OCR
RECOGNISING ACHIEVEMENT

GCSE

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.

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

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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

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
	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)		**any two from:** could cause hypothermia / exposure / (1) could lead to frostbite / unconsciousness / death (1) could slow / stop enzymes working / chemical reactions (in body) (1)	2	**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
	(b)		**any two from:** shiver (1) **increase** respiration (1) **increase** exercise (1) less blood flow to skin surface (1)	2	**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)
	(c)		blurred vision (1) means he can't see snowballs clearly (1) OR poor balance / muscle control (1) therefore can't dodge the snowballs (1) OR poor judgement (1) so throw too hard / misses (1)	2	one mark for effect alcohol and one mark effect on ability to have a snowball fight **allow** dizziness **allow** slows down his responses / slows reflexes / increases reaction time
			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)		**[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) **[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) **[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) **[Level 0]** Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)	6	**This question is targeted at grades up to E** **Indicative scientific points at level 3 may include:** **at least one from** **parts of the body and mechanism involved** • blood - white blood cells engulf pathogen • white blood cells make antibodies • airways have mucus to trap pathogen **Indicative scientific points at level 2 may include:** **parts of the body involved** • white blood cells • antibodies • airways have mucus **Indicative scientific points at level 1 may include:** **how virus enters** • virus came from other cats • virus in air • cat breathed virus in • through the airways • enters cells of the lung **ignore** • 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 ÷ 3.24 or 85 ÷ 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 ✓ (1) Put the plant from the middle of the room into a box Take the lamp away Take the lamp away and replace with a heater ✓ (1) Water the plants to stop them getting too hot	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**	

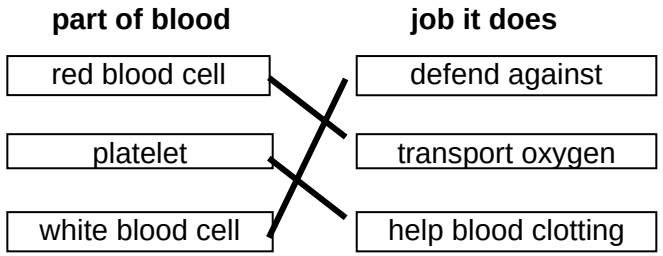
Question			Answer	Marks	Guidance
7			**[Level 3]** Answer includes discussion on how to distinguish animals. It also includes characteristics of arthropods and insects and applies them to these organisms **and** has been able to suggest a way of deciding if organisms are in the same species. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks) **[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) **[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) **[Level 0]** Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)	6	**This question is targeted at grades up to E** **Indicative scientific points at level 3 may include:** • any points from level 2 plus • more features in common than with organisms of different species **allow** higher level answers referring to fertile offspring from interbreeding **allow** compare DNA as way of identifying same species / different species **Indicative scientific points at level 2 may include:** • 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. **allow** animals have a nervous system / move to find food **Indicative scientific points at level 1 may include:** • 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)	**[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) **[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) **[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)	6	**This question is targeted at grades up to C** **Indicative scientific points at level 3 may include:** • 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 **Indicative scientific points at level 2 may include:** • 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 **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 **Indicative scientific points at level 1 may include:** • 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)		• 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)			2	all correct 2 marks one or two correct 1 mark
	(b)		scientists needed to gather more evidence to support the work of other scientists (1) scientists wanted to make sure results are reproducible (1)	2	**allow** idea of **verifying** the results **allow** to improve the technique
			Total	**4**	

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