in bubbles ALLOW description of decrease in bubbles e.g. further lamp the less bubbles ALLOW there is a negative correlation
			Total	6	

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Question			Answer/Indicative content	Marks	Guidance
4	a		to allow a valid comparison of the results✓	1 (AO3.1b)	
	b	i	correct plots ✓✓ smooth curved line between points ✓	3 (AO3 x 2.2)	**ALLOW** +/- half a square All correct = 2 marks 3 or 4 plots correct = 1 mark **DO NOT ALLOW** sketchy line / line thicker than half a square
		ii	increases up to 10 days/70^{o}C ✓ then decreases ✓	2 (AO3.1a)	**ALLOW** increases up to 9-11 days **ALLOW** increases by 44^{o}C
		iii	**FIRST CHECK THE ANSWER ON ANSWER LINE** **If answer = 39 (^{o}C) award 2 marks** 70-31 ✓ = 39 (^{o}C)✓	2 (AO2.2) (AO1.2)	
		iv	normal compost is made by aerobic respiration✓ aerobic respiration releases more energy than anaerobic respiration✓	2 (AO2 x 2.1)	2 correct ticks = 2 marks 1 correct ticks = 1 mark 3 ticks two correct = 1 mark 3 ticks one correct = 0 marks 4 or more ticks = 0 marks
	c	i	**FIRST CHECK THE ANSWER ON ANSWER LINE** **If answer = 8 (kg) award 3 marks** 1500-1200 **OR** 300 ✓ 300/40 **OR** 7.5 ✓ = 8 (kg) ✓	3 (AO3 x 2.2)	**ALLOW** one mark for clear evidence of rounding incorrect answer correctly to the nearest whole number
		ii	less carbon dioxide is produced ✓	1 (AO3.1b)	**ALLOW** less contribution to global warming / greenhouse effect / climate change
			Total	**14**	

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Question			Answer/Indicative content	Marks	Guidance
5	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.

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Question			Answer/Indicative content	Marks	Guidance
	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	

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