



GCSE

Biology B

Unit **B732/01**: Modules B4, B5, B6 (Foundation Tier)

General Certificate of Secondary Education

Mark Scheme for June 2016

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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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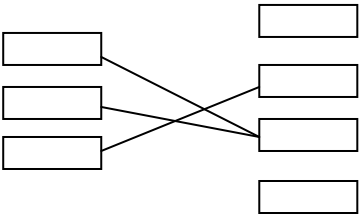
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Annotations used in scoris

Annotation	Meaning
	correct response
	incorrect response
BOD	benefit of the doubt
NBOD	benefit of the doubt not given
ECF	error carried forward
	information omitted
I	ignore
R	reject
CON	contradiction

Abbreviations, annotations and conventions used in the detailed Mark Scheme.

- / = alternative and acceptable answers for the same marking point
- (1)** = separates marking points
- allow** = answers that can be accepted
- not** = answers which are not worthy of credit
- reject** = answers which are not worthy of credit
- ignore** = statements which are irrelevant
- () = words which are not essential to gain credit
- = underlined words must be present in answer to score a mark (although not correctly spelt unless otherwise stated)
- ecf = error carried forward
- AW = alternative wording
- ora = or reverse argument

Question		Answer	Marks	Guidance						
1	a	 <p>1 mark for each correct line (3)</p>	3	allow oxygen – root hairs as an extra line or as an alternative to oxygen – stomata						
	b	<table border="1" data-bbox="318 619 660 726"><tr><td>✓</td><td></td></tr><tr><td>✓</td><td></td></tr><tr><td></td><td>✓</td></tr></table> <p>all correct (2) 2 correct (1)</p>	✓		✓			✓	2	ignore crosses
✓										
✓										
	✓									
Total			5							

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Question			Answer	Marks	Guidance
2	a	i	drooped / wilted (1)	1	ignore drops / dries out flop / shrivel / die etc
		ii	water it (1)	1	ignore minerals / nutrients / fertiliser / light
	b		contain minerals (1) to help the plant grow / make plant grow better / make it grow quicker (1)	2	allow specific examples e.g. nitrates/ phosphates/ potassium / magnesium ignore nutrients ignore simply 'to make plant grow' / 'for growth' ignore to increase development / to increase rate of recovery allow a specific function of a mineral eg (magnesium) to make chlorophyll
	c		pests/birds (1) stop plant / fruit from being eaten (1) to prevent plant/fruit from being damaged / ruined (1)	2	allow (keep away) insects ignore organisms unless linked to eating or damage ignore reference to fruit falling keep away pests/birds that would eat the plant/fruit = 2
	d		gets enough/more light (1) light needed for photosynthesis (1) for more growth / bigger crop (1)	2	ignore simply 'gets light' ignore to grow allow won't grow as much in the shade
Total				8	

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Question		Answer	Marks	Guidance
3	a	<p>[Level 3] Answer includes two adverse environmental condition with at least one fully explained. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks)</p> <p>[Level 2] Answer includes two adverse environmental conditions coupled with at least one explanation. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks)</p> <p>[Level 1] Answer includes two adverse environmental conditions. Quality of written communication impedes communication of the science at this level. (1 – 2 marks)</p> <p>[Level 0] Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)</p>	6	<p>This question is targeted at grades up to C</p> <p>Explanations at level 3 may include:</p> <ul style="list-style-type: none"> • lower temperatures decrease the rate of photosynthesis • less water uptake or more water loss may reduce photosynthesis as water is required <p>Explanations at level 2 may include:</p> <ul style="list-style-type: none"> • lack of water in the soil results in lack of water uptake / gets less water • windy so more water lost by transpiration / via stomata / less braches so less photosynthesis <p>Indicative scientific points about the adverse environmental conditions may include:</p> <ul style="list-style-type: none"> • low temperatures / too cold • lack of water (in soil) (not just dry) • windy so more water loss / damage to branches <p>Use the L1, L2, L3 annotations in Scoris; do not use ticks.</p>
	b	<p>any two from: stops water entering (1)</p> <p>stops oxygen entering (1)</p> <p>stops bacteria/fungi/microbes/decomposers entering (1)</p>	2	<p>ignore reference to low temperature / dry soil</p> <p>allow less respiration / growth / reproduction of bacteria / fungi / microbes (1)</p>

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Question		Answer	Marks	Guidance
	c i	<p>any two from: idea that graph shows an increase in recent times (1)</p> <p>idea that there was a decrease until recently (1)</p> <p>idea that there have been great fluctuations (1)</p> <p>there have been wider rings at other times (in the past) / e.g. 3800 years ago (1)</p> <p>idea that results might not be representative of all trees (1)</p>	2	<p>ignore yes/no allow increases starting in any correct year (between 2000 years ago to present) allow trees are wider in present day (1) allow shows an overall increase (1)</p> <p>allow decreases (from 4000) to any correct year (between 2000 years ago to 500) (1)</p> <p>allow the pattern is random (1) allow it has gone up and down (1) BUT allow it has gone up and down but there is an increase in recent years (2)</p> <p>allow only shows bristlecone pine trees (1) allow only shows some bristlecone pine trees (1) allow only measured in California (1)</p> <p>ignore it is warmer in California</p>
	ii	<p>any two from: there is not enough evidence (to support theory) (1)</p> <p>other factors could have caused wider rings (1)</p>	2	<p>ignore yes/no allow idea that correlation does not mean causation (1) ignore no evidence ignore not enough proof</p> <p>allow named factors such as rainfall or light (intensity) (1) ignore other things could have caused the wider rings</p>

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Question		Answer	Marks	Guidance
		only provides information about tree rings in one location (1)		ignore idea that graph supports global warming recently as rings are getting wider
		Total	12	

Question		Answer	Marks	Guidance
4	a	<p>fertilisation</p> <p>menstruation</p> <p>ovulation</p> <p>breaking down of the uterus lining</p> <p>release of an egg from the ovary</p> <p>joining of egg and sperm</p>	2	1 or 2 correct lines = (1) 3 correct lines = (2)
	b	<p>any three from:</p> <p>increase in temperature reduces sperm production (1)</p> <p>the reduction persists for several days (1)</p> <p>being in the scrotum means the testes are outside the body cavity (1)</p> <p>kept cooler (1)</p>	3	
		Total	5	

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Question		Answer	Marks	Guidance
5	a	<p>any two from: a simple/closed (1) fracture / break / arm broken (1) of the humerus (1)</p>	2	ignore crack / split / snap
	b	i	1	
		ii	2	<p>allow it goes up (with age)</p> <p>ignore hollow / lighter allow more brittle / osteoporosis</p>
	c	<p>hip replacement kidney failure</p> <p>dialysis heart disease</p> <p>pacemaker osteoporosis</p> <p>ventilator pneumonia</p>	2	<p>all three correct = 2 1 or 2 correct = 1</p>
Total			7	

Question			Answer	Marks	Guidance
6	a	i	glucose and oxygen (1)	1	
		ii	coronary artery (1)	1	
	b		<p>[Level 3] Answer includes an advantage and a disadvantage of taking the drugs and includes references to the action and includes a reason why Tim is convinced Quality of written communication does not impede communication of the science at this level. (5 – 6 marks)</p> <p>[Level 2] Answer includes an advantage and a disadvantage of taking the drugs and include a reference to the action of these drugs Or Answer includes references to the action of these drugs and a reason why Tim is convinced Or Answer includes an advantage and a disadvantage of taking the drugs and reason why Tim is convinced</p> <p>Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks)</p> <p>[Level 1] Answer includes an advantage and a disadvantage of taking the drugs OR a reason why Tim is convinced OR includes a reference to the action of these drugs. Quality of written communication impedes communication of the science at this level. (1 – 2 marks)</p>	6	<p>This question is targeted at grades up to C.</p> <p>Biological knowledge about the action of the drugs may include:</p> <ul style="list-style-type: none"> • aspirin / warfarin are anti-coagulants • these drugs reduce blood clotting • blood takes longer to clot if cuts occur • if blood does not clot bleeding may occur • blood clots can lead to blocked blood vessels • blood clots in coronary arteries this can lead to heart attacks <p>Indicative scientific points about advantages may include:</p> <ul style="list-style-type: none"> • aspirin / warfarin reduce the number of cases / chance of dangerous blood clots occurring • from 35 down to 22 or 12 <p>Indicative scientific points from disadvantages may include:</p> <ul style="list-style-type: none"> • number of cases / chance of dangerous bleeding increases when taking the drugs • from 2 people to 4 or 8 <p>Reasons why Tim may be convinced include:</p> <ul style="list-style-type: none"> • total number of problems drops when taking either drug • idea that reduced risk of blood clots is greater than the increased risk from bleeding <p>Use the L1, L2, L3 annotations in Scoris. Do not use ticks.</p>

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Question		Answer	Marks	Guidance
		[Level 0] Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)		
Total			8	

Question		Answer	Marks	Guidance
7	a	(calculation for Sanchez) (-) 6.3 (%) (1) Sanchez is very dehydrated and Leroy is slightly dehydrated (1) Sanchez (less likely to complete the race as he) will have muscle spasms / cramps (1)	2	allow: (-) 6.25 (%) / (-) 6 (%) (1) allow: ecf for symptoms if calculation incorrect ignore choice of who wins
	b	more respiration occurs (1) carbon dioxide is toxic (1)	2	allow poisonous / changes pH ignore harmful
Total			5	

Question		Answer	Marks	Guidance
8	a	cell wall (1) flagellum (1)	2	
	b	cholera (1)	1	
	c	2 1 3 (1)	1	
Total			4	

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Question		Answer	Marks	Guidance
9	a	to stop oxygen entering / to maintain anaerobic conditions / prevent aerobic conditions (1) to allow carbon dioxide to escape (1)	2	ignore to stop air entering allow fermentation needs absence of oxygen (1) allow to stop it exploding / prevents pressure build up / AW (1) allow to stop unwanted/harmful microbes entering (1)
	b	kills yeast (1)		1
		Total	3	

Question		Answer	Marks	Guidance
10	a	any two from: bacteria (1) rotting / decaying / decomposing (1) organic waste / animal waste / plant waste / dead plants / AW (1)	2	allow biodegrading ignore just 'waste' allow made by anaerobic process / in absence of oxygen / fermentation (1)
	b	(risk of) explosion (1)		1
	c	C / using it to provide energy (1) releasing it into the air is wasteful / causes pollution / adds to the greenhouse effect / causes global warming (1) burning it off is wasteful / releases carbon dioxide (1)	3	If wrong letter is chosen can score one mark for a correct reason.
		Total	6	

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Question	Answer	Marks	Guidance
11	<p>[Level 3] Gives at least one similarity AND at least one difference AND at least one explanation for each Quality of written communication does not impede communication of the science at this level. (5 – 6 marks)</p> <p>[Level 2] Gives at least one similarity OR at least one difference AND an explanation. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks)</p> <p>[Level 1] Gives either one similarity AND one difference. Quality of written communication impedes communication of the science at this level. (1 – 2 marks)</p> <p>[Level 0] Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)</p>	6	<p>This question is targeted at grades up to C</p> <p>Indicative scientific points about explanations may include:</p> <ul style="list-style-type: none"> • phytoplankton rise because it is warmer / more light / more photosynthesis • phytoplankton fall because they are eaten (by zooplankton) • zooplankton rise because there is more phytoplankton to eat • zooplankton fall because there is less phytoplankton to eat <p>Indicative scientific points about similarities and differences may include:</p> <p>Similarities:</p> <ul style="list-style-type: none"> • both rise and fall • both peak in summer • lowest in winter <p>Differences:</p> <ul style="list-style-type: none"> • peak for phytoplankton is higher / minimum number of phytoplankton is lower / ORA • peak for phytoplankton is earlier than peak for zooplankton / ORA (allow reference to months) <p>Use the L1, L2, L3 annotations in Scoris; do not use ticks.</p>
	Total	6	

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Question		Answer	Marks	Guidance
12	a	gel (beads) / glass beads / mesh / matrix (1)	1	allow reagent sticks
	b	50 (°C) and (pH) 5 (1)	1	allow any value for pH between 4.5 and 5
	c	(55 °C) uses less energy / cheaper as less heat needed (1) idea that if the pH is not exactly 5 it makes little difference at 55 (°C) but does make a difference at 60 (°C) (1)	2	ignore just 'cheaper' ignore just 'less heat' allow at 55 (°C) it works well at a range of pH but at 60 (°C) it only works at pH5 (1) allow at 60 (°C) it will denature if pH changes slightly (1) ignore just 'at 60 the enzyme will denature' ignore at pH 5 the activity is similar at 55 (°C) and 60 (°C)
	d	advantage of free enzymes: high(er) activity levels (1) advantage of immobilised enzymes: any one from: can reuse enzymes / recover enzymes (1) product not contaminated (with enzyme) (1) can use a continuous flow process (1)	2	must have an advantage of free enzymes and an advantage of immobilised enzymes for two marks allow immobilised enzyme has lower activity (1) allow free enzymes work quicker (1) allow idea of no expense needed to immobilise them (1) allow the idea that immobilised enzymes are more stable at different pH (1) but ignore immobilised enzymes are more stable at different temperatures
		Total	6	

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Question			Answer	Marks	Guidance
13	a	i	<p>any two from: population increased (1) distribution increased / spread out (more) (1) breeding increased / starts(1)</p>	2	<p>allow 'it increased' ignore more sightings</p> <p>allow more areas where it is seen</p>
		ii	<p>any two from: (yes, because) each survey was over a few years (1) each survey involved many birdwatchers (1)</p> <p>(no, because) idea that the two surveys just show a 'snapshot' / only cover 7 years / only two surveys / small sample size / no evidence about the years in between (1)</p> <p>ideas about difficulty in gathering data (1)</p> <p>don't know how extensive the surveys were (1)</p>	2	<p>ignore the yes and no</p> <p>allow have been seen in the same areas in both surveys / over last 20 years (1) allow survey involves two different time periods (1)</p> <p>allow not enough data (1)</p> <p>e.g. easy to miss birds or not easy to spot birds (1) e.g. could have counted the same birds more than once (1)</p> <p>allow don't know which parts of the country were surveyed (1)</p> <p>allow there is one breeding in Scotland or North that does not match trend (1)</p>
	b	i	farmland (birds) (1)	1	
		ii	woodland (birds) (1)	1	

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Question	Answer	Marks	Guidance
	<p>iii idea that the total for sea, woodland and farmland species is less than the total for all (1) BUT correct use of data, i.e. sea, woodland and farmland species add up to $(19+38+19)=76$ but total is 121 (2)</p>	2	<p>allow sea , woodland and farmland species only add up to 76 (1)</p>
	<p>iv any two from: (yes because) two out of three groups of birds show a decrease in population or 57 species showed a decrease but 19 showed an increase (1)</p> <p>(no because) total bird population size has not changed (very much) (1)</p> <p>not all bird species are shown or 45 bird species are not shown (1)</p> <p>graph does not show which individual species have increased or decreased (1)</p>	2	<p>ignore yes or no</p> <p>allow the seabird population went up the other two went down or only the seabird population went up (1) allow only woodland and farmland decreased (1) allow only 57 species went down (1) allow only 19 species went up (1)</p>
	Total	10	

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