

**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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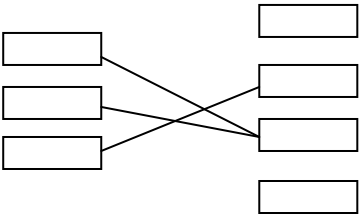
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## Annotations used in scoris

Annotation	Meaning
	correct response
	incorrect response
<b>BOD</b>	benefit of the doubt
<b>NBOD</b>	benefit of the doubt <b>not</b> given
<b>ECF</b>	error carried forward
	information omitted
<b>I</b>	ignore
<b>R</b>	reject
<b>CON</b>	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	<b>allow</b> oxygen – root hairs as an extra line or as an alternative to oxygen – stomata						
	b	<table border="1" data-bbox="320 619 660 726"> <tbody> <tr> <td>✓</td> <td></td> </tr> <tr> <td>✓</td> <td></td> </tr> <tr> <td></td> <td>✓</td> </tr> </tbody> </table> <p>all correct (2) 2 correct (1)</p>	✓		✓			✓	2	<b>ignore</b> crosses
✓										
✓										
	✓									
<b>Total</b>			<b>5</b>							

Question			Answer	Marks	Guidance
2	a	i	drooped / wilted (1)	1	<b>ignore</b> drops / dries out flop / shrivel / die etc
		ii	water it (1)	1	<b>ignore</b> minerals / nutrients / fertiliser / light
	b		contain minerals (1)  to help the plant grow / make plant grow better / make it grow quicker (1)	2	<b>allow</b> specific examples e.g. nitrates/ phosphates/ potassium / magnesium <b>ignore</b> nutrients  <b>ignore</b> simply 'to make plant grow' / 'for growth' <b>ignore</b> to increase development / to increase rate of recovery <b>allow</b> 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	<b>allow</b> (keep away) insects <b>ignore</b> organisms unless linked to eating or damage  <b>ignore</b> 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	<b>ignore</b> simply 'gets light'  <b>ignore</b> to grow <b>allow</b> won't grow as much in the shade
<b>Total</b>				<b>8</b>	

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

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

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

Question		Answer	Marks	Guidance
4	a	<pre> graph LR     A[fertilisation] --- B[joining of egg and sperm]     C[menstruation] --- D[breaking down of the uterus lining]     E[ovulation] --- F[release of an egg from the ovary]             </pre>	2	1 or 2 correct lines = (1) 3 correct lines = (2)
	b	<p><b>any three from:</b></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	
		<b>Total</b>	<b>5</b>	



Question		Answer	Marks	Guidance
5	a	<p><b>any two from:</b>                      a simple/closed (1)                      fracture / break / arm broken (1)                      of the humerus (1)</p>	2	ignore crack / split / snap
	b i	moderate (1)	1	
	ii	<p>risk increases (with age) (1)                      bones are weaker because they are less dense / more porous / bones more likely to break / oestrogen levels drop in women (1)</p>	2	<p><b>allow</b> it goes up (with age)  <b>ignore</b> hollow / lighter  <b>allow</b> more brittle / osteoporosis</p>
	c	<pre>                     graph LR                         A[hip replacement] --- B[kidney failure]                         C[dialysis] --- D[heart disease]                         E[pacemaker] --- F[osteoporosis]                         G[ventilator] -.- H[pneumonia]                     </pre>	2	<p>all three correct = 2                      1 or 2 correct = 1</p>
		<b>Total</b>	<b>7</b>	

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

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

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	<b>allow:</b> (-) 6.25 (%) / (-) 6 (%) (1)  <b>allow:</b> ecf for symptoms if calculation incorrect  <b>ignore</b> choice of who wins
	b	more respiration occurs (1)  carbon dioxide is toxic (1)	2	<b>allow</b> poisonous / changes pH <b>ignore</b> harmful
		<b>Total</b>	<b>5</b>	

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

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	<b>ignore</b> to stop air entering <b>allow</b> fermentation needs absence of oxygen (1)  <b>allow</b> to stop it exploding / prevents pressure build up / AW (1)  <b>allow</b> to stop unwanted/harmful microbes entering (1)
	b	kills yeast (1)		1
		<b>Total</b>	<b>3</b>	

Question		Answer	Marks	Guidance
10	a	<b>any two from:</b> bacteria (1)  rotting / decaying / decomposing (1)  organic waste / animal waste / plant waste / dead plants / AW (1)	2	<b>allow</b> biodegrading  <b>ignore</b> just 'waste'  <b>allow</b> made by anaerobic process / in absence of oxygen / fermentation (1)
	b	(risk of) explosion (1)		1
	c	<b>C</b> / 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.
		<b>Total</b>	<b>6</b>	

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

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



Question	Answer	Marks	Guidance
	<p><b>iii</b> idea that the total for sea, woodland and farmland species is less than the total for all (1)  <b>BUT</b>  correct use of data, i.e. sea, woodland and farmland species add up to <math>(19+38+19=)76</math> but total is 121 (2)</p>	2	<p><b>allow</b> sea , woodland and farmland species only add up to 76 (1)</p>
	<p><b>iv</b> <b>any two from:</b>  (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><b>ignore yes or no</b></p> <p><b>allow</b> the seabird population went up the other two went down or <b>only</b> the seabird population went up (1)  <b>allow only</b> woodland and farmland decreased (1)  <b>allow only</b> 57 species went down (1)  <b>allow only</b> 19 species went up (1)</p>
	<b>Total</b>	<b>10</b>	



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