OCR
Oxford Cambridge and RSA

GCSE

Biology B

Unit **B732/02**: Modules B4, B5, B6 (Higher Tier)

General Certificate of Secondary Education

Mark Scheme for June 2015

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This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which marks were awarded by examiners. It does not indicate the details of the discussions which took place at an examiners' meeting before marking commenced.

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.

OCR will not enter into any discussion or correspondence in connection with this mark scheme.

Annotations used in scoris

Annotation	Meaning
	correct response
	incorrect response
	benefit of the doubt
	benefit of the doubt **not** given
	error carried forward
	information omitted
	ignore
	reject
	contradiction

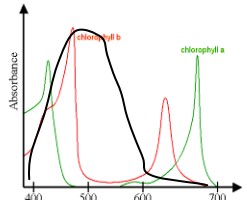
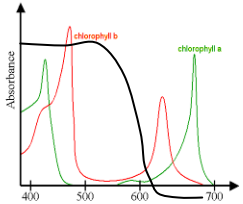
Abbreviations, annotations and conventions used in the detailed Mark Scheme.

/ = 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 i	as the temperature increases, the rate of photosynthesis increases and decreases (1) **but** as the temperature increases, the rate of photosynthesis increases, **levels off**, and then decreases (2) **plus** correct uses of data, e.g.: rises to max rate of 20 (arbitrary units) / rises to max rate at 30 (^{o}C) / decreases after 40 (^{o}C) / rate is zero at 55 (^{o}C) / constant / optimum 28 – 40 (^{o}C)	3	(it) increases and goes down = 0 (it) increases, levels off, then decreases (1) **allow** answer in range 28-30 (^{o}C) **allow** answer in range 28-40 (^{o}C)
ii	(as the temperature increases, the rate of photosynthesis) increases because particles/enzymes have more (kinetic) energy / collide more (frequently) / ORA (1) levels off because of some other limiting factor / not enough CO_2 / not enough light / temperature is not a limiting factor (1) decreases because enzymes denature (1)	3	 **ignore** optimum temperature **allow** at start, temperature is the limiting factor (1)
iii	answer in range 28-30 (^{o}C) (1) idea that max rate of photosynthesis and heating any more would be wasteful (1)	2	if give temperature above 30 (^{o}C) then no marks at all **allow** value less than 28 (^{o}C) if explains that reduced rate of photosynthesis / yield is balanced by reduced heating costs = 2 answer below 28 (^{o}C) with no justification = 0

Question	Answer	Marks	Guidance
b	cost of heaters / cost of heating / payback time for heaters (1) idea of pollution / environmental damage / carbon footprint (1)	2	**ignore** simply 'cost' **allow** idea that gas/oil heaters also release carbon dioxide for photosynthesis (1) **allow** idea that transpiration might increase / may need more water (1)
	Total	**10**	

Question	Answer	Marks	Guidance
2 a	**[Level 3]** Gives a full explanation that pesticide movement is driven by transpiration and occurs through the xylem **and** explains why pesticide movement is greater on warm sunny days. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks) **[Level 2]** Gives an explanation that pesticide movement is driven by transpiration and occurs through the xylem. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks) **[Level 1]** Gives a partial explanation explaining that pesticide movement is linked with transpiration **or** that it occurs through the xylem. Quality of written communication impedes communication of the science at this level. (1 – 2 marks) **[Level 0]** Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)	6	**This question is targeted at grades up to A** **Indicative scientific points at level 3 (HD) may include:** **transpiration** is greater when it is warm / sunny because: • (higher temperatures) increase rate of evaporation / diffusion • (on sunny days) stomata open (more widely) **Indicative scientific points at levels 1 and 2 (SD) may include:** • pesticide moves by transpiration • transpiration involves evaporation / diffusion • transpiration is greater when it is warm / sunny • movement through xylem if refer to stem/veins/vessels/phloem instead of xylem, limit to 5/3/1 marks if refer to just evaporation/diffusion instead of transpiration, limit to 5/3/1 marks if only give L3 indicative points, limit to L1 **Use the L1, L2, L3 annotations in Scoris; do not use ticks.**
b i	do not break down / can not be excreted (1)	1	**allow** stays around / can not be removed / keeps working
ii	gets into food chains / passes along food chains / bioaccumulation / idea that may harm other organisms (1)	1	**allow** builds up /accumulates
	Total	**8**	

Question	Answer	Marks	Guidance
3 a	outside cells (1)	1	**allow** on the surface / on the leaf / on the outside **allow** secrete enzymes
b	low rate of (aerobic) respiration / need oxygen for (aerobic) respiration / ORA (1) low rate of growth/reproduction OR need oxygen for growth/reproduction (1)	2	**allow** no respiration **allow** need oxygen for metabolism/energy **allow** no growth / no reproduction
c	water **moves** into cells on outside / water **moves** out of cells on inside (1) (because) solute moves into cells on outside / solute moves out of cells on inside (1) solute moved by active transport (1)	3	 **allow** valid example of solute e.g. sugar / ions
d	a line that falls to (or almost to) zero in the red part of the spectrum (1)  or 	1	
	Total	**7**	

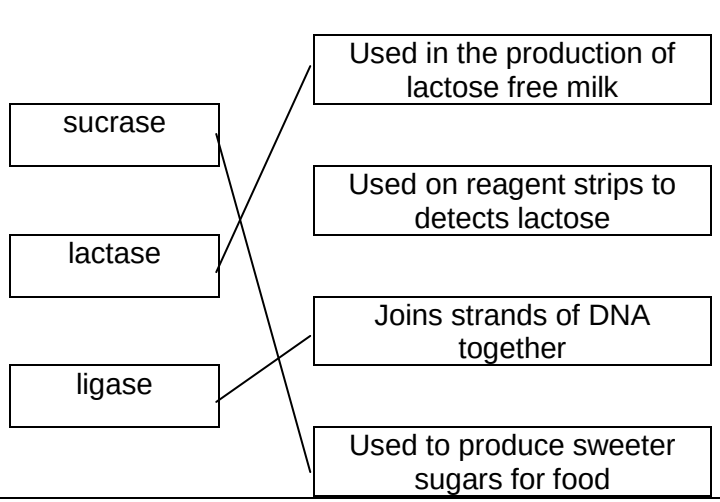
Question	Answer	Marks	Guidance
4 a	pituitary (gland) (1) growth (hormone) (1) maintains the wall/lining of the uterus/womb (1) stimulates an egg to develop (1)	4	 **allow** (H)GH **not** repairs/thickens/builds wall/lining **allow** prevents corpus luteum breaking down **allow** inhibits FSH / LH **allow** inhibits egg production **allow** stimulates the growth of a follicle **allow** stimulates egg production **allow** stimulates oestrogen production **ignore** ovulation
b	**any two from:** too much/more urine is released (1) urine is **more** dilute (1) blood is too/more concentrated (1) increased thirst (1) less water **reabsorbed** (into blood) (1)	2	must be comparative **allow** urinate more often **allow** urine has a higher concentration of water **allow** blood has a lower concentration of water **allow** become dehydrated / need to drink more water **ignore** references to permeability of tubules (as in question)
	Total	**6**	

Question	Answer	Marks	Guidance
5 a	Dr Grace: idea that doctors have to decide who gets one (1) Dr Henshaw: idea that (may have to take the organs when) relatives do not agree / relatives may think the donor forgot to opt out (1)	2	 **ignore** ref to deciding if to continue treatment **ignore** references to the wishes of the donor **allow** idea that have to decide whether to abide by the relatives wishes
b i	**any two from:** (in the opt out system) people do not need to do anything to donate / ORA (1) idea that organs may be donated even though donors did not wish this (1) they may forget to opt out / did not know they had to opt out / did not have time to opt out (1)	2	 **ignore** don't need a card to donate
ii	**any two from:** (supports it because) the 2 (much) higher numbers are in opt-out countries / Spain and Portugal have higher numbers (1) (however) one country with opt out/Poland the numbers are lower (1) (can not tell) as only data from six countries given (1)	2	 **allow** mean/ average/total in the three countries with opt out is higher (may quote figures: 24 vs 14 for means / 72.1 vs 42.1 for totals) **allow** Spain and Portugal support the prediction **allow** Poland does not support the prediction
	Total	**6**	

Question	Answer	Marks	Guidance
6 a	<table><tr><td>saliva</td><td></td></tr><tr><td>gastric juice</td><td></td></tr><tr><td>bile from the liver</td><td>✓</td></tr><tr><td>secretions from the pancreas and small intestine</td><td></td></tr></table>	1	More than 1 tick = 0
b	**any two from:** they contain different enzymes (1) enzymes do not get denatured (1) each enzyme has a different optimum pH / works best at a different pH (1)	2	**allow** correct named examples
	Total	**3**	

Question	Answer	Marks	Guidance
7 a	adrenaline (1)	1	
b i	0.08 (1)	1	
ii	contraction of ventricles is longer / 0.24 v 0.08 (1) need to pump blood further / to the body (1)	2	**allow** atria only need to pump the blood into the ventricles / do not need to pump as far (1) **ignore** to generate a higher pressure
	Total	**4**	

Question	Answer	Marks	Guidance
8	**[Level 3]** Answer includes a correct calculation of index with a relevant conclusion **and** answer includes reference to a reduction in coronary artery diameter reducing blood supply to the heart muscle Quality of written communication does not impede communication of the science at this level. (5 – 6 marks) **[Level 2]** Answer includes a correct calculation of index with a relevant conclusion **or** a partially correct attempt at calculating the index and reference to a reduction in coronary artery diameter reducing blood supply to the heart muscle Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks) **[Level 1]** Answer includes some reference to the heart disease being caused by a reduced blood supply to heart muscle **or** a partially correct attempt at calculating the index. Quality of written communication impedes communication of the science at this level. (1 – 2 marks) **[Level 0]** Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)	6	**This question is targeted up to grade A*** **Indicative scientific points about the link may include:** • **narrower / reduced diameter reduces blood supply to heart muscle** • **narrower / reduced diameter means heart cells have less oxygen or glucose / stop contracting / stop respiration** **Indicative scientific points concerning calculation may include:** • **correct calculation of area = $\pi 2^2$ = allow answer from 12.5 to 12.6** • **correct calculation of index = allow answer from 1.5 to 1.6** **Indicative scientific points concerning conclusion may include:** • **reference to Eric's index falling in both groups** • **however closer to the mean for the group with CHD** **Correct index only = L2,3**
	Total	**6**	

Question	Answer	Marks	Guidance
9 a		2	three correct =2 marks one or two correct = 1 mark if 2 lines from one enzyme, then do not credit for that enzyme
b i	protein (1)	1	**allow** polypeptides **not** amino acids
ii	idea that claim can not be quantified (1) people's taste differs / it's just an opinion / it's subjective (1)	2	**allow** it is only a claim / not scientific fact / cannot be proved / there is no evidence
iii	plasmid (1)	1	**allow** virus **allow** loop of DNA
	Total	**6**	

Question	Answer	Marks	Guidance
10 a i	fertiliser / sewage (1)	1	**allow** nitrates / phosphates / any correct mineral **allow** nitrogen / phosphorous / potassium / magnesium **allow** detergents
ii	**any two from:** (dead) plants/algae rot/decompose/breakdown/decay (1) (by) decomposers / bacteria (1) (so) less oxygen (1) (so) fish can not respire (1)	2	**if no other mark awarded allow 1 mark for** lack of food for fish (1)
b i	**algae** numbers will change at different times due to sunlight / temperature (1)	1	**ignore** fair test **allow** idea that **algal** growth varies seasonally **allow** idea that visibility of **disc** may vary seasonally
ii	pollution increases (1) BUT idea pollution increases initially and then levels off/improves (2) idea that more **algae** will make the water less clear / decrease (maximum) depth that disc can be seen (1)	3	
iii	1988 (1)	1	
	Total	**8**	

Question	Answer	Marks	Guidance
11 a	low doses will not kill the (most) resistant bacteria (1) (so) they will (survive and) reproduce (1)	2	**ignore** immune bacteria
b	**[Level 3]** Answer fully explains the effect of antibiotics on the yoghurt-making process. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks) **[Level 2]** Answer partially explains the effect of antibiotics on the yoghurt-making process. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks) **[Level 1]** Answer states that bacteria are added to milk to make yoghurt **and** states that antibiotics kill bacteria OR States that as antibiotic concentration increases, pH of yoghurt increases Quality of written communication impedes communication of the science at this level. (1 – 2 marks) **[Level 0]** Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)	6	**This question is targeted at grades up to A.** **Indicative scientific points at level 3 should:** increasing concentrations of antibiotic kill **more** bacteria **less lactic acid** made so higher pH so yoghurt production reduced **Indicative scientific points at level 2 should include:** • bacteria are added to milk to make yoghurt because they make **lactic acid** which lowers the pH • antibiotics will kill the yoghurt-making bacteria Must mention lactic acid to get level 2 **Indicative scientific points at level 1 should include:** • bacteria are added to milk to make yogurt • antibiotics kill bacteria **ignore** less yoghurt, less profit **allow** *Lactobacillus* as alternative for bacteria **Use the L1, L2, L3 annotations in Scoris. Do not use ticks.**
	Total	**8**	

Question	Answer	Marks	Guidance
12 a	too many bacteria / the colonies join together (1)	1	
b	(no because) her soil has 300 000 bacteria (1) has less than the normal / less than 3 000 000 (1)	2	**allow** one mark for dish 6 being diluted 100 000 times and dish 7 being diluted 1 000 000 times **allow** 1 mark ecf for yes, her soil has 3 000 000 bacteria which is the same as normal
	Total	**3**	

Question	Answer	Marks	Guidance
13 a i	**any two from:** as mass increases, heart rate decreases / AW / ORA (1) as mass increases, life span increases / AW / ORA (1) as heart rate decreases, life span increases / AW / ORA (1)	2	if get 2 correct and 1 wrong then award 2 marks 'as mass increases, heart rate decreases and life span increases' = (2)
ii	(yes) – idea that the life time heart beats are all around 1 or 2 billion (1) (no) – idea that some life time heart beats are more than twice / three times the value of others / AW OR chicken does not fit pattern (1)	2	**ignore** most are about the same (simply repeating question) **allow** all between 0.7-2.2 billion / within 1.5 billion (yes) – idea that most are about the 1 billion / within 0.5 billion, but chicken is the odd one out as it's about 2 billion / a lot more = (2) **allow additional marking points:** sample is not large enough to reach a valid conclusion (1) idea that there is still a large difference between eg 0.7 and 0.8 billion (1)
iii	no (no mark) **any two from:** for their mass, heart rate is too low (1) for their mass, life span is too high (1) for their mass, life time heart beats are too high (1)	2	**if yes, no marks** **if trend not clear, check table in 13ai to see if/where human placed** **allow** any two other correct comparisons

Question	Answer	Marks	Guidance
b i	idea that can use these findings to target treatment / preventative care (1) idea that results are reliable because they involved many people / involved people from around the world (1)	2	**allow** can inform / identify patients (with potential risks) **allow** idea that results are reliable because 4 years is a long time OR idea that results are not reliable because 4 years is not a long time **ignore** idea that it's not worth treating heart disease patients
ii	idea that the study only included heart disease patients / AW (1) idea that results only show patients with heart beats below 58 and above 78 (beat per min) / do not show results for all heart beats / AW (1)	2	**ignore** not enough data **allow additional marking points:** 4 years is not a long time (1) idea that data only shows a correlation and does not prove causation (1) there are (many) other factors affecting heart disease (1)
	Total	**10**	

OCR (Oxford Cambridge and RSA Examinations)
1 Hills Road
Cambridge
CB1 2EU

OCR Customer Contact Centre

Education and Learning
Telephone: 01223 553998
Facsimile: 01223 552627
Email: general.qualifications@ocr.org.uk

www.ocr.org.uk

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Head office
Telephone: 01223 552552
Facsimile: 01223 552553

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