



GCSE MARKING SCHEME

SCIENCE - BIOLOGY (LEGACY)

JANUARY 2013

INTRODUCTION

The marking schemes which follow were those used by WJEC for the January 2013 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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B1 (LEGACY) MARK SCHEME - JANUARY 2013

FOUNDATION TIER

Question	Marking details	Marks Available
Q.1	Predation	
(a)	Fox and rabbit;	1
(b) (i)	1.5 (months) (allow: 1.2 to 1.8);	1
(b) (ii)	(large) increase/growth in numbers (not: more rabbits);	1
	Fewer foxes so less predation /fewer foxes to {kill/eat rabbits}; (not: no foxes/ no hunting or catching)	1
(c)	Shortage of food/space/disease/loss of habitat/competition for food; (not: named disease/habitat loss due to humans)	1
(d)	(they are) white/have white hair (not: paler);	1
	Not camouflaged/can be easily seen (against background)	1
	Question total	[7]

Question	Marking details	Marks Available
Q.2 (a)	5 10 11;	1
(b)	male;	1
(c)	6;	1
(d)	genes;	1
(e)	DNA;	1
Question total		[5]

Question	Marking details	Marks Available
Q.3	(a) (i) Testing / discovery / developing <u>new</u> drugs; (ii) 2 from stroke / AIDS / kidney failure; (negate if extra answers) (not: HIV)	1
	(b) (i) Cause distress; (not: ref. cruel) (ii) Computers; tissue cultures (negate if extra answers)	1
	(c) Monkeys related to humans more <u>closely</u> ;	1
	(d) Use of <u>fewer</u> monkeys / <u>fewer</u> tests on monkeys in future;	1
Question total		[6]

Question	Marking details	Marks Available
Q.4	(a) (i) 270;	1
	(ii) 2630;	1
	(b) (i) fat; (not:cream)	1
	(ii) skimmed; (not:low fat)	1
	(c) (i) less sugar; and more calcium; (in milk)	2
	(not: acids/ref. to bones)	
Question total		[6]

Question	Marking details	Marks Available
Q.5 (a)	asexual;	1
(b)	clones;	1
(c)	mutation;	1
(d)	radiation / uv light / radioactive materials; (not : pollution / chemicals unqualified)	1
(e)	(ii);	1
Question total		[5]

B1

FOUNDATION AND HIGHER TIER

Question	Marking details	Marks Available
Q.7/1 (a)	Correctly plotted points ($\pm \frac{1}{2}$ small square; -1 per error);	2
	Line correctly drawn through centre of points;	1
(b) (i)	64 \rightarrow 65 (units);	1
	Eating/lunch/food/meal or description;	1
	Drinking - if clearly qualified e.g. sugary drink, or valid equivalent); (not: lunchtime)	
(iii)	(Increased) insulin;	1
Question total		[6]

Question	Marking details	Marks Available									
Q.8/2 (a)	(i) R R and r	1									
	(ii) <table border="1" style="display: inline-table; vertical-align: middle;"> <tr> <td style="padding: 5px;">gametes</td> <td style="padding: 5px;">R</td> <td style="padding: 5px;">R</td> </tr> <tr> <td style="padding: 5px;">r</td> <td style="padding: 5px;">Rr</td> <td style="padding: 5px;">Rr</td> </tr> <tr> <td style="padding: 5px;">r</td> <td style="padding: 5px;">Rr</td> <td style="padding: 5px;">Rr</td> </tr> </table>	gametes	R	R	r	Rr	Rr	r	Rr	Rr	
gametes	R	R									
r	Rr	Rr									
r	Rr	Rr									
	Gametes correct;	1									
	Genotypes correct using gametes given by candidate;	1									
	(b) (i) <table border="1" style="display: inline-table; vertical-align: middle;"> <tr> <td style="padding: 5px;">gametes</td> <td style="padding: 5px;">R</td> <td style="padding: 5px;">r</td> </tr> <tr> <td style="padding: 5px;">R</td> <td style="padding: 5px;">RR</td> <td style="padding: 5px;">Rr</td> </tr> <tr> <td style="padding: 5px;">r</td> <td style="padding: 5px;">Rr</td> <td style="padding: 5px;">rr</td> </tr> </table>	gametes	R	r	R	RR	Rr	r	Rr	rr	
gametes	R	r									
R	RR	Rr									
r	Rr	rr									
	Gametes correct;	1									
	Genotypes correct using gametes given by candidate;	1									
	(iii) 3:1/75%:25% (not: 75:25 or fraction);	1									
	Question total	[6]									

Question	Marking details	Marks Available
Q.9/3 (a)	<p>Initial temperature of (water) (however expressed);</p> <p>Final temperature of (water) (however expressed);</p> <p>Change/rise in temperature (2 marks)</p> <p>Allow 1 mark for the temperature of the water</p> <p>Award 2 marks for the difference between the temperature at the start and end.</p> <p>(not: gap between food and test tube / time taken for food burn)</p> <p>(neutral: volume of water / mass of food)</p>	1 1
(b)	The mass/weight/grams (of the pieces of food);	1
Question total		[6]

B1

HIGHER TIER

Question	Marking details	Marks Available	
Q.4	(a) (i) Spray/treat (the plant) with herbicide and it survives (the genes have successfully introduced)/plant will not be affected by herbicide;	1	
	(ii) Be able to provide sufficient fish oil to supply global demand / conserve fish stocks, owtte;	1	
	(iii) Ethical reasons/ create organisms that we have no control over/morally wrong/genes could spread to other species/long term effects unknown/could create herbicide resistant weeds/concern over eating GM produce (not: playing God/cross contamination/spread to other organisms)	1	
	(b) (i) All bars correct, 0.25 small square tolerance; (not: on top of bars)	1	
	(ii) As the amount of GM crops grown increases, the amount of non-GM crops grown decreases/inverse relationship, comparison needed;	1	
	(iii) GM maize production 2002 = 12 million hectares GM maize production 2006 = 36 million hectares therefore % increase = 200%; (No evidence of calculation required.)	1	
		Question total	[6]

Question	Marking details	Marks Available
Q.5	(a) (i) (As the temperature rises) sweat production increases;	1
	urine production decrease;	1
	or ref to numbers	
	(b) (i) Explanation (As temperature rises) the sweat <u>glands</u> make more sweat;	1
	(ii) to cool the body;	1
	(c) (i) hairs lie flat;	
	vasodilation occurs/capillaries increase in diameter;	
	not: get bigger/expand/move up/ref. to shivering)	2
(ii) Converse of c(i)		
(allow ref. to shivering)	2	
Question total		[8]

Question	Marking details	Marks Available
Q.6	(a) (i) – (v) correct + clearly indicated	4
	(b) It would prevent the effector / muscle / gland from working / prevent / or slow down impulse reaching effector.	1
	(c) Electrical; (not : electric / electricity / kinetic)	1
Question total		[6]

Question	Marking details	Marks Available
Q.7 (a) (i)	1. Variation in colour/pattern; 2. results from mutation/change in genes/DNA; 3. Natural selection <u>by predation</u> /survival of the fittest; 4. and sexual selection/females select most colourful males <u>to breed</u> ; 5. Most colourful males survive/are at an advantage; 6. to pass on genes;	6
Question total		[6]

Question	Marking details	Marks Available
Q.8	(a) Reduce / decrease/quicker; (not: improved)	1
	(b) Concentration of coffee / caffeine / mass of coffee / volume of water;	1
	(not:amount)	
	Gender, age, time between drinking and testing,	[any 3x1]
	fasting, health/hearing/volume of signal;	
	(not:answers to (b)same coffee/computer/body mass /reaction time before test)	
	Question total	[5]

Question	Marking details	Marks Available
Q.9	(a) (i) Evolution; (ii) (Charles) Darwin;	1
	(b) Beak Feathers <u>Long</u> legs <u>Long</u> neck Claws on feet (Any 2) (not: no wings/ curved neck/ small head)	2
Question total		[4]

B2 (LEGACY) MARK SCHEME - JANUARY 2013

FOUNDATION TIER

Question	Marking details	Marks Available
Q.1 (a)	All 3 bars correct, labelled; and correct height; Quality of drawing – same width as those given	[3]
(b) (i)	jellyfish;	[3]
(ii)	eat them / wrapped in it;	
(iii)	produces poisonous gases;	
(c)	Reuse bags/refill bottles/ charge for bags; Recycle; Reduce or no packaging /alternative packaging; Biodegradable; (Any 2 from 4)	[2]
Question Total		[8 Marks]

Question	Marking details	Marks Available
Q.2 (a)	A - Cytoplasm; B - nucleus; C - (cell) membrane; D - cell wall; E- vacuole	[5]
(b) (i)	B;	
(ii)	D/E;	
(iii)	C;	[3]
Question Total		[8 Marks]

Question	Marking details	Marks Available
Q.3 (a)	<p><i>Fox</i></p> <p><i>Sparrows, Hedgehogs, Thrushes</i></p> <p><i>Snails</i></p> <p><i>4/5 correct = 4 marks</i></p> <p><i>3 correct = 3 marks</i></p> <p><i>2 correct = 2 marks</i></p> <p><i>1 correct = 1 mark</i></p>	[4]
(b)	<p>(i) Leaves /(oak) tree; (allow: green plant)</p> <p>(ii) Snail/caterpillar;</p> <p>(iii) Caterpillar, hedgehog, fox;</p>	[1]
		[1]
		[1]
	Question Total	[7 Marks]

Question	Marking details	Marks Available
Q.4 (a)	Energy; enzymes; aerobic;	[3]
(b) (i)	Correct plots (+/- 0.5 small square); (-1 per error) line (joined with ruler through centre of plots	[2] [1]
(ii)	Correct reading from candidates graph (41°C);	[1]
(iii)	9 (allow error carried forward from (ii));	[1]
(iv)	(Heat from) respiration;	[1]
(v)	Repeat (with other individuals)/do more experiments; (not: ref. to thermometer/measure more frequently)	[1]
(c)	Carbon dioxide; water;	[2]
Question Total		[12 Marks]

B2

FOUNDATION & HIGHER TIER

Question	Marking details	Marks Available
Q.5/1 (a)	A stomach; B pancreas;	
	C large intestine; D oesophagus/gullet;	[4]
(b) (i)	4.7 mins/ 4 mins 42 secs;	[1]
(ii)	6;	[1]
(iii)	As the pH rises up to pH2 the time taken becomes less; Above pH2 the time taken increases (ref. to pH2 once only);	[1] [1]
	Question Total	[8 Marks]

Question	Marking details	Marks Available
Q.6/2 (a)	Decreased; Increased; In the light;	[1] [1] [1]
(b)	photosynthesis occurs; carbon dioxide is absorbed/taken in; oxygen produced; (not:equation)	[1] [1] [1]
(c)	Place apparatus in dark/cover in light-proof paper; (not switch off light – unless total darkness indicated)	[1]
Question Total		[7 Marks]

B2

HIGHER TIER

Question	Marking details	Marks Available
Q.3 (a)	undifferentiated / unspecialised cell; Not: specialised cells which can change/develop into other types of cells or other types of tissues; accept: turn into other cells/ to become any other cells not: new cells/ take place of other cells	[1] [1]
(b)	(Any 2) no rejection issues/ body will accept cells/ the cells will be compatible; no <u>moral/ethical</u> issues (relating to the stem cells used); no need for tissue typing/ no need to check tissues match; no need for a donor/ to find a donor/wait for a donor; NOT: ethnic/ killing embryos / reference to religion	[2]
Question Total		[4 Marks]

Question	Marking details	Marks Available
Q.4 (a)	decrease the numbers (of sandeels); sandeels are eaten by herring; herring compete with sandeels for (animal) plankton/feed on plankton;	[1] [1] [1]
(b) (i)	Any 3 herring compete with birds for sandeels/reduce number of sandeels; sandeels do not have enough food / (animal) plankton; rise in sea temp (global warming) affect plankton distribution or numbers; fishing for sandeels; Not enough food for birds as numbers of sandeels dropping; (not: ref. bird breeding rate unqual./ref. herring killing sandeels)	[3]
(ii)	quotas for <u>sandee</u> fisheries / <u>sandee</u> fishing ban or protected species/ marine or nature reserves; (not: captive breeding/increase number of seals/fishing ban unqual.)	[1]
Question Total		[7 Marks]

Q.5 (a)

[9]

Carbon dioxide	B;	diffusion;	down a gradient;
Glucose	C;	active transport;	against a gradient;
Oxygen	A;	diffusion;	down a gradient;

Question total [9]

Question	Marking details	Marks Available
Q.6	(a) (i) Aerobic respiration;	[1]
	(ii) CO ₂ / water;	[1]
	(b) (i) Slow release of / store of energy;	[1]
	(ii) Rapid / immediate release of <u>energy</u> ;	[1]
	(c) (i) Lactic acid;	[1]
	(ii) Lack of/little oxygen; oxygen debt; anaerobic respiration; (any 2)	[2]
Question Total		[7 Marks]

Question	Marking details	Marks Available
Q.7	(a) M = excretion (not: urination);	
	(b) L = urea (correct spelling); X = urease (correct spelling);	[1] [1]
	(c) (i) light/temperature;	[1]
	(ii) plants die; because light is blocked out; decay (not: broken down); by <u>bacteria</u> (not: decomposers); use oxygen; for respiration; fish decrease/die from lack of oxygen (allow: suffocate); Any 4 x 1	[4]
Question Total		[8 Marks]

B3 (LEGACY) MARK SCHEME - JANUARY 2013

FOUNDATION TIER

Question	Marking details	Marks Available	
Q.1	(a) (i) Kills (unwanted) microbes/bacteria/sterilise the wire; (not: removes microbes/kills germs)	[1]	
	(ii) Keeps microbes away from gel/out/prevent microbes entering;	[1]	
	(iii) Prevents lid being removed/stop dish being opened; (not: keeping microbes out)	[1]	
	(b) (i) Plotting correct (+/- 0.5 square) -1 per error; Line drawn with ruler joining centre of plots;	[2] [1]	
	(ii) 138 (not: if °C);	[1]	
	(iii) <u>Grow faster at 25 °C</u> than at 15 °C;	[1]	
	(c) Slows/prevents growth/multiplication of bacteria; (not: kills bacteria/less bacteria)	[1]	
		Question Total	[9]

Question	Marking details	Marks Available
Q.2 (a)	A;	1
	C;	1
	B;	1
	C;	1
	B;	1
Question Total		[5]

Question	Marking details	Marks Available
Q.3	(a) (i) X aorta;	[1]
	Y atrium;	[1]
	(ii) DACB ;	[1]
	(b) (i) Capillary;	[1]
	(ii) Oxygen;	
	Carbon dioxide;	[3]
	Diffusion;	
Question Total		[7]

Question	Marking details	Marks Available
Q.4 (a)	Cortex L ;	[1]
	Medulla K ;	[1]
	Pelivis M ;	[1]
(b)	(i) Urea;	[1]
	(ii) Ureter (correct spelling);	[1]
	(iii) Bladder;	[1]
	(iv) Urethra (correct spelling);	[1]
(c)	Glucose;	[1]
Question Total		[8]

Question	Marking details	Marks Available
Q.5 (a)	(i) bacteria;	[1]
	(ii) methanol (not: a waste material);	[1]
	(iii) Use of waste material (not: industrial material);	[1]
	(iv) (good) source of protein;	[1]
	(v) tasteless / dislike of bacteria;	[1]
	(allow: grown on industrial waste)	
(b)	Food substance <u>produced quickly</u> ;	[1]
	(not: fast food/ref. large amounts)	
Question Total		[6]

B3**FOUNDATION & HIGHER TIER**

Question	Marking details	Marks Available
Q.6/1 (a) (i)	water vapour lost from leaves (plant)/stomata/ water vapour lost by transpiration; not water; allow: water evaporates from leaves) (water vapour) condenses (on inside of bell jar);	[1] [1]
(ii)	to show the water (vapour) comes from the plant or converse; (not: to make it a fair test/ref. control/ref. soil/compare observations)	[1]
(iii) I	to prevent water evaporating/being lost from the soil/ to prevent soil water affecting the environment / evaporation;	[1] [1]
II	to prevent air entering/leaving the bell jar/to prevent water vapour in the outside air affecting the environment.;	[1]
(b)	xylem;	[1]
	Question Total	[6]

Question	Marking details	Marks Available
Q.7/2 (a)	Oxygen used by the bacteria for respiration/bacteria respire;	[1]
(b) (i)	Fair test;	[1]
(ii)	Untreated (milk);	[1]
(iii) I	UHT;	[1]
II	It had the <u>most</u> amount of oxygen/oxygen not used up; (not: ref colour) therefore the least number of/no bacteria; (not: ref. enzymes)	[1]
Question Total		[6]

Question	Marking details	Marks Available
Q.8/3	(a) (i) glucose/sugar/amino acids/mineral salt/named salt/minerals; (ii) to provide oxygen for respiration/mixing; (not: stirring/reference to fermentation)	[1]
	(b) fungi/moulds;	[1]
Question Total		[3]

B3**HIGHER TIER**

Question	Marking details	Marks Available
Q.4	(a)	
	(i) 55 (°C);	[1]
	(ii) enzymes are denatured/destroyed/destroyed (not: killed);	[1]
	(iii) {substrate/pulped} apple used up/all juice extracted/all pectin broken down/maximum working of pectinase; (not: reference to limiting factor unqualified)	[1]
	(iv) pH/volume/concentration of enzyme/variety or type of apple; (not: amount/quality/temperature)	[1]
	(b) pre-digestion of baby foods/biological washing powers/cheese making/soft centred chocolates/lactose free milk (not: beer making);	[1]
	Question Total	[5]

Question	Marking details	Marks Available
Q.5	(a) (i) W - pulmonary artery; X - aorta; (ii) Both sides of table needed, matched statements per row; W deoxygenated/ X is oxygenated (allow: ref. CO ₂ /less or more O ₂ ; not: no O ₂) W lower pressure/ X higher pressure or ref. more/less comparative statements (not: ref. colour)	[1] [1] [2]
	(b) contracting; Because valves between atria and ventricles closed / valves at start of arteries or semi-lunar valves are open; (not: valves are open) (linked marks)	[2]
Question Total		[6]

Question	Marking details	Marks Available
Q.6	(a) A ureter (accurate spelling);	[1]
	B renal vein;	[1]
	(b) Presence of protein (not: ref. less);	[1]
	into the blood;	[1]
	(c) Water has been reabsorbed/removed;	[1]
	into the blood;	[1]
	(d) (i) I 80;	2
	II 6;	
	(ii) More people are able to work (full time)/ORA;	[1]
(iii) Relatives will have similar tissue types/ genes/DNA/less chance of rejection;	[1]	
(not: similar blood groups)		
Question Total		[10]

Question	Marking details	Marks Available
Q.7 (a)	CO ₂ ;	[1]
(b)	0.166/0.17 cm per min, units needed (not: 1/6 th);	[1]
(c)	Glucose/sugar used up; (not: yeast used up)	[1]
(d)	Increase in temperature; causes increase in rate/speeds up/more gas produced; Boiling {destroys / denatures} enzyme / boiling kills yeast;	[2]
(e)	pH/substrate conc/CO ₂ conc/enzyme conc/type of yeast/type of sugar/O ₂ present not: ref. pressure/ref. amount/conc yeast)	[1]
Question Total		[6]

Question	Marking details	Marks Available
Q.8	(a) (i) antigens on microorganism; cause antibody production (not: triggers immune system); by white cells;	2 from 3 [2]
	(ii) protein;	[1]
(b)	Memory cells (produced); Antibodies produced very quickly/rapid response/immediately;	[1] [1]
(c)	After 1 st injection antibodies increase (then decrease); After 2 nd injection antibodies increase longer/higher; go above level needed for full immunity	[1] [1] [1]
Question Total		[8]



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