

Biology B

General Certificate of Secondary Education

Unit **B731/01**: Modules B1, B2, B3 (Foundation Tier)

Mark Scheme for January 2012

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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.

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For answers marked by levels of response:








- Read through the whole answer from start to finish**
- Decide the level that best fits** the answer – match the quality of the answer to the closest level descriptor
- 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

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

Annotation	Meaning
R	reject
CO	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>any two from:</p> <p>could cause hypothermia / exposure / (1) could lead to frostbite / unconsciousness / death (1) could slow / stop enzymes working / chemical reactions (in body) (1)</p>	2	<p>allow reverse arguments e.g. must stay warm so do not get hypothermia not hyperthermia allow (could cause) poor circulation ignore stop body / organs working ignore feel weak / shivering / pneumonia ignore enzymes denaturing when cold</p>
	(b)	<p>any two from:</p> <p>shiver (1) increase respiration (1) increase exercise (1) less blood flow to skin surface (1)</p>	2	<p>allow marks for explanations linked to descriptions eg he could shiver so (his muscles) generate heat (2) allow hair on skin is erect but hair on skin is erect to trap air (2) allow higher level responses to vasoconstriction in the skin less blood flow to skin so less heat to skin surface (2)</p>
	(c)	<p>blurred vision (1) means he can't see snowballs clearly (1)</p> <p>OR</p> <p>poor balance / muscle control (1) therefore can't dodge the snowballs (1)</p> <p>OR</p> <p>poor judgement (1) so throw too hard / misses (1)</p>	2	<p>one mark for effect alcohol and one mark effect on ability to have a snowball fight</p> <p>allow dizziness allow slows down his responses / slows reflexes / increases reaction time</p>
Total			6	

Question			Answer	Marks	Guidance
2	(a)	(i)	bacteria (1) cholera (1) OR fungus (1) athletes foot (1) OR protozoa (1) malaria (1)	2	disease must match pathogen for second mark allow other correct diseases eg bacteria – salmonella/food poisoning (2) ignore other viruses
		(ii)	make sure it is safe / see if it works / to find correct dosage (1)	1	ignore suitable allow so it doesn't harm us / identify side-effects

Question	Answer	Marks	Guidance
(b)	<p>[Level 3] Answer applies understanding of pathogens to describe at least one defence mechanism and how it works that may have stopped this virus. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks)</p> <p>[Level 2] Answer applies understanding of pathogens to state one defence mechanism that may have stopped this virus. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks)</p> <p>[Level 1] An incomplete answer, applies understanding of pathogens to describe how the virus gets into the cat. 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 E</p> <p>Indicative scientific points at level 3 may include: at least one from parts of the body and mechanism involved</p> <ul style="list-style-type: none"> • blood - white blood cells engulf pathogen • white blood cells make antibodies • airways have mucus to trap pathogen <p>Indicative scientific points at level 2 may include: parts of the body involved</p> <ul style="list-style-type: none"> • white blood cells • antibodies • airways have mucus <p>Indicative scientific points at level 1 may include: how virus enters</p> <ul style="list-style-type: none"> • virus came from other cats • virus in air • cat breathed virus in • through the airways • enters cells of the lung <p>ignore</p> <ul style="list-style-type: none"> • skin acts as a barrier • blood clots to stop pathogen • stomach makes acid to kill pathogen • reference to antibiotics
	Total	9	

Question		Answer	Marks	Guidance
3	(a)	(rugby players) need a lot of energy / more active (1)	1	ignore gives you energy
	(b)	cheating / unfair advantage (1)	1	allow could get banned if caught / illegal / might be side effects (1) allow adverse health effects
	(c) (i)	26.2 (2) BUT $85 \div 3.24$ or $85 \div 1.8^2$ (1)	2	allow 26 / 26.23 / 26.234568 (2) but 26.0 (incorrect rounding) max (1)
	(ii)	(yes) his BMI is between 25-29.9 (1)	1	answer must include numbers from the box allow more than 25 and less than 30 allow ecf from (i) e.g. if BMI = 32: no, because his BMI is over 30 (1)
	(iii)	(yes) (no mark) idea that unhealthy means you have a disease (and not overweight) / ora (1) idea that an England rugby player would need to be very fit (to be able to compete at that level) (1) OR idea that England rugby players have a lot of muscle not fat (1)	2	if no, then no marks at all must have one idea about health-free from disease idea and one about fitness – ability to perform play rugby (at high level) or idea of muscle not fat idea about fitness must relate to rugby players; idea about health need not ignore just ‘rugby players have a lot of muscle’
		Total	7	

Question		Answer	Marks	Guidance
4	(a)	one under lamp (plant B) had more light and grew more / one to the side (plant A) grew towards the lamp (1)	1	ignore plant B is healthier ignore leaning to the light as it must imply growth has occurred allow auxin makes it bend to the light
	(b)	Put a heat shield between the plants and the lamp <input checked="" type="checkbox"/> (1) Put the plant from the middle of the room into a box <input type="checkbox"/> Take the lamp away <input type="checkbox"/> Take the lamp away and replace with a heater <input checked="" type="checkbox"/> (1) Water the plants to stop them getting too hot <input type="checkbox"/>	2	more than two ticks deduct a mark for each extra tick
Total			3	

Question			Answer	Marks	Guidance
5	(a)	(i)	climate change / habitat destruction / hunting / pollution / competition / disease (1)	1	
		(ii)	(more) tourism / generates income / more employment (1)	1	allow examples e.g. (more) safaris ignore (have more) ivory ignore uses of elephants (e.g. for transport / work)
	(b)	(i)	evolution (1)	1	allow speciation ignore evolving / evolved
		(ii)	(Charles) Darwin (1)	1	allow Wallace
	(c)		any two from allows sun's rays / radiation / IR / heat pass through atmosphere (1) (carbon dioxide) stops / reduces the (re-radiated) radiation / heat / IR passing out in to space (1) because (carbon dioxide) reflects back the radiation / heat / IR (1)	2	ignore sunlight ignore UV not allows more radiation / IR / heat to enter atmosphere allow (carbon dioxide) traps heat (from Earth) ignore traps heat from sun ignore references to ozone
	(d)		only a limited number of mammoth tusks / they will run out (1) no more will be born (1)	2	ignore they are extinct unless qualified ignore they are frozen
Total				8	

Question			Answer	Marks	Guidance
6	(a)	(i)	four (1)	1	allow list of four correct organisms from each level
		(ii)	enters as grass photosynthesises / as sunlight absorbed by grass (1) flows through as each organism eats / feeds (1)	2	ignore sun's energy unless qualified
		(iii)	lives on / off / in a host / living organism (1) causing it harm (1)	2	ignore feeding from it / kills it
		(iv)	oxpecker eats / gets rid of the ticks (1) stops the ticks feeding on buffalo's (blood) (1)	2	allow prevents the ticks passing on diseases allow the buffalo when it senses danger
	(b)	(i)	2.0 (1)	1	allow 2 and +2 but not -2
		(ii)	(buffalo with or without oxpeckers have the same average number of ticks) therefore the buffalo do not benefit from the oxpeckers / idea of oxpeckers make no difference (1)	1	allow ecf allow higher level answers referring to the amount of variation between buffalo
		(iii)	any two from: oxpeckers cause wounds / cause harm to the buffalo (1) oxpeckers stop the wounds healing (1) oxpeckers feed on the buffalo's blood (1)	2	allow wounds open up ignore feeding on buffalo
Total				11	

Question	Answer	Marks	Guidance
7	<p>[Level 3] Answer includes discussion on how to distinguish animals. It also includes characteristics of arthropods and insects and applies them to these organisms and has been able to suggest a way of deciding if organisms are in the same species. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks)</p> <p>[Level 2] Answer includes a discussion that correctly links a characteristic to animals or arthropods or insects or has been able to suggest a way of deciding if organisms are in the same species. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks)</p> <p>[Level 1] Limited discussion of either animal characteristics or the characteristics of arthropods or insects or the types of features used to classify organisms. 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 E</p> <p>Indicative scientific points at level 3 may include:</p> <ul style="list-style-type: none"> • any points from level 2 plus • more features in common than with organisms of different species <p>allow higher level answers referring to fertile offspring from interbreeding allow compare DNA as way of identifying same species / different species</p> <p>Indicative scientific points at level 2 may include:</p> <ul style="list-style-type: none"> • animals take in food ready-made and are multicellular. • arthropods have jointed external skeleton. • insects have six legs, three parts to the body and two pairs of wings. <p>allow animals have a nervous system / move to find food</p> <p>Indicative scientific points at level 1 may include:</p> <ul style="list-style-type: none"> • they would count the number of legs • does it move • has it got an external skeleton
	Total	6	

Question		Answer	Marks	Guidance
8		30 (chromosomes) (1) but because the sperm cell and the egg cell contain half the chromosome number (of a normal cell) (1) because fertilisation produces (normal cell number of) 60 chromosomes (1)	3	because sperm contains 30 which join with 30 chromosomes from the egg (2) allow higher level responses to haploid and diploid cells
		Total	3	

Question			Answer	Marks	Guidance
9	(a)	(i)	protein (1)	1	allow peptide / polypeptide ignore amino acids
		(ii)	mitosis (1)	1	allow phonetic spelling but important that “t” is in the middle
		(iii)	idea that there is the same (amount of) DNA / genetic material in each (new) cell after division (as before) (1)	1	answer must refer to new cells produced after division allow makes a copy of chromosomes so there are two new copies, one for each cell ignore just to copy DNA
	(b)	(i)	<p>[Level 3] Describes rise in enzyme activity linked to temperature increase and identifies the optimum temperature. Also describes the rapid decrease after the optimum temperature and applies understanding to reference that amylase active site being correct shape to recognise starch. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks)</p> <p>[Level 2] Describes the increase to best / peak activity then a rapid decrease of activity and applies understanding of enzyme lock and key mechanism to explain why only starch is broken down. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks)</p> <p>[Level 1] Describes general shape as increasing enzyme activity with increased temperature and that there is a best temperature. 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>Indicative scientific points at level 3 may include:</p> <ul style="list-style-type: none"> enzyme activity rapid decreases after the optimum temperature due to change in shape of active site reference to amylase active site being correct shape to recognise starch <p>Indicative scientific points at level 2 may include:</p> <ul style="list-style-type: none"> enzyme activity increases at beginning then decreases optimum temperature at peak of graph optimum temperature is at 37°C +/- 1°C describes lock and key mechanism <p>allow best /peak temperature instead of optimum allow references to higher level denaturing to explain lack of activity after 42°C ignore enzyme is no good after 42°C no credit for enzyme dies</p> <p>Indicative scientific points at level 1 may include:</p> <ul style="list-style-type: none"> as temperature rises the rate of enzyme activity increases

Question			Answer	Marks	Guidance
			[Level 0] Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)		<ul style="list-style-type: none"> best temperature identified
		(ii)	(artificial) transfer of genes (1) from one living organism to another (1)	2	allow splicing genes from one living organism to another (2) ignore transferring nucleus
			Total	11	

Question		Answer	Marks	Guidance
10	(a)	reaction of glucose (with oxygen) (1) energy needed to make muscles contract (1)	2	allow word equation for respiration (1) energy must be applied to muscles
	(b)	to get more oxygen / more energy / more glucose (1) to muscles (1) OR remove carbon dioxide / excess heat (1) from muscles (1)	2	responses must be comparative allow so muscles get extra oxygen / extra energy to muscles max of 1 mark if not linked to muscles
	(c) (i)	93.6% (1)	1	allow 94 or 93.62 or 93.617 not 94.0 (incorrect rounding)
	(ii)	second week's training more successful than first week's training (oxygen consumption raised) / ora (1) refers to table of fitness level in second week his fitness has improved (to excellent) (1)	2	allow gentle jogging not as good as sprinting and jogging ora allow sprinting and jogging move him into the excellent fitness level
Total			7	

Question		Answer	Marks	Guidance
11	(a)	<p>part of blood</p> <p>red blood cell</p> <p>platelet</p> <p>white blood cell</p> <p>job it does</p> <p>defend against</p> <p>transport oxygen</p> <p>help blood clotting</p>	2	all correct 2 marks one or two correct 1 mark
	(b)	<p>scientists needed to gather more evidence to support the work of other scientists (1)</p> <p>scientists wanted to make sure results are reproducible (1)</p>	2	allow idea of verifying the results allow to improve the technique
Total			4	

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