

Biology B

General Certificate of Secondary Education

Unit **B631/02**: Modules B1, B2, B3 (Higher Tier)

Mark Scheme for January 2013

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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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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

Subject-specific Marking Instructions

- / = 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)	glass (falling) / light (1)	1	allow cup
		(ii)	eye / retina (1)	1	allow rods / cones / fovea not neurone / optic nerve ignore light receptor ignore Marco
		(iii)	hand / arm / fingers / muscles (1)	1	ignore Hanns
	(b)	(i)	5 (1)	1	
		(ii)	drinks contain different concentrations / percentages / strengths (of alcohol) / AW (1)	1	ignore whisky has more alcohol than cider / reference to amounts of alcohol / they had different types of drinks allow Hann's drinks are more concentrated ORA allow more alcoholic ORA
	(c)		temazepam (1)	1	allow correct answer ticked or underlined
			Total	6	

Question		Answer	Marks	Guidance									
2	(a) (i)	(both) parents heterozygous / (both) Ee/ (both) have one of each allele (1)	1	ignore they are both carriers BUT allow carriers of the recessive allele allow (both) parents have 2 different alleles allow they have a recessive allele each allow they have heterozygous alleles ignore references to genes									
	(ii)	genotypes of parents and offspring correct (1) or <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td></td> <td>E</td> <td>e</td> </tr> <tr> <td>E</td> <td>EE</td> <td>Ee</td> </tr> <tr> <td>e</td> <td>Ee</td> <td>ee</td> </tr> </table> (1) but 25% / 0.25 / ¼ / 1 in 4 / 1:3 (2)		E	e	E	EE	Ee	e	Ee	ee	2	eg genotype of both parents Ee and genotypes of offspring EE, Ee, Ee and ee (1) correct Punnett squares or spaghetti diagram without labels scores (1) ignore incorrect Punnett diagram if answer line is correct not 1 in 3 / 3:1 / 1:4
	E	e											
E	EE	Ee											
e	Ee	ee											
	(b)	tick in 1st row / people who are homozygous for the E allele have free earlobes (1)	1	two ticks or more scores zero									
Total			4										

Question		Answer	Marks	Guidance
3	(a)	<p>any three from converts excess glucose (1)</p> <p>to <u>glycogen</u> (1)</p> <p>(stores) in liver / (stores) in muscles (1)</p> <p>(liver or muscle) cells take up more glucose (1)</p> <p>increased rate of respiration (in liver or muscle cells) / increased metabolic rate (in liver or muscle cells) (1)</p>	3	<p>use ticks in this question allow when levels are too high allow removes excess glucose ignore breakdown of glucose</p> <p>not any incorrect spelling or incorrect name eg glucagon</p> <p>ignore references to insulin targets liver cells</p>
	(b)	<p>idea of balancing bodily inputs and outputs / maintaining a constant internal environment / control of internal environment (1)</p>	1	<p>allow maintain optimum status in body allow examples of controlling or maintaining eg temperature, carbon dioxide, water level, pH allow 'keeping the glucose levels the same' (limit of acceptability) ignore keep everything in balance</p>
	(c)	<p>any two from use oxygen / happens only with oxygen (1) produces carbon dioxide (1) produces water (1) does not produce lactic acid (1) (releases) more energy / more efficient (1) complete breakdown of glucose (1)</p>	2	<p>allow responses to more/correct amount of ATP allow reverse arguments for anaerobic respiration if clearly stated</p> <p>if two marking points given in first line, mark them both and just check there are no contradictions on the next line</p>

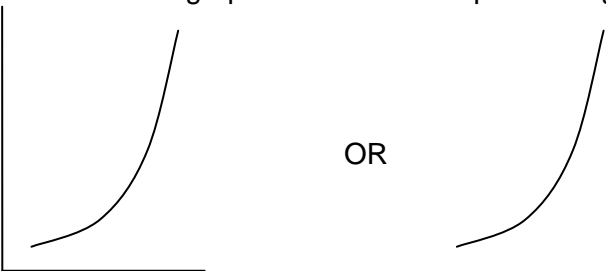
Question		Answer	Marks	Guidance
	(d)	small intestine / ileum (1)	1	allow villi
Total			7	

Question		Answer	Marks	Guidance
4	(a) (i)	A, T, C, G (any order) (1)	1	
	(ii)	different sequence / order / pattern (1)	1	allow some are missing ignore different bases / different combinations / linked differently
	(b)	to prevent resistant strains spreading / being selected for / AW (1)	1	ignore reference to the person becoming resistant / the disease becoming resistant BUT allow to prevent bacteria becoming resistant allow bacteria can develop resistance ignore to stop bacteria mutating
Total			3	

Question			Answer	Marks	Guidance
5	(a)	(i)	18/45 x 100 (1) BUT 40(%) (2)	2	correct answer, no working = (2) allow correct answer in table if answer line is blank
		(ii)	Hughesly (1)	1	allow 40(%) allow ecf if answer to (i) is incorrect ie town with highest percentage only allow Hughesly if it is the highest percentage allow Hughesly if (a)(i) is blank
		(iii)	bigger sample size / more representative sample (1)	1	allow more towns / more areas counted ignore repeats ignore same number of graves in each town
	(b)	(i)	mutualism / mutualistic (1)	1	allow symbiosis / symbiotic ignore mutual relationship / mutual
		(ii)	can not move (1) can not make food / photosynthesise (1)	2	allow reproduce using spores / cells have walls (1) ignore do not have compact bodies allow do not have cellulose cell walls / made of hyphae / made of mycelium / no leaves / no roots / no chloroplasts / do not store starch (1) ignore not green ignore do not fight for food
	(c)		any two from (too much) competition (from grass / plants) (1) idea that light is blocked (1) (less light so) less photosynthesis (1)	2	 allow competing for light (2) ignore references to sulfur dioxide
Total				9	

Question		Answer	Marks	Guidance
6	(a)	<p>any two from rounded shape to reduce water loss or transpiration (1) spines / no leaves to reduce water loss or transpiration (1) small surface area (to volume ratio) to reduce water loss or transpiration (1) leaves reduced to spines for small surface area (to volume ratio) (1)</p> <p>idea of swollen stem to store water (1)</p> <p>idea of deep roots to absorb (more) water (1)</p> <p>idea of roots near surface or widespread roots which cover a wide area to absorb (surface) water (quickly / before it evaporates) (1)</p> <p>green stem for photosynthesis (1)</p>	2	<p>look for marks across both 1 and 2 for the ideas i.e. allow both marks if seen in 1. e.g. rounded shape gives small surface area to reduce water loss scores (2) ignore spines to prevent animals eating them</p> <p>allow (stem is) corrugated or fluted to expand when water is taken in</p> <p>e.g. long / deep roots to collect more water</p> <p>e.g. wide spread roots to absorb more water ignore references to roots to collect nutrients</p> <p>allow reference to fewer stomata / stomata in pits / stomata closed during the day</p>
	(b)	<p>carbon dioxide water oxygen</p> <p>all correct (2) two correct (1)</p>	2	<p>carbon dioxide and water - order does not matter allow correct formulae; ignore balancing ignore '+ energy'</p>
	(c)	glucose (1)	1	<p>allow oil / fat / lipid allow (named) carbohydrate eg starch / cellulose not glucose and water / glucose and oxygen / glucose and carbon dioxide / carbon dioxide and water</p>
	(d)	colour (of petals / flowers) (1)	1	<p>ignore nectar not scent / smell ignore bright green flowers or bright flowers</p>

Question		Answer	Marks	Guidance
	(e)	any two from soft (tissue) (1) unsuitable conditions (1) fossils not found yet (1)	2	allow idea that recently evolved allow plant decays (easily) / rots away (completely) allow fossilisation is a rare event allow not every organism is fossilised
Total			8	

Question		Answer	Marks	Guidance
7	(a)	increase at an ever increasing rate / growth or gradient of curve is getting steeper (1)	1	ignore is increasing rapidly / it keeps on increasing allow it doubles every time / increases by a fixed percentage every time allow a sketch graph which shows exponential growth 
	(b)	need renewable energy sources / wind / tidal / solar / wave / hydro-electric / geothermal / biomass (1) so don't use up finite resources / do not cause pollution (1)	2	allow use / cut down / burn wood for 1 mark allow use wood and re-plant trees for 2 marks marks for wood or biomass – can only gain second mark for mention of re-planting ignore incorrectly matched sustainable resource to pollution effect e.g. stop burning wood because it produces CO ₂ eg use renewable energy so less fossil fuels used scores (2) ignore vague answers eg wave energy is cleaner scores (1); tidal energy is environmentally friendly scores (1) ignore can be used again ignore references to global warming
Total			3	

Question			Answer	Marks	Guidance
8	(a)	(i)	at least 4 points correctly plotted (1) but all points correctly plotted (2) smooth curve through all points (1)	3	allow +/- half square allow +/- half square not lines with ruler between points
		(ii)	6.5 (1)	1	allow answer in range 6.0 - 7.0 (1) allow a range allow 6 and 7
	(b)	(i)	diffusion (1)	1	allow active transport ignore absorption or a description
		(ii)	plasma (1)	1	allow the liquid part / water
Total				6	

Question			Answer	Marks	Guidance																	
9	(a)	(i)	A and D (1)	1	both needed for 1 mark either order																	
		(ii)	mitosis (1)	1	mark phonetically eg mytosis, meitosis, mytoesis not meiosis, meiotsis																	
	(b)	<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th></th> <th>positive phototropism</th> <th>negative phototropism</th> <th>positive geotropism</th> <th>negative geotropism</th> <th></th> </tr> </thead> <tbody> <tr> <td>shoot</td> <td>✓</td> <td></td> <td></td> <td>✓</td> <td>(1)</td> </tr> <tr> <td>root</td> <td></td> <td>✓</td> <td>✓</td> <td></td> <td>(1)</td> </tr> </tbody> </table>		positive phototropism	negative phototropism	positive geotropism	negative geotropism		shoot	✓			✓	(1)	root		✓	✓		(1)	2	more than two ticks on a line = 0 for that line
	positive phototropism	negative phototropism	positive geotropism	negative geotropism																		
shoot	✓			✓	(1)																	
root		✓	✓		(1)																	
	(c)	(genetically) identical / know what you are getting / get required characteristics (1)	1	ignore easier / cheaper / get more / selective breeding allow faster / takes a shorter period of time																		
Total				5																		

Question			Answer	Marks	Guidance
10	(a)	(i)	isolate / remove / extract / take / select (insulin) <u>gene</u> (1) insert / inject / put (bacterial) DNA (with insulin gene) into bacteria (1)	2	allow use (restriction) enzyme to remove insulin gene (1) not remove DNA gene ignore remove insulin allow insert into bacteria (1) allow insert plasmid into bacteria (1) ignore add / mix with bacteria
		(ii)	(bacteria contain) human (insulin) gene / human DNA (1)	1	allow idea of universal code eg inserted DNA made up of A T G C (1) allow human DNA code can be interpreted by bacteria (1) allow made from same gene (1)
	(b)		idea of being less efficient at moving materials in / out of cells (1) small(er) surface area to volume ratio / ora (1)	2	allow specific examples, eg cannot absorb enough oxygen / nutrients (1) allow diffusion pathway too long (1)
			Total	5	

Question		Answer	Marks	Guidance	
11	(a)	<p>any two from reduced gene pool / less variation (1)</p> <p>diseases might wipe out population (1)</p> <p>(increased risk of) genetic diseases / harmful alleles combining / genetic abnormalities (1)</p> <p>but combining of harmful <u>recessive</u> alleles / increased risk of <u>recessive</u> (genetic) diseases / increased risk of harmful <u>recessive</u> characteristics showing = (2)</p>	2	<p>ignore no variation</p> <p>allow disabilities</p> <p>not causes mutations</p>	
	(b)	(i)	permeable / moist / large surface area / good blood supply / thin wall / (wall) one cell thick (1)	1	not thin cell walls
		(ii)	blood at higher pressure (1)	1	
			Total	4	

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