



GCSE MARKING SCHEME

SCIENCE – BIOLOGY (LEGACY)

JANUARY 2012

INTRODUCTION

The marking schemes which follow were those used by WJEC for the January 2011 examination in GCSE SCIENCE – BIOLOGY (LEGACY). They were finalised after detailed discussion at examiners' conferences by all the examiners involved in the assessment. The conferences were held shortly after the papers were taken so that reference could be made to the full range of candidates' responses, with photocopied scripts forming the basis of discussion. The aim of the conferences was to ensure that the marking schemes were interpreted and applied in the same way by all examiners.

It is hoped that this information will be of assistance to centres but it is recognised at the same time that, without the benefit of participation in the examiners' conferences, teachers may have different views on certain matters of detail or interpretation.

WJEC regrets that it cannot enter into any discussion or correspondence about these marking schemes.

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UNIT B1 (LEGACY)

Question	Answer	Mark
1. (a) (i)	4 bars - correct height with a label Tolerance +/- $\frac{1}{2}$ small square -1 for each error	2
(ii)	I decrease/ decline/ go down	1
	II <u>Warmer</u> conditions/ Global warming <u>AND</u> so more eggs/ young/ caterpillars produced/ more reproduction	1
(b)	Survive genes generation	3
	Become extinct/ died out/ wiped out/ disappeared/ endangered/ decrease in number/ decrease in population NOT died off/ it dies	1
	Total for Question	8

Question	Answer	Mark
2. (a) (i)	5.7	1
	(ii) Uses all feet/ legs / ORA	1
(b) (i)	Most (90%) of life{ in the water/ swimming}/ ORA NOT better adapted to water	1
	(ii) Strong legs / large feet	1
(c) (i)	Not as much/less fat (must be comparative)	1
	(ii) less body heat produced/ medium body heat produced	1
(d)	Long time underwater/ can stay underwater for 8 minutes/ fast swimming/ swims at 15 km/h (Very) deep diving/ swimming/ 90% time spent in water/ long time spent in water	1 1
Total for Question		8

Question	Answer	Mark
3. (b) (i)	dominant	1
(ii)	No, No	1
(c) (i)	2 or 3 4 1 or 2	3
(ii)	50%	1
Total for Question		6

Question	Answer	Mark
4. (a) (i)	I Heart Disease – contains higher fat	1
	II Stroke – contains higher salt	1
	Answers must be comparative	
(ii)	(Savoury Pie) high in <u>salt</u> <u>SO</u> risk of <u>kidney damage</u>	1
(iii)	Calculation method and numbers correct $300 \times 2 / 150$ or 600/15	1
	Answer correct with units (4) = 2 marks	1
(b)	Obesity/ overweight/ excessive weight or mass/ diabetes/ high blood pressure NOT put on weight/ too fat	1
	Total for Question	6

Question	Answer	Mark
5. (a) (i)	Within a certain range	1
(ii)	<u>Increase</u> followed by <u>decrease</u>	1
(iii)	Eating (lunch / food/ dinner etc)	1
(b) (i)	Insulin	1
(ii)	diabetes	1
(iii)	I Urine II Glucose	2
Total for Question		7

FOUNDATION AND HIGHER TIER

Question	Answer	Mark
6/1 (a)	<p>smoking is addictive/contains nicotine which is addictive/contains a drug or chemical which is addictive/ they get addicted/ dependent</p> <p>NOT hooked/ crave/ withdrawal symptoms</p>	1
(b)	<p>any two disease/health related reasons - accept 2 cancers {lung/ throat/ tongue/ bladder/ pancreas} cancer/ lung disease/ emphysema/ narrowed arteries/ heart disease/ reduction of fertility/ may have underweight babies/ decreased life expectancy/ increased chance of miscarriage</p> <p>NOT heart attack/ breathing problems/ bronchitis/ lung damage</p> <p>accept answer related to secondary smoking/ ref to other people breathing their smoke</p> <p>accept answer related to cost of cigarettes</p>	Any 2
(c) (i)	3	1
(ii)	<p>For last five days they have smoked less each day;</p> <p>There is a decrease in the number of cigarettes smoked/ correct numerical answer;</p> <p>Only once in the 2 week period has the previous daily average of 25 cigarettes smoked been reached (therefore considered successful);</p> <p>Most of the time both smoke less than their target</p> <p>Accept answers only referring to one of the people.</p>	Any 2
Total for Question		6

Question	Answer	Mark
7/2 (a)	variation	1
(b) (i)	mutation	1
(ii)	(change in) DNA (not: change in genetics)	1
(c)	(offspring produced by sexual reproduction) show variation are different or not identical/ have genes from two parents/ have different alleles (accept: are not a clone) ORA NOT have two parents/ have different genes or chromosomes	1
Total for Question		4

Question	Answer	Mark
8/3 (a)	A - hair	1
	C – (blood) capillary/ <u>blood</u> vessel	1
(b)	(sweat gland) <u>removes salts and water</u> (NOT water alone) <u>/sweat from blood/produces sweat</u>	1
	(poured onto surface of skin (water in)) sweat evaporates	1
	Withdrawing or releases or takes heat from body/ body heat required to evaporate (water in) sweat/ lowers skin or blood temperature/ taking heat with it NOT cools you down/ lets out heat	1
Total for Question		5

HIGHER TIER

Question	Answer	Mark
4. (a)	Starts off higher (blood) glucose rises higher/ more rapidly/ falls more rapidly blood glucose takes longer to get back to normal or level off blood glucose drops below normal/ lower than the normal man	Any 3
(b)	<u>inject</u> insulin (before eating breakfast)/ use insulin pen or ensure that the breakfast is very low in glucose/sugar/carbohydrate/fruit or take Metformin/ Novonorm	1
(c)	insulin produced which converts glucose to glycogen (in the liver) Spelling must be accurate for glycogen	1
	Total for Question	6

Question	Answer	Mark
5. (a)	Cross 1 - award 1 mark for all the offspring being Bb	1

Gametes	B	B
b	Bb	Bb
b	Bb	Bb

Cross 2 - **award 1 mark for 50% Bb and 50% bb** 1

Gametes	B	b
b	Bb	bb
b	Bb	bb

(b) If the bought rabbit or it was homozygous or BB then all offspring would be black/ there will be no white offspring 1

If the bought rabbit or it was heterozygous or Bb then 50% of offspring would be black and 50% white or some white/
Bought rabbit must be Bb to produce any white rabbits 1

Total for Question **4**

Question	Answer	Mark
6. (a)	DNA	1
(b)	Chromosomes / genes	1
(c)	scientific names are used by all / are constant / do not vary/ it will be the same in all languages/ used by all scientists/ international communication/ universally understood/ common names are different in different countries	1
		(Total 3)
7.	C B E A D	5 x 1
	Total for Question	5

Question	Answer	Mark
8. (a)	Decrease in appetite/ makes them not feel hungry NOT affect appetite so less food is <u>eaten</u> NOT so they do not eat	1 1
(b) (i)	correct line starts at 70 and shows no decrease in mass (can increase)	1
(ii)	control	1
(c)	Animal rights/ human not same as mice/research on mice is not valid for humans/ might cause mice to starve/ unethical to experiment on animals (not: simple idea of cruelty/ harmed/ suffer)	1
Total for Question		5

Question	Answer	Mark
9. (a)	Age and gender	2
(b)	Mutation	1
	leading to <u>variation</u>	1
	large brain size advantage/survival value	1
	NOT survival of the fittest alone	
	Genes/ alleles passed on NOT mutation passes on unless qualified by gene	1
(c)	Most believed in creationism/God made humans/ went against religious views/ against bible	1
	NOT lack of proof/ against church	
	Total for Question	7
10.	In order:	(5 x 1)
	Stimulus – heat/ hot object	
	Receptor – skin/ nerve endings/ sensory cells (NOT hand)	
	sensory neurone/ nerve	
	connecting/ relay/ intermediate/ internuncial neurone or nerve	
	motor neurone/ nerve	
	muscle/ effector	
	synapses - anywhere where correctly referenced	
	Any 5 from 7	
	Total for Question	5

UNIT B2 (LEGACY)

FOUNDATION TIER

Question	Answer	Mark
1. (a)	one mark for each labelled structure in correct location; Vacuole – should occupy at least quarter of space Nucleus – bigger than chloroplast Cell wall - can be single or double line Labels should be unambiguous Deduct marks for nucleus and/ or chloroplast if inside the vacuole	4
(b)	cytoplasm clearly indicated in correct location;	1
(c) (i)	membrane;	1
(ii)	chloroplast;	1
(d)	two from: (cell) membrane / cytoplasm / nucleus	2
Total for Question		9

Question	Answer	Mark
2. (a)	oxygen; carbon dioxide + water; (either way round) can use correct symbols	3
(b) (i)	(I) kill/ destroy (NOT get rid of)bacteria / fungi / microorganisms; NOT germs	1 1
	(II) C:	1
	(III) repeat/ do it again NOT increase number of flasks	
(ii)	(I) <u>rise</u> / fall / stay the same;	1
	(II) rise / fall / <u>stay the same</u> ;	1
(c)	Any suitable reference to life processes e.g. movement/ for exercise / repair / cell division/ excretion/ reproduction/ sensitivity/ feeding or digestion/ maintain body temperature/ keeping warm (not: growth / photosynthesis/ heat energy alone/ catch food/ eat food)	1
Total for Question		9

Question	Answer	Mark
3. (a) (i)	all plots correct; tolerance +/- ½ small square, Allow just top of bar drawn/ not shaded. (one error minus 1)	2
(ii)	Small Skipper; Small Copper, (either order)	2
(b) (i)	Common Blue; Hairstreak; (either order)	2
(ii)	The grass was cut (too low)/ needed longer or higher grass/ grass is too short NOT grass wrong height/ not enough grass/ need a lot of grass	1
(iii)	10;	1
(c)	such as: trampling / people walking/ pesticide/ reference to change in habitat/ moved to different habitat/ grass too short/ grass cut below 3cm; NOT moved (alone), scared away	1
Total for Question		9

Question	Answer	Mark
4.	(a) (i) bacteria / fungi;	1
	(ii) acid;	2
	little oxygen; (either order)	
	NOT no oxygen, microbes need oxygen to decay	
	(iii) dried;	1
	(b) (i) (fossil)fuel / burnt to provide heat (burning qualified)	1
(ii) carbon dioxide/ CO ₂ ;	1	
(c)	<u>decays</u> ;	2
	<u>nutrients absorbed</u> by plants;	
Total for Question		8

FOUNDATION & HIGHER TIER

Question	Answer	Mark
5/1 (a)	(i) Pancreas/ small intestine	1
	(ii) small intestine	1
	(iii) mouth	1
	(b) (i) carbohydrase / amylase (spelling must end in –ase)	1
	(ii) glucose	1
	NOT simple sugar (can be neutral)	
Total for Question		5

Question	Answer	Mark
6/2 (a)	use of {(a living) organism / predator / natural enemy/ animal}/ introduce a species; to feed off / reduce / kill a (crop) pest / alien species Correct use of example = 2 marks	1
(b)	Alien/ exotic (species)	1
Total for Question		3

Question	Answer	Mark
7/3 (a) (i)	60	1
	(ii) CO ₂ / carbon dioxide (amount = neutral)	1
	(iii) any two from: same size greenhouse/ same <u>number</u> plants / same spacing / same aspect or greenhouses face same direction/ same variety or type of plants / same age or mass or size of plants / same mineral feed or nutrients / same ventilation / same soil or mass of soil Accept carbon dioxide if not used in (ii) (ECF) NOT same temperature/ same greenhouse/ same glass/ amount of	2
(b)	plants had insufficient or not enough light / heat/ ORA	1
	so less photosynthesis/ reduced rate of photosynthesis	1
	NOT not as easy to photosynthesise or quicker/slower photosynthesis	
	so less food / glucose (for tomato growth)	1
	NOT less energy or less fruit produced	
Total for Question		7

HIGHER TIER

Question	Answer	Mark
4 (a)	cell wall correctly <u>drawn & labelled</u> (must be double line)	1
	vacuole correctly <u>drawn & labelled</u>	1
	(deduct if contains nucleus/mitochondria)	1
	chloroplast(s) correctly <u>drawn & labelled in cytoplasm</u>	
	deduct one mark for each incorrect label	
(b)	any one from: plant tissue can regenerate from stem / undifferentiated cells more so than animal tissue/ easier for plants to regenerate from stem cells animals tend to grow to a finite size (more so than plants)/ animals have a maximum size that they grow to (OWTTE) plant growth occurs from (restricted growth areas) meristems/ plants have branching growth or animals have a compact growth	1
(c)	repair / replacement of damaged tissues / organs/ cells (accept named tissue such as tendons/ trachea/ retina/ heart) to treat Parkinson's/ arthritis/ AVP NOT cure disease	1
	Total for Question	5

Question	Answer	Mark
5. (a)	<p>at 20⁰C or at lower temperature (enzyme and protein) molecules are moving slower/ ORA</p> <p>therefore fewer collisions or description of fewer collisions or fewer reactions/ ORA</p> <p>fewer protein molecules broken down / digested or fewer amino acids produced / less digestion/ ORA</p> <p><u>fewer</u> amino acid molecules move/ go into side B. NOT time taken (3 from 4)</p>	<p>Any</p> <p>3</p>
(b)	<p>At 90⁰ or higher temperature enzyme denatured or destroyed/ ORA</p> <p>fewer reactions / fewer amino acids produced/ less digestion/ ORA</p> <p>NOT slower/ rate of reaction decreases</p>	<p>1</p> <p>1</p>
Total for Question		5

Question	Answer	Mark
6. (a)	Arrows from pipit and larvae to kestrel.	1
(b) (i)	more <u>foxes</u> and/ or <u>golden eagles</u> would eat the (increasing) hare (population because they would not have grouse to eat.)	1
(ii)	more heather or food (for hares to eat.)/ less competition for food/ heather	1
(c)	Correct order clockwise = D, B, A, C	4x1
Total for Question		7

Question	Answer	Mark
7. (a) (i)	100	1
	(ii) 5	1
(b)	More <u>haemoglobin</u> / higher than normal haemoglobin NOT RBC	1
	More oxygen (carried)	1
	<u>More</u> AEROBIC respiration/ respire aerobically for longer	1
	<u>Less</u> anaerobic respiration.	1
Total for Question		6

Question	Answer	Mark
8. (a)	Water passes out or is lost/ plant is dehydrated	1
	by osmosis	1
	from higher concentration to lower concentration (must be show clear direction)	1
	through selectively or semi or partially permeable membrane	1
	NOT SPM	
	(No marks if refer to solutions moving rather than water)	
(b) (i)	Active transport/ uptake	1
(ii)	Oxygen/ O ₂	1
	Glucose.	1
	NOT ATP	
Total for Question		7

Question	Answer	Mark
9.	Overgrowth of algae/ algal bloom/ rapid growth of plants or algae	1
	Plants /algae/ producers die.	1
	Because of lack of light/ light blocked out	1
	and decay/ decomposes	1
	Bacteria or fungi or decomposers use oxygen.	1
	NOT microbes/ micro-organisms	
	for respiration	1
	aerobic life / fish die / suffocate	1
	Any 5x1	
	Total for Question	5



WJEC
245 Western Avenue
Cardiff CF5 2YX
Tel No 029 2026 5000
Fax 029 2057 5994
E-mail: exams@wjec.co.uk
website: www.wjec.co.uk