OCR
Oxford Cambridge and RSA

GCSE

Biology A

Unit **A162/02**: Modules B4, B5, B6 (Higher Tier)

General Certificate of Secondary Education

Mark Scheme for June 2015

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.

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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 the detailed Mark Scheme:

Annotation	Meaning
/	alternative and acceptable answers for the same marking point
(1)	separates marking points
not/reject	answers which are not worthy of credit
ignore	statements which are irrelevant - applies to neutral answers
allow/accept	answers that can be accepted
(words)	words which are not essential to gain credit
words	underlined words must be present in answer to score a mark
ecf	error carried forward
AW/owtte	credit alternative wording / or words to that effect
ORA	or reverse argument

Available in scoris to annotate scripts:

BP	Blank Page – this annotation must be used on all blank pages within an answer booklet (structured or unstructured) and on each page of an additional object where there is no candidate response.
	correct response
	incorrect response
BOD	benefit of doubt
NBOD	no benefit of doubt
ECF	error carried forward
0 , L1 , L2 , L3	indicate level awarded for a question marked by level of response
^	information omitted
CON	contradiction

R	reject
	indicate uncertainty or ambiguity
	draw attention to particular part of candidate's response

ADDITIONAL OBJECTS: You **must** assess and annotate the additional objects for each script you mark. Where credit is awarded, appropriate annotation must be used. If no credit is to be awarded for the additional object, please use annotation as agreed at the SSU.

Subject-specific Marking Instructions

a. Accept any clear, unambiguous response (including mis-spellings of scientific terms if they are *phonetically* correct, but always check the guidance column for exclusions).

b. Crossed out answers should be considered only if no other response has been made. When marking crossed out responses, accept correct answers which are clear and unambiguous.

e.g. for a one-mark question where ticks in the third <u>and</u> fourth boxes are required for the mark:

This would be worth 1 mark.

This would be worth 0 marks.

This would be worth 1 mark.

c. Marking method for tick-box questions:

If there is a set of boxes, some of which should be ticked and others left empty, then judge the entire set of boxes.
If there is at least one tick, ignore crosses and other markings. If there are no ticks, accept clear, unambiguous indications, e.g. shading or crosses. Credit should be given according to the instructions given in the guidance column for the question. If more boxes are ticked than there are correct answers, then deduct one mark for each additional tick. Candidates cannot score less than zero marks.

e.g. if a question requires candidates to identify cities in England:

Edinburgh	
Manchester	
Paris	
Southampton	

the second and fourth boxes should have ticks (or other clear indication of choice) and the first and third <u>should be blank</u> (or have indication of choice crossed out).

Edinburgh			✓			✓	✓	✓	✓	
Manchester	✓	×	✓	✓	✓				✓	
Paris				✓	✓		✓	✓	✓	
Southampton	✓	×		✓		✓	✓		✓	
Score:	**2**	**2**	**1**	**1**	**1**	**1**	**0**	**0**	**0**	**NR**

d. For answers marked by levels of response:

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

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

iii. **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

iv. 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

Question			Expected Answer	Marks	Additional Guidance
1	(a)	(i)	*any two from* starch; cellulose; (named) protein / amino acids / enzymes; chlorophyll; DNA/ RNA /nucleic acids; fats / lipids / fatty acids / glycerol ;	2	**ignore** ref to functions
		(ii)	carbon dioxide / CO_2 ; Protection / shelter / safety / (suitable) habitat ;	2	
	(b)		**Level 3 (5-6 marks)** Explanation uses ideas from: photosynthesis, temperature and enzymes Quality of written communication does not impede communication of the science at this level **Level 2 (3-4 marks)** Explanation uses ideas from two of : photosynthesis, temperature and enzymes Quality of written communication partly impedes communication of the science at this level **Level 1 (1-2marks)** Makes ref. to either photosynthesis OR temperature OR enzymes Quality of written communication impedes communication of the science at this level **Level 0 (0 marks)** Insufficient or irrelevant science. Answer not worthy of credit	6	**This question is targeted at grades up to C** **Indicative scientific points may include** **Photosynthesis** • (If enzymes do not function) the rate of photosynthesis drops /stops • If there is no photosynthesis less/no glucose will be made • Less / no respiration • idea of (temp) limiting factor for P/S **Temperatures** • temperature is **too,** hot/ high / low / cold, (algae die) **Ignore** ref to figures • Reaction slows (photosynthesis) • fewer collisions / ref to kinetic energy changes N.B. Credit 'reaction slows' only once(either temperature or photosynthesis)

Question			Expected Answer	Marks	Additional Guidance
					Enzyme • enzyme works best / fastest at optimum temperature • enzyme is damaged /denatured / changes shape(at **high** temperatures); **Ignore** Killed / dies • Ref. To active site • ref to lock and key / substrate no longer complementary A
		c	*any three from* sample or look at different areas of coral (where algae dead and alive) ; measure / change temperature; measure / change UV / light record amount of living / dead algae ; ref. to correlation between either factor and dead algae;	3	**Award marks for natural habitat OR experimental situation** **Accept** coral for algae throughout **Accept** appropriate sampling techniques **e.g.** more UV, less algae

Question			Expected Answer		Marks	Additional Guidance
		d	Peer review is when the public evaluate the data		2	
			Peer review is when scientists evaluate the data of other scientists	✓		
			Peer review is when both the public and scientists evaluate the data			
			Peer review allows the public to keep up to date with the latest findings			
			Peer review gives greater confidence in the findings	✓		
			Peer review means the scientists get paid			
			Total		**15**	

Question			Expected Answer	Marks	Additional Guidance
2	a		(allows) <u>diffusion</u> ; Idea of concentration gradient (between blood and fluid) ; (low concentration) prevents urea moving from fluid back into the blood / ORA ;	3	**Ignore** osmosis **accept** idea of equilibrium **Ignore** urine
	b		72 (2)	2	Award 1 mark for working 600 X 60 X 2 **OR** 72,000 (1)
	c		If the concentration of the blood plasma decreases, water will move into the red blood cells and they will burst Water moves from a dilute solution to a concentrated solution across a partially permeable membrane	2	
	d	i	13.64 (2)	2	Award 1 mark for $\frac{2.5-2.2}{2.2}$ **OR** $\frac{0.3}{2.2}$ **OR** 13.6 / 13.63 / 13.636363 (1) Look for answer in the table if nothing written in the space

Question			Expected Answer	Marks	Additional Guidance
	d	ii	Potato pieces had a different mass / weight (at the start of the experiment) ; Idea that it allows comparison of the potato pieces/results are comparable ;	2	**Ignore** accuracy/precision/fair test /reliability
	d	iii	Greater than 0.4 mol lose mass	1	
	d	iv	0.3 (1) 0.4 (1)	2	**Accept** 0.31 **accept** 0.39 **accept** either order
	e		*any three from* repeats (more) tests between 0.3 and 0.4 Keep surface area the same Keep temperature the same leave them in for longer same starting mass / weight same age / variety of potato OR use same potato correct ref. to more accurate measuring **apparatus** removal of excess solution by blotting pieces must be totally immersed in the solution / prevent evaporation of water	3	 **Ignore** greater range / other concentrations **Ignore** size / volume
			Total	**17**	

<table>
<tr><th colspan="3">Question</th><th>Expected Answer</th><th>Marks</th><th>Additional Guidance</th></tr>
<tr><td>3</td><td>a</td><td></td><td><table><tr><td></td><td>Horse</td><td>Donkey</td></tr><tr><td>Sperm cell</td><td>32</td><td>31</td></tr></table></td><td>1</td><td>NEED BOTH</td></tr>
<tr><td></td><td>b</td><td></td><td>Meiosis</td><td>1</td><td></td></tr>
<tr><td></td><td>c</td><td></td><td>any two from

mules will have 63 chromosomes ;

(when mules gametes form) they could have 31 or 32 chromosomes / idea of cannot have half a chromosome;

(therefore) chromosomes cannot form pairs / gametes are not compatible ;</td><td>2</td><td>accept ova / eggs and sperm</td></tr>
<tr><td></td><td></td><td></td><td>Total</td><td>4</td><td></td></tr>
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Question			Expected Answer	Marks	Additional Guidance
4			**Level 3 (5-6 marks)** a good explanation of protein synthesis **AND** A good description of cell specialisation Quality of written communication does not impede communication of the science at this level **Level 2 (3-4 marks)** An explanation of protein synthesis **AND** a description of cell specialisation Quality of written communication partly impedes communication of the science at this level **Level 1 (1-2marks)** an explanation of protein synthesis **OR** a description of cell specialisation Quality of written communication impedes communication of the science at this level **Level 0 (0 marks)** Insufficient or irrelevant science. Answer not worthy of credit	6	**This question is targeted at grades up to A*** **Indicative scientific points may include** **Protein synthesis** • DNA / genetic material is located in the nucleus • the DNA cannot leave the nucleus • the DNA is unzipped /copied • mRNA is formed • mRNA can leave the nucleus • enters the cytoplasm • ribosome involved • gene has a sequence of bases • ref. to triplet code / codon • which corresponds to the order of amino acids • amino acids are joined to form the protein. **Cell specialisation** • all cells contain the same genes • genes / DNA / mRNA code for proteins • different genes are switched on /switched off • ciliated cells have the gene switched on • genes that are switched on in a cell will produce the protein / cilia • genes that are switched off in a cell will not produce the protein / cilia Accept higher level answers
			Total	**6**	

Question			Expected Answer	Marks	Additional Guidance
5	a		**Level 3 (5-6 marks)** Good description of synaptic transmission **AND** An explanation of how antidepressants may work Quality of written communication does not impede communication of the science at this level **Level 2 (3-4 marks)** A description of transmission at a synapse **AND** ref. to how antidepressants might work **OR** A good description of transmission at a synapse Quality of written communication partly impedes communication of the science at this level **Level 1 (1-2marks)** A description of transmission at a synapse. **OR** Ref. to how antidepressants might work Quality of written communication impedes communication of the science at this level **Level 0 (0 marks)** Insufficient or irrelevant science. Answer not worthy of credit	6	**This question is targeted at grades up to A*** **Indicative scientific points may include** **Synaptic transmission** • electrical impulse arrives at the first neuron • chemicals / (named) neurotransmitters are **released** • into the gap / cleft • chemicals diffuse across gap • receptors (on the second neurone) • (chemicals) bind to receptors • on the second neuron • electrical impulse is generated • chemical is reabsorbed back in to first neuron • via the re uptake channels **How antidepressants work** • drug blocks the re-uptake channels • stops reabsorption (of serotonin) • the concentration of serotonin increases / serotonin remains (in the synaptic cleft) • so more serotonin to bind to receptors • drug may bind to receptors • so more impulses generated

Question			Expected Answer	Marks	Additional Guidance
	b		***any two form*** which of the drugs is the **most** effective ; which of the drugs is the least dangerous / has fewer side effects / side effects are not serious / side effects not serious enough to stop use of drug ; would need to consider patients other (named) medical condition ; any interaction with other medication ; consider patients alcohol intake / consider the **impact** of the drug on lifestyle ;	2	**ignore** references to cost **accept** least harmful **ignore** no side effects
			Total	**8**	

Question			Expected Answer	Marks	Additional Guidance
6	a	i	Cerebral cortex	1	**Accept** cerebrum / cerebral hemispheres /pre – frontal cortex
		ii	***any one from*** idea of some children (are found when they) are too old to learn language skills / Idea that language develops at an early age : idea of neurone pathways (for language)form earlier in life / neurone pathways (for language)less likely to form later in life / neurone pathways (for language)not formed	1	**Ignore** memory **Accept** up to 10 years
	b		***any two from*** electrical stimulation is invasive / MRI scans are not invasive; electrical stimulation has risk / MRI has less risk ; electrical stimulation could harm / damage (named) parts of the brain / cause infection /death / pain **OR** MRI causes less or no damage etc ;	2	**ignore** references to ethics / religion **accept** description of invasive, such as need to cut the skull/inserts electrodes into the brain **Accept** dangerous **Ignore** not safe / no risk **Ignore** side effects
			Total	**4**	

Question			Expected Answer	Marks	Additional Guidance
7	a		idea that colour / flower will be the same / ORA for seeds ; ref. to clone / genetically identical; ORA taking a cutting is a faster process / seeds would take longer to grow into a plant ;	3	**Ignore** cost
	b		meristem	1	**do not accept** stem cell **Ignore** cambium
	c		*Tissue* –phloem / xylem / palisade / spongy mesophyll / epidermis / cambium / meristem; *Organ* – flower/ root / leaf/ stem / fruit / petal / sepal / stamen / ovary ;	2	**Accept** higher level answers e.g. parenchyma
			Total	**6**	

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

http://www.ocr.org.uk

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Facsimile: 01223 552553