Biological Molecules Mark Scheme 3

Level	IGCSE
Subject	Biology
Exam Board	CIE
Торіс	Biological Molecules
Paper Type	(Extended) Theory Paper
Booklet	Mark Scheme 3

Time Allowed:	44 minutes	
Score:	/36	
Percentage:	/100	

1 (a)	carbon ; hydrogen ; oxygen ; nitrogen ; sulfur ; [4 max]	R CHONS
(b)	 N / nitrogen, fixation ; bacteria / <i>Rhizobium</i> ; R 'nodules are bacteria' convert, nitrogen / N₂ / AW, into, ammonia / NH₃ / ammonium / NH₄⁺ / amino acid(s) ; 	N-fixing bacteria = 2 mar R to nitrite / nitrate
	4 plants use (fixed) nitrogen to make, amino acids / proteins / AW ; [3 max]	A plants use NH_3 / NH_4^+
(c)	 (dead plants) eaten by, animals / detritivores / scavengers; e.g. earthworms / termites / AW; ref. their faeces / increase in surface area; decay / decomposition; A decomposers by, bacteria / fungi / saprophytes / saprotrophs; break down proteins to amino acids; deamination; ammonia / NH₃ / NH₄; ammonia to <u>nitrite</u>; nitrification / nitrifying bacteria; <i>Nitrosomonas / Nitrobacter</i> in correct context of nitrification; [6 max] 	MP3 must be related to MP1 or 2 A even if linked to incorrect organism R if wrong type of bacteria (e.g. N-fixing) A if in context of MP1 or 2 but do not award twice protein \rightarrow ammonia / AW = 1 mark if 6, 7, 8 not given R 'nitride' unless qualified by NO ₂ ⁻ R nitrate unqualified by nitrite or ammonia

1ligh1ligh2ligh3wat4car5tem6cor7gra8pes9par10use	ht intensity ; A limited sunlight / lack + of sunlight / sunshine ht duration ; A day length ater / moisture availability ; A drought / flood / humidity / soil water rbon dioxide, availability / concentration / tension / level ; mperature ; mpetition / overcrowding / space / weeds ; azing / herbivores / predation / primary consumers ; ests ; arasites / disease ; e of (inappropriate) herbicides / pearby use of herbicides ;	R heat / warmth
10 use 11 pol 12 soil 13 win 14 salt	A drift of herbicides / weed killers Illution / sulphur dioxide / acid rain ; il pH / depth of soil / type of soil / poor soil / oxygen in the soil ; nd speed ; It concentration of soil ; [3 may	R oxygen unqualified
(e) accept 1 sm 2 tak 3 not 4 apt 5 too 6 ref. 7 ref. 8 ref. 9 no 10 cor 11 AV	t ora with population starting to increase about day 40 nall population to start with ; kes time for eggs to hatch ; it enough food / soya bean plants not grown enough / AW ; whids, not sexually mature / cannot breed / finding mates ; o cold / too wet / AW (another appropriate weather condition) ; f. to, predators / ladybirds ; f. to, parasites / disease ; f. to, pesticides / insecticides ; immigration ; mpetition (between aphids, with another pest) ; /P ; [3 max	 do not expect knowledge of aphid biology I names of phases (lag, log) I 'adjusting to surroundings' refs. to soya must refer to food for aphids A few soya plants / competition for food / soya grows slowly R unfavourable conditions unqualified [] (e.g. correct ref. biotic and abiotic factors)
	[Total: 19]

(a)	(reserves last longer for walking / ora ; (approx) 4 times longer / other use of figures ;	
	(ii)	glucose and <u>muscle</u> glycogen ;	[1]
	(iii)	fat and carbohydrate ;	[1]
	(iv)	award two marks if correct answer (16.6 / 17) is given if no answer or incorrect answer award one mark for correct working	
		1660 / 100 OR 5800 / 350 OR average of the two 16.57 / 16.58 / 16.59 / 16.6 / 17 (kJ per gram) ;; R rounding down to 16.5	[2]
(b)	(muscle, growth / development / repair ; A 'make / build up, muscle'	[1]
	(ii)	to build up, energy / glycogen, reserves / stores ; muscle / liver, glycogen ; converted to fat / stored as fat ;	[2]
(c)	($C_6H_{12}O_6 \longrightarrow 2C_3H_6O_3$ (+ energy released)	
		1 mark for glucose + lactic acid formulae correct ; 1 mark for balanced equation ; R if anything else given (CO ₂ + H ₂ O)	
	(ii)	 short, time / distance, for sprint <i>or</i> long, time / distance, for marathon; sprint needs (lots of) energy quickly / marathon needs energy over long period; sprint oxygen supply not sufficient / oxygen supplied during marathon; anaerobic does not need oxygen / aerobic needs oxygen; lactic acid, removed after sprint / would build up in marathon; ref to muscle, fatigue / cramp / pain; ref to oxygen debt; 	
		8 AVP ; e.g. fat has higher energy content useful for marathon	[max 4]
	(iii)	glycogen in liver broken down to glucose ; correct ref to <u>glucagon</u> ; R if 'glucagon breaks down glycogen' glucose from liver enters the blood ; R 'excreted into blood' <i>idea that</i> balances use of glucose ; A 'replaces glucose used up'	[max 2]

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