



GCSE

## Biology B

General Certificate of Secondary Education

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

## Mark Scheme for January 2012

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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 <u>not</u> given
	error carried forward
	information omitted
	ignore
	reject
	contradiction

## Subject-specific Marking Instructions

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)	<div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="display: flex; flex-direction: column; align-items: center;"> <div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;">alcohol</div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;">aspirin</div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;">LSD</div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;">nicotine</div> </div> <div style="display: flex; flex-direction: column; align-items: center;"> <div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;">pain killer</div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;">hallucinogen</div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;">stimulant</div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;">depressant</div> </div> </div> <p style="margin-top: 20px;">(a) (i) 3.4/ 0.25 or 3.4/0.50<sup>2</sup> (1) BUT 13.6 (2)</p> <p style="margin-top: 20px;">(ii) addiction (1)</p> <p style="margin-top: 20px;">(iii) check if harmful / see if safe / it may be toxic / check for side effects / get levels of medication <b>or</b> dosage correct / check it works (1)</p> <p style="margin-top: 20px;">(iv) animals harmed in testing / ethical idea e.g. cruel to animals (1)</p>	2	All 3 correct (2) 1 or 2 correct (1)
			2	<b>allow</b> 14 (2) but not 14.0
			1	more than one answer circled then no marks
			1	<b>allow</b> they might be dangerous <b>ignore</b> may affect body / organs unless qualified <b>ignore</b> check for faults
			1	answer must refer to negative aspects of <b>animal testing</b> <b>but ignore</b> just 'because it is tested on animals' <b>allow</b> animals may not behave like humans so unreliable <b>ignore</b> unqualified answers e.g. against religious belief
		<b>Total</b>	<b>7</b>	

Question			Answer	Marks	Guidance
2	(a)	(i)	<b>enzymes</b> work best (at 37 °C) / optimum temperature for <b>enzymes</b> (1)	1	answer must refer to enzymes <b>allow</b> not high enough for <b>enzymes</b> to denature <b>ignore</b> 'enzymes can still function'
		(ii)	<b>any two from:</b> vasoconstriction / blood vessels constrict / blood vessels narrow (1)  idea that there is <b>less blood</b> near <b>skin</b> surface (1)  less heat loss by <b>radiation</b> (1)	2	<b>allow</b> blood vessels get thinner  <b>not</b> blood vessels move away from skin surface <b>ignore</b> no blood near skin surface <b>ignore</b> blood flows away from skin <b>ignore</b> blood not flowing as close to skin surface
		(iii)	hypothermia (1)	1	<b>allow</b> phonetic spellings but <b>not</b> hyperthermia
	(b)		2 (hours) (1)	1	
			<b>Total</b>	<b>5</b>	

Question		Answer	Marks	Guidance
3	(a)	(different) age / gender / level of activity / appropriate medical condition like diabetes etc (1)	1	<b>allow</b> religious / ethical beliefs / allergies / vegetarian / vegan <b>ignore</b> different sizes / masses <b>ignore</b> they need different amounts of energy / protein etc without a reason <b>ignore</b> different lifestyles
	(b) (i)	motor neurone (1)	1	<b>allow</b> motor nerve
	(ii)	release of (neuro)transmitter (1)  <b>diffusion</b> across (the synapse / gap) (1)	2	<b>allow</b> chemical released <b>allow</b> named transmitter e.g. acetylcholine  simply 'transmitter diffuses' = 1 only <b>ignore</b> 'it diffuses across synapse' <b>ignore</b> 'impulse travels across' idea 'impulses diffuse across synapse' = 0
	(c)	$C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O$	2	mark for correct formulae (1) mark for correct balancing (1) dependent on 1 <sup>st</sup> mark
	(d)	reference to (fatigue caused by) lactic acid / lactate (1) BUT break down lactic acid / oxidise lactic acid / move lactic acid to liver (2)	2	<b>ignore</b> description of other changes e.g. pulse rate slowing  'remove lactic acid' = 1 only (for lactic acid)
		<b>Total</b>	<b>8</b>	

Question			Answer	Marks	Guidance
4	(a)	(i)	<b>any one from:</b> climate change (1) pollution (of rainforest) (1) hunting (1)  competition for food / space (1)  disease (1)	1	<b>ignore</b> habitat destruction <b>allow</b> global warming / acid rain <b>allow</b> increase in predators but ignore just predators  <b>allow</b> decrease in prey / food <b>ignore</b> limited resources <b>ignore</b> just 'competition'  <b>allow</b> idea of disturbance from felling (1) <b>allow</b> populations become isolated (1) <b>allow</b> not reproducing fast enough / death rate greater than birth rate (1)
		(ii)	<b>any one from:</b> legal protection / stop hunting (1) idea of education of local people (1) captive breeding programs (1) artificial ecosystems / reserves (1)	1	<b>ignore</b> protection of habitat <b>ignore</b> replant rainforest <b>ignore</b> zoos / enclosures / cage <b>ignore</b> 'conservation programs' <b>ignore</b> tourism  <b>allow</b> corridors to prevent isolation (1) <b>allow</b> provide food / feeding stations (1)
		(b)	<b>any two from:</b> (provide jobs in / make money from) tourism (1) protects local human food supply (1) (tourist trade may lead to) improvements in water / electricity supplies (1) can use plants for building materials / fuel (1) can use plants for medicines (1) prevents soil erosion (1)	2	<b>ignore</b> simply 'make money' <b>allow</b> for food  <b>ignore</b> use plants for resources  <b>ignore</b> references to global warming <b>ignore</b> references to attacks by animals
			<b>Total</b>		<b>4</b>

Question		Answer	Marks	Guidance
5	(a)	142.9 (%) (2)  <b>but</b> $1 \div 0.7 \times 100$ (1)	2	<b>allow</b> 143 or 142.86 (2) <b>but</b> 142 (1)  <b>allow</b> $1.7 - 0.7 = 1$ (million) OR increase = 1 (million) (1)
	(b)	acid rain (1)	1	<b>allow</b> description of the effects of acid rain eg acidic lakes / trees die / fish in lakes killed / damage buildings or statues <b>allow</b> idea of more sulfurous / sulfuric acid in atmosphere <b>ignore</b> just 'harmful to animals'
	(c) (i)	<b>any three from:</b> can withstand high body temperatures (1) so does not need to sweat / can store heat at night (1)  long eye-lashes / bushy (1) stop sand getting into eyes (1)  hair lines nostrils / close nostrils (1) to stop sand getting in (1)  large feet / wide feet (1) to stop camel sinking into sand / spread out the load (1)  can drink large amounts of water (1) so they can travel further without water (1)  large surface area to volume (1) to allow more heat loss (1)	3	<b>allow</b> any three correct ideas  <b>allow</b> more sets of eyelids / more eye lashes  <b>allow</b> flat feet / webbed feet <b>ignore</b> just 'to walk on sand'  <b>ignore</b> stores water / fat in hump <b>but allow</b> reference to fat as a food store / source of metabolic water (1)  additional marking points: <b>allow</b> (underside) of body less fur / short fur / thin fur (1) so heat is lost more easily (1) <b>or</b> <b>allow</b> longer fur (on upper side) (1) to keep warm at <b>night</b> (1) <b>ignore</b> no fur

Question		Answer	Marks	Guidance
	(ii)	mammal (1)	1	
	(d) (i)	replaced by <b>minerals</b> (1)	1	<b>not</b> replaced by calcium
	(ii)	<b>any two from:</b> idea of acquired characteristics are not passed on / idea of only genetic characteristics being passed on (1)  idea of environmental factors not altering the genes / not controlling characteristics (1)	2	answer must refer to current theories not Lamarck's, e.g. 'acquired characteristics are passed on' = 0  <b>allow</b> neck length not controlled by environment / neck length is controlled by genes / stretching neck will not affect genes
		<b>Total</b>	<b>10</b>	

Question			Answer	Marks	Guidance
6	(a)	(i)	water + carbon dioxide (1) glucose + oxygen (1)	2	either order <b>allow</b> sugar <b>ignore</b> food <b>ignore</b> light / chlorophyll <b>allow</b> correct symbols / formulae / a mixture of words and formulae (if give formulae then do not need to be balanced)
		(ii)	(starch is) insoluble / (starch) does not dissolve (1)	1	assume unqualified answer refers to starch <b>allow</b> starch does not affect osmosis / water potential <b>ignore</b> simply 'glucose is soluble' <b>ignore</b> starch is a large molecule
	(b)		3 <sup>rd</sup> box true, all rest false (1)	1	must have 5 ticks in the correct boxes
	(c)		small sample size / <b>only</b> five repeats (1)  sample may be unrepresentative (1)	2	<b>ignore</b> references to size of quadrat  <b>allow</b> idea that need random placement of quadrats <b>allow</b> sample may be biased  <b>ignore</b> simply 'sample size' or 'randomness'
			<b>Total</b>	<b>6</b>	

Question		Answer	Marks	Guidance
7	(a)	undifferentiated cell / unspecialised cell / cell that can become any (type of) cell (1)	1	<b>not</b> just cell that can divide <b>allow</b> a cell that can differentiate <b>ignore</b> cells with no function
	(b)	meiosis (1)	1	<b>allow</b> spelt phonetically (no 't') <b>allow</b> reduction division
	(c)	(idea that) fertilisation restores the correct number of chromosomes / restores diploid number / to prevent there being too many chromosomes after fertilisation (1)	1	<b>allow</b> reference to specific numbers of chromosomes e.g. so fertilised egg has 46 chromosomes <b>allow</b> so fertilised egg has a full set / amount of DNA <b>ignore</b> simply 'they carry half the number of chromosomes' answer has to have some reference to fertilisation / fertilised egg / zygote / embryo
	(d)	the embryos are killed / believe that they have a right to life / ethically wrong / religious objections (1)	1	<b>allow</b> idea that it's unnatural / immoral / against God / 'playing God' <b>allow</b> embryos are living
	(e)	1737 (1)	1	
		<b>Total</b>	<b>5</b>	

Question		Answer	Marks	Guidance
8	(a)	aorta (1)	1	more than one answer circled then no marks
	(b)	has to pump blood further / needs to generate more pressure (1)	1	<b>allow</b> has to work harder / pump blood to (whole) body <b>ignore</b> pump more blood / pumps faster
	(c)	(wire must go through the skin) so possible infection (1)	1	<b>allow</b> reference to battery may be damaged / disconnected <b>allow</b> idea of wire disconnecting or breaking <b>ignore</b> ideas that power may fail
		<b>Total</b>	<b>3</b>	

Question			Answer	Marks	Guidance
9	(a)	(i)	glucose, fats, oxygen (1)	1	<b>need all three for 1 mark</b> <b>any other substance negates mark</b>
		(ii)	they (diffuse from) a high(er) <b>concentration</b> to a low(er) <b>concentration</b> (1)	1	need reference to concentration <b>allow</b> there is a lower concentration in the foetus <b>allow</b> there is a higher concentration in the mother <b>allow</b> the concentration in the foetus is low but high in the mother
		(iii)	large surface area / rich blood supply / permeable / small distance (between the two blood systems) / (large) concentration gradient (1)	1	 <b>allow</b> thin wall <b>but ignore</b> thin cell wall <b>allow</b> one cell thick / thin cells <b>ignore</b> just 'thin'  <b>allow</b> counter-current flow (1)
	(b)	(i)	34 / 34.3 / 34.29 (1)	1	<b>allow</b> 34.28571429 <b>not</b> 34.2 <b>or</b> 34.28 <b>or</b> 34.0 (incorrect rounding)
		(ii)	foetal blood has higher percentage of red blood cells (1)  idea that oxygen passes from maternal (oxy) <b>haemoglobin</b> to foetal <b>haemoglobin</b> (1)	2	<b>allow</b> foetal blood has higher concentration of Hb <b>allow</b> foetal blood has more red blood cells (per 100cm <sup>3</sup> ) <b>allow</b> foetal blood has more Hb (per 100cm <sup>3</sup> ) <b>ignore</b> answer that quotes figures 34 and 50 but makes no comparison  <b>not</b> red blood cells pass from maternal blood to foetal blood <b>ignore</b> simply oxygen passes from maternal blood to foetal blood  <b>allow</b> high level answer: higher affinity of foetal Hb (1)
			<b>Total</b>	<b>6</b>	

Question		Answer	Marks	Guidance
10	(a)	<b>any two from:</b> (cell) wall / vacuole / chloroplast / starch granules (1)	1	<b>need two answers for one mark</b> <b>ignore</b> cellulose / chlorophyll
	(b)	(positive) phototropism (1)	1	
	(c) (i)	different proteins are made / protein shape is different (1)  may be enzymes / structural proteins (that do not work properly) (1)	2	<b>allow</b> no protein made  <b>allow</b> idea that growth hormones may be affected
	(ii)	tick in second box (1)	1	more than one tick negates a correct response
	(d)	people will get more vitamin A /  less people will develop vitamin A deficiency / night blindness / xerophthalmia (1)	1	<b>ignore</b> rice contains vitamin A <b>ignore</b> just 'vitamin A'  <b>allow</b> improves vision at night <b>ignore</b> simply improves vision
		<b>Total</b>	<b>6</b>	

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