OCR
RECOGNISING ACHIEVEMENT

GCSE

Biology B

General Certificate of Secondary Education

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

Mark Scheme for June 2013

OCR (Oxford Cambridge and RSA) is a leading UK awarding body, providing a wide range of qualifications to meet the needs of candidates of all ages and abilities. OCR qualifications include AS/A Levels, Diplomas, GCSEs, Cambridge Nationals, Cambridge Technicals, Functional Skills, Key Skills, Entry Level qualifications, NVQs and vocational qualifications in areas such as IT, business, languages, teaching/training, administration and secretarial skills.

It is also responsible for developing new specifications to meet national requirements and the needs of students and teachers. OCR is a not-for-profit organisation; any surplus made is invested back into the establishment to help towards the development of qualifications and support, which keep pace with the changing needs of today's society.

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.

For answers marked by levels of response:

a. **Read through the whole answer from start to finish**

b. **Decide the level** that **best fits** the answer – match the quality of the answer to the closest level descriptor

c. **To determine the mark within the level**, consider the following:

Descriptor	Award mark
A good match to the level descriptor	The higher mark in the level
Just matches the level descriptor	The lower mark in the level

d. Use the **L1**, **L2**, **L3** annotations in Scoris to show your decision; do not use ticks.

Quality of Written Communication skills assessed in 6-mark extended writing questions include:

- appropriate use of correct scientific terms
- spelling, punctuation and grammar
- developing a structured, persuasive argument
- selecting and using evidence to support an argument
- considering different sides of a debate in a balanced way
- logical sequencing.

Annotations

Annotation	Meaning
	correct response
	incorrect response
	benefit of the doubt
	benefit of the doubt **not** given
	error carried forward
	information omitted
	ignore
	reject
	contradiction
	Level 1
	Level 2
	Level 3

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

<table>
<tr><th colspan="3">Question</th><th>Answer</th><th>Marks</th><th>Guidance</th></tr>
<tr><td>1</td><td>(a)</td><td></td><td>any two from:
microbes can respire faster (1)
microbes can reproduce/grow faster (1)
enzymes work faster / enzymes are closer to optimum (1)</td><td>2</td><td>allow non-comparative statements but must have at least one comparative statement to gain full marks

e.g. microbes grow fast = 1
microbes grow fast and enzymes work fast = 1
enzymes work fast so microbes grow faster = 2

ignore microbes work faster
allow alternatives to microbes e.g. bacteria / fungi</td></tr>
<tr><td></td><td>(b)</td><td></td><td><table>
<tr><td>adobo</td><td></td><td>drying the food stops enzymes working</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td>bummalo</td><td></td><td>acid provides for enzymes to work</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td>blatjang</td><td></td><td>a concentrated solution draws water out of the microbes</td></tr>
</table></td><td>1</td><td>all correct = 1 mark</td></tr>
<tr><td></td><td></td><td></td><td>Total</td><td>3</td><td></td></tr>
</table>

Question			Answer	Marks	Guidance
2	(a)		(cells) have partially permeable membrane (1) potato / cells are more concentrated than the distilled water (1)	2	**allow** semi-permeable membrane answer must be comparative **allow** cells have lower water concentration (than distilled water) **allow** correct ref. to concentration gradient **allow** higher level answers relating to water potential assume unqualified references to concentration refer to solute e.g. water moves from high to low concentration = 0 but water moves from high water concentration to low water concentration = 1
	(b)	(i)	**any two from:** **cells** are full of water / **cells** are rigid / **cells** swollen / AW (1) cells are **turgid** / **turgor** pressure (1) clear description of turgor: e.g. contents of cells pushing against **cell wall** (1)	2	 **ignore** cells take in water (in question) **ignore** chip is rigid **ignore** cells are stronger / hard **allow** chip is turgid **ignore** not flaccid
		(ii)	A (1)	1	
			Total	**5**	

Question			Answer	Marks	Guidance
3	(a)		**(Level 3)** Answer includes more than one correct assumption **and** a correct calculation **and** a sensible interpretation of the result. Quality of written communication does not impede communication of the science at this level. **(5–6 marks)** **(Level 2)** Answer includes a correct assumption **and** a correct calculation OR Answer includes a correct calculation **and** a sensible interpretation of the result. Quality of written communication partly impedes communication of the science at this level. (**3–4 marks)** **(Level 1)** Answer includes either a correct assumption **or** a correct calculation **or** a sensible interpretation. 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 from grades D to A** **Indicative scientific points may include:** assumptions: • no immigration / emigration between release and recapture • no death / reproduction between release and recapture • identical sampling methods • the marking does not affect the survival rate • marked slugs have mixed with non-marked slugs • marks don't get removed calculations: ▪ calculation is $\frac{50 \times 45}{5} = 450$ ▪ estimate of population is 450 ▪ the population is halved interpretations: ▪ method of control is working / is successful as population has gone down/halved ▪ an appreciation that these are only estimates. If mostly matches level 3 but only has one assumption, give 5 marks If give formula only i.e. 50x45/5 then award 1 mark if level 1, 3 marks if level 2, 5 marks if level 3 If incorrect calculation, then can give sensible interpretation ecf for L1 **Use L1, L2, L3 annotations in scoris. Do not use ticks**

Question			Answer	Marks	Guidance
	(b)	**(i)**	C (1)	1	
		(ii)	(cells with) **most** chloroplasts / palisade layer is near the top of the leaf (1)	1	**allow** upper epidermis is transparent / one cell thick **ignore** cuticle **ignore** large surface area / thin
		(iii)	they (carotene / xanthophyll) absorb different **wavelengths** (to chlorophyll) (1) a wider range of **wavelengths** can be absorbed / more of the spectrum is absorbed (1)	2	**allow** absorb different colours (of light) **allow** correct reference to just one pigment **ignore** absorb wrong wavelengths **ignore** just 'absorb more light'
			Total	**10**	

Question			Answer	Marks	Guidance
4	(a)		$C_6H_{12}O_6$ **and** $6O_2$ (1)	1	**any order** must use subscripts
	(b)		idea that not enough mass/materials/substances/nutrients lost from soil to supply the mass/material/substances/nutrients gained by the tree (1) correct **calculation**: soil lost 1kg but tree gained 78kg (1)	2	**allow** the tree gained (much) more mass than the soil lost **allow** total weight changed from 102kg → 179kg **allow** soil would have been 22kg (if scientists were correct) **allow** the tree gained 77kg from somewhere else (not soil) = 2 marks **allow** tree gains 78kg but soil **only** lost 1kg = 2 bod
	(c)	(i)	(water lost in) transpiration (1) idea that only a **small** proportion is used in photosynthesis (1)	2	**allow** evaporation from plant
		(ii)	more transpiration (1) idea that wind moves away water **vapour** (1)	2	**allow** more water lost through stomata **allow** more evaporation / more diffusion (out of leaf) **ignore** simply 'more water lost'
			Total	**7**	

Question			Answer	Marks	Guidance
5	(a)	(i)	90 (%) (1)	1	**allow** 90.32258 or correct rounding
		(ii)	vessel at A = capillary (1) vessel at B = vein (1)	2	**allow** capillary bed / arteriole **ignore** small artery **allow** venule / named vein e.g. vena cava
	(b)		reduces effective blood circulation / blood could fall back into heart / backflow would happen (1) pressure is not maintained / reduces pressure (1)	2	**ignore** references to oxygenated/deoxygenated **ignore** less blood but **allow** less blood pumped around body **ignore** job of valves e.g. valves stop backflow **allow** not enough pressure to push blood around **allow** oedema / idea of fluid building up in tissues / lungs **ignore** references to higher pressure e.g. inside heart
			Total	**5**	

<table>
<tr><th colspan="3">Question</th><th>Answer</th><th>Marks</th><th>Guidance</th></tr>
<tr><td>6</td><td>(a)</td><td></td><td>
<table>
<tr><th>part of the kidney</th><th>letter</th><th></th></tr>
<tr><td>cortex</td><td>E</td><td></td></tr>
<tr><td>medulla</td><td>D</td><td></td></tr>
<tr><td>renal artery</td><td>(A)</td><td></td></tr>
<tr><td>renal vein</td><td>B</td><td></td></tr>
<tr><td>ureter</td><td>C</td><td>(2)</td></tr>
</table>
</td><td>2</td><td>3 or 4 correct (2)
1 or 2 correct (1)</td></tr>
</table>

Question	Answer	Marks	Guidance
(b)	**(Level 3)** Explains the role of ADH in controlling the amount of water removed in urine **and** how alcohol affects the action of ADH. Quality of written communication does not impede communication of the science at this level. **(5–6 marks)** **(Level 2)** Explains the role of ADH in controlling the amount of water removed in urine. Quality of written communication partly impedes communication of the science at this level. **(3–4 marks)** **(Level 1)** Gives a simple description that the **kidneys** remove **excess** water. 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 includes level 2 points plus** • explains that alcohol causes even more water to be lost / even less reabsorbed. **ignore** alcohol reduces ADH (in question) **Indicative scientific points at level 2 may include:** • ADH increases the amount of water reabsorbed / reduces amount lost in urine • less ADH decreases the amount of water reabsorbed / increases amount lost in urine • ADH increases permeability of kidney tubules so more water is reabsorbed back into the blood • increased water in blood reduces the amount of ADH **Indicative scientific points at level 1 may include:** • kidneys remove **excess** water (to form dilute urine) • kidneys reabsorb less water. **ignore** drinking more water/beer increases volume of urine **ignore** drinking more water/beer makes urine more dilute (in question) **allow** level 1, 2 marks max for drinking alcohol causing more dilute urine than drinking water (no mention of ADH) **Use L1, L2, L3 annotations in scoris. Do not use ticks**.

Question			Answer	Marks	Guidance
	(c)		genetically identical / tissue match (1) (twins/kidneys) are same age / size (1)	2	**allow** no risk of rejection **but ignore** less risk of rejection **allow** same genes / DNA / chromosomes **not** similar genes / tissue **ignore** references to blood group **allow** similar size
			Total	**10**	

Question			Answer	Marks	Guidance
7	(a)		supports claim (that found in stomach) because it works best/optimum around pH 2 (1) does not support claim that it is a protease since there is no evidence (to support or reject claim) (1)	2	**allow** optimum pH matches stomach pH **allow** idea it could be another type of enzyme
	(b)		**any four from:** (protein) not digested in mouth/oesophagus **or** is digested in stomach (1) no **protease** in mouth/oesophagus **or** **protease** is in stomach (1) protease needed to digest coat of tablet (1) protease needed to digest wall of beads (to release medicine) (1) early release from thin beads / later release from thick walled beads (1)	4	**allow** break down as an alternative for digestion **ignore** acid if answer clearly refers to protease (or protein-digesting enzymes) then do not need to keep repeating this to gain subsequent marks
			Total	**6**	

Question			Answer	Marks	Guidance
8	(a)		6.0 – 2.1 (1) BUT 3.9 (litres) (2)	2	**allow** 6.0 -2.2 (1) or 3.8 (2) **ignore** 4 (litres)
	(b)		**any two from:** **lining** of airways becomes inflamed (1) fluid builds up (in lungs) (1) **muscles** around bronchioles contract (1) airways/bronchioles constricted/narrowed (1)	2	**ignore** symptoms of asthma e.g. wheezing / tight chest / difficulty breathing / less air in lungs **allow** lining of airways becomes swollen **ignore** lungs become inflamed **allow** mucus builds up **allow** muscles in bronchioles go into spasm **ignore** just 'airways shrink' but **allow** airways shrink and restrict air flow **ignore** airways close **allow** lung capacity reduced **ignore** references to bronchi / trachea / alveoli
			Total	**4**	

Question			Answer	Marks	Guidance
9	(a)		idea that **CO_2** from the atmosphere is used up during **photosynthesis** **or** **CO_2** returned to atmosphere when biofuel is **burnt** (1) **but** idea that **CO_2** used up in **photosynthesis** is **balanced** by **CO_2** returned to atmosphere when **burnt** (2)	2	**ignore** carbon neutral
	(b)		otherwise it could explode / so it does not explode (1)	1	**allow** it will explode at 10% **allow** will not burn at very low levels
	(c)		less energy content / less energy efficient / releases less energy (1)	1	**allow** idea of land that normally used for crops is lost to biofuels / habitat destruction **ignore** uses lots of land **allow** idea that production could be too slow in cold climates **ignore** less efficient
			Total	**4**	

Question			Answer	Marks	Guidance
10	(a)		no maggots when covered because **flies** could not get in / lay eggs (1) this shows the flies are needed to produce maggots **or** maggots develop from eggs not meat (1)	2	**allow** reverse argument: only get maggots when uncovered as **flies** can get in / lay eggs **ignore** just 'maggots don't come from meat'
	(b)		no bacteria in B because they were **killed** / bacteria **killed** in both flasks in stage 2 (1) bacteria cannot get into B / can get into A (1) BUT shape of the neck in B stops the bacteria getting in / the shape of the neck allows bacteria into flask A (2) bacteria multiply in A / in B gravy stays sterile (1)	3	 **ignore** B has no bacteria / A has bacteria **ignore** bacteria grow/develop in A (in question) **ignore** bacteria do not grow/develop in B (in question) **allow** ideas about how they reproduce as extra marking points e.g. bacteria in A feed and multiply by asexual reproduction or binary fission (1) **ignore** references to oxygen / lack of oxygen

Question	Answer	Marks	Guidance
(c)	**any two from:** (yes) milk contains harmful bacteria/microbes (1) pasteurisation will kill these bacteria/microbes (1) **or** (no) idea that people should have a choice (1) the raw milk may taste better / pasteurisation can alter the taste (1) pasteurisation may remove some of the nutrients from the milk (1)	2	**allow** pathogens **ignore** germs **ignore** references to shelf life **allow** (no) idea that although has bacteria in they are destroyed in the stomach/acid (1) **ignore** (no) idea that bacteria are not harmful but **allow** (no) idea that bacteria are not harmful with an explanation, e.g. not harmful if drunk quickly (before bacteria can multiply) explanation must match their yes or no answer unless they are clearly giving both sides of the argument eg (no) although pasteurisation will kill harmful bacteria in the milk people should be given the choice (2)
(d)	**any two from:** **enzymes** do not denature at high temperatures (1) can use the hydrogen sulfide to make food (1) do not need light to make food (1) tolerant to hydrogen sulfide / hydrogen sulfide does not poison them (1)	2	**allow enzymes** can work at high temperature **ignore** bacteria can withstand heat **ignore** feed on hydrogen sulfide
	Total	**9**	

Question			Answer	Marks	Guidance
11			**(Level 3)** Answer suggests factory was about 8/9/10km away **and** explains the patterns to include decay **and** explains the pattern in terms of oxygen levels. Quality of written communication does not impede communication of the science at this level. **(5–6 marks)** **(Level 2)** Answer suggests factory was about 8/9/10km away. **Also** Explains the patterns to include decay **or** explains the pattern in terms of oxygen levels. Quality of written communication partly impedes communication of the science at this level. **(3–4 marks)** **(Level 1)** Answer suggests factory was about 8/9/10km away **or** explains the patterns to include decay **or** explains pattern in terms of oxygen levels. 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 C** **Indicative scientific points may include:** (algae/plants grow using the nutrient from the fertiliser, and block light) • algae/plants die and are decayed by bacteria so bacteria numbers go up • decay/ bacterial respiration uses up oxygen • fish can't respire so die • further away fertiliser levels decrease, fewer bacteria, higher oxygen levels, more fish **ignore** fertiliser kills fish If get the wrong distance in level 3 but have valid explanations, award 5 marks. **Use the L1, L2, L3 annotations in scoris; do not use ticks.**
			Total	**6**	

Question			Answer	Marks	Guidance
12	(a)		water would be lost (when soil is burnt) / some of the loss in mass could be from water / to remove the mass of water / different soils have different amounts of water (1)	1	**ignore** simply 'soil contains water'
	(b)		3.10 (2) **but** if answer incorrect 1.74 ÷ 56.10 x 100 (1)	2	**note –** two decimal places needed **allow** 3.1016 or rounding to anything other than 2 decimal places (1)
	(c)		**A** because it had a high(er) **humus** content (1)	1	letter **and** explanation needed for mark
	(d)		idea that larger soil particles have more air spaces / larger air spaces (1) **plus** so the water will drain through / water not retained **or** idea that there is more space for water to occupy / can take up more water **or** less water can cling to soil particles (1)	2	**allow** reverse argument e.g. smaller particles have smaller air spaces (1) hold onto water better (1) **second mark is dependent on first**
			Total	**6**	

Question			Answer	Marks	Guidance
13	(a)		cholesterol: males have a higher value in most countries / 4 countries / all except India / ORA (1) BMI: males have a higher value in most countries / 4 countries / all except Cyprus / ORA (1)	2	**allow** males have a higher cholesterol / ORA **allow** males have a higher BMI value / ORA **allow** 'males have higher values / ORA' for 1 mark if no other mark awarded
	(b)		idea that children are still growing (1) idea that results are (too) variable (1)	2	 **allow** e.g. sudden growth spurts / different rates of growth note just 'growth spurts ' gets 1
	(c)	(i)	all points correctly plotted to within 0.5 square (2) **but** three / four points correctly plotted to within 0.5 square (1)	2	points are: (3.2, 24.5) (3.6, 22.6) (4.7, 28.0) (4.7, 25.2) (5.0, 27.0) **ignore** labels
		(ii)	there is (now) **no** link / pattern / correlation (1) (because) points are scattered / random / AW (1)	2	 **allow** examples e.g. Greece and Netherlands have same cholesterol but different BMI
	(d)		there is a different number of people in each country (1) taking an **average/mean** gives the two countries equal weighting **or** taking an **average/mean** of the two values does not give a true mean of all the people (1)	2	
			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

For staff training purposes and as part of our quality assurance programme your call may be recorded or monitored

Oxford Cambridge and RSA Examinations
is a Company Limited by Guarantee
Registered in England
Registered Office; 1 Hills Road, Cambridge, CB1 2EU
Registered Company Number: 3484466
OCR is an exempt Charity

OCR (Oxford Cambridge and RSA Examinations)
Head office
Telephone: 01223 552552
Facsimile: 01223 552553