



GCSE MARKING SCHEME

SCIENCE - BIOLOGY (NEW)

JANUARY 2013

INTRODUCTION

The marking schemes which follow were those used by WJEC for the January 2013 examination in GCSE SCIENCE - BIOLOGY (NEW). 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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BIOLOGY 1 (NEW) MARK SCHEME - JANUARY 2013

FOUNDATION TIER

Question	Marking details	Marks Available
Q.1 (a)	copepods;	[1]
(b)	sandeels;	[1]
(c)	less food for sandeels/ fewer sandeels/ no food for sandeels; so less food for puffins/puffins starve/ puffin has nothing to feed off; must make link to food and fall in numbers at least once	[2]
Question Total		[4]

Question	Marking details	Marks Available
Q.2 (a)	Animal; Mammal; Alopex; lagopus;	[4]
(b)	<p><i>White hair</i>: Idea of camouflage/ blending in/ match environment; NOT hide/ disguise</p> <p><i>Thick hair</i>: Insulation/ traps (warm) layer of air/ keeps heat <u>in</u>/ let out less body heat; NOT keep it warm/ so it doesn't get cold</p> <p><i>Small ears</i>: Idea of reduced surface area/ {reduces/ less} heat loss; NOT stop heat escaping/ no heat loss/ keeps heat in (can be neutral if used with reduced surface area)</p>	[3]
(c)	<p>Universal/ unique/ unchanging/ they all use the same name/ same in all languages/ international/ common name is different in different languages;</p>	[1]
Question Total		[8]

Question	Marking details	Marks Available
Q.3 (a)	(3) 2 5 1 (6) 4;;; All 4 correct = 3marks 2/3 correct = 2 marks 1 correct = 1 mark	[3]
(b)	<u>glucose</u> ; NOT sugar	[1]
(c)	(i) 0.8; (ii) Reference {eating/ take in / ingest/ consume} too much fat/ too much fat in diet; Reference {eating/ take in / ingest/ consume} too much sugar/ carbohydrates; NOT carbs (Alternative if first two not awarded) <u>eat</u> too much/ too many <u>calories/ energy</u> ; NOT too much chocolate Sedentary/ lack of exercise/ not enough sport;	[1]
Question Total		[8]

Question	Marking details	Marks Available
Q.4	(a) (i) Light;	[1]
	(ii) <u>Growth/ grows</u> towards the light/ <u>positive</u> phototropism; NOT bends/ moves/ leans	[1]
	(b) hormone	[1]
	(c) To get <u>more</u> light/ for <u>more</u> photosynthesis;	[1]
Question Total		[4]

Question	Marking details	Marks Available
Q.5 (a)	10;	[1]
(b)	4.5; 3.2;	[2]
(c)	Any two from: Competition for/ shortage of/ less/ running out of: light; water; nutrients/ minerals; space/ room; carbon dioxide;	[2]
Question Total		[5]

Question	Marking details	Marks Available
Q.6 (a)	(i) fewer {species/ animals} recorded (2012)/ ref to a correctly named animal (snail/ tadpole/ newt)/ biodiversity reduced/ lots of animals are no longer present; Reference to a { <u>fall in / lowered</u> } pH/ pH has gone from 7 to 4/ { <u>became/ now</u> } acidic; Must have some ref to change NOT <u>more</u> acidic	[2]
(b)	(i) annual or several years/same month/more frequent in each year;	[1]
	(ii) quantitative data/ / count them/ tally/ find out how many;	[1]
	(iii) longer observation period/ observe several times in the day;	[1]
(c)	(i) increased increased decreased; all three required for one mark	[1]
	(ii) Bacteria/ fungi/ mould; NOT decomposers/ microbes/ algae	[1]
	Question Total	[7]

BIOLOGY 1 (NEW) FOUNDATION AND HIGHER TIER

Question	Marking details	Marks Available									
Q.7/1 (a)	<table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <tr> <td style="padding: 5px;">Gametes</td> <td style="padding: 5px;">A</td> <td style="padding: 5px;">A</td> </tr> <tr> <td style="padding: 5px;">a</td> <td style="padding: 5px;">Aa</td> <td style="padding: 5px;">Aa</td> </tr> <tr> <td style="padding: 5px;">a</td> <td style="padding: 5px;">Aa</td> <td style="padding: 5px;">Aa</td> </tr> </table> <p style="margin-left: 40px;">Award 1 mark for all 4 gametes being correct (Must use A and a);</p> <p style="margin-left: 40px;">Award 1 mark for the mechanics of the cross; Award this mark even if the gametes are incorrect or the wrong letters are used.</p>	Gametes	A	A	a	Aa	Aa	a	Aa	Aa	[2]
Gametes	A	A									
a	Aa	Aa									
a	Aa	Aa									
(b)	<p>(i)</p> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <tr> <td style="padding: 5px;">Gametes</td> <td style="padding: 5px;">A</td> <td style="padding: 5px;">a</td> </tr> <tr> <td style="padding: 5px;">A</td> <td style="padding: 5px;">AA</td> <td style="padding: 5px;">Aa</td> </tr> <tr> <td style="padding: 5px;">a</td> <td style="padding: 5px;">Aa</td> <td style="padding: 5px;">aa</td> </tr> </table> <p style="margin-left: 40px;">Award 1 mark for all 4 gametes being correct;</p> <p style="margin-left: 40px;">Award 1 mark for the mechanics of the cross; Award this mark even if the gametes are incorrect</p> <p style="margin-left: 40px;">ECF- both these marks can be awarded if letters used in (a) are carried forward into (b). Also award the marks if any two F1 individuals are selfed.</p> <p>(ii) 3 grey bodied: 1 black bodied (or correct ratio from given answer);</p>	Gametes	A	a	A	AA	Aa	a	Aa	aa	[2]
Gametes	A	a									
A	AA	Aa									
a	Aa	aa									
(c)	(Gregor) Mendel;	[1]									
Question Total		[6]									

Question	Marking details	Marks Available
Q.8/2	(a) (i) 5	[1]
	6	
	4	
	2	
	0 (not required for mark)	
	0 (not required for mark)	
	(ii) All bars correct height – according to candidate’s tally;;	
(iii) They are shorter than the woodland plants;	[1]	
(b)	Collect seeds from the plant growing in each locality and sow (plant) in opposite locality (Accept reference to the transplanting of seedlings)	[1]
	If plant height changes then caused by environment/ if plant height doesn’t change then due to genetics;	[1]
Question Total		[6]

Question	Marking details	Marks Available
Q.9/3 (a)	The analysis of the DNA of an organism/ looking at the {patterns/ bands} in <u>DNA</u> ;	[1]
(b)	<p>Any 2 from :</p> <p><u>{Identifying/ finding out who is}</u> the {culprit/ suspect} from evidence at a crime scene/ or example; NOT solving crimes/ catching criminals</p> <p>{Paternity/ maternity} testing/ finding out who the {father/ mother} is/ identify relatives;</p> <p>Comparison between species for classification purposes;</p> <p>Identification of genes associated with an {inherited disease/ named inherited disease}/ to find out if parents may have children with cystic fibrotic disease/ determine risk of developing breast cancer;</p> <p>Identification of dead bodies;</p>	[2]
Question Total		[3]

Question	Marking details	Marks Available
Q.10/4	(a) Heat being transported around the body via the blood;	[1]
	(b) Fan increasing the rate of <u>evaporation</u> of sweat; Therefore increased rate of cooling/ more heat removed from the {blood/ body};	[2]
Question Total		[3]

Question**Marking details****Marks Available****Q.11/5**

Indicative content

Use the measuring cylinder to measure 20cm³ of water into the boiling tube. (Accept any reasonable volume of water)

Measure the initial temperature of the water with the thermometer and record the temperature (in a suitable results table)

Choose a piece of food and find it's mass using the balance. Record the mass (in the results table). Accept measure 1g of the food sample. (Accept any reasonable mass of food sample)

Impale/ attach/ stick the piece of food carefully on the mounted needle.

Hold the food in the Bunsen burner flame until it catches alight/ Light the food in the Bunsen flame

Hold burning food sample under the boiling tube until all the food has burnt.

Measure the final temperature of the water with the thermometer and record the temperature (in a suitable results table)

Calculate the rise in temperature of the water

Repeat with other food sample

If an equal mass of the two foods has not been used accept reference to :

Energy released from food/g (J) =

mass of water(g) x temperature rise (°C) x 4.2

Mass of food sample(g)

5-6 marks

The candidate constructs an articulate, integrated account correctly linking relevant points, such as those in the indicative content, which shows sequential reasoning. The answer fully addresses the question with no irrelevant inclusions or significant omissions. The candidate uses appropriate scientific terminology and accurate spelling, punctuation and grammar

3-4 marks

The candidate constructs an account correctly linking some relevant points, such as those in the indicative content, showing some reasoning. The answer addresses the question with some omissions. The candidate uses mainly appropriate scientific terminology and some accurate spelling, punctuation and grammar.

1-2 marks

The candidate makes some relevant points, such as those in the indicative content, showing limited reasoning. The answer addresses the question with significant omissions. The candidate uses limited scientific terminology and inaccuracies in spelling, punctuation and grammar.

0 marks

The candidate does not make any attempt or give a relevant answer worthy of credit

Question Total [6]

BIOLOGY 1 (NEW) HIGHER TIER

Question	Marking details	Marks Available
Q.6	(a) (i) Prey;	[1]
	(ii) Predator;	[1]
	(iii) Reproduction/ accept immigration;	[1]
	(b) Extinction/ natural selection;	[1]
	(c) Camouflage/ blend in/ green beads are less easily seen/ ORA;	[1]
(d) Prey is static/ prey is only identified on the basis of colour;	[1]	
Question Total		[6]

Question	Marking details	Marks Available
Q.7 (a)	Blood; Urine;	[2]
(b)	Any three from Insulin injections/ jabs; {Metformin/ novonorm/ actose/ named correct} tablets/ take tablets for type 2 diabetes/ take tablets to control blood {glucose/ sugar} level; NOT take tablets unqualified Controlled intake of carbohydrate/ fat/ named foods rich in carbohydrate or fat; Pancreatic tissue transplant; Regular exercise;	[3]
(c)	Not able to produce insulin; Not able to produce glucagon;	[2]
Question Total		[7]

Question	Marking details	Marks Available
Q.8	(a) (i) (Reduced because of) lack of food/ water voles;	[1]
	(ii) <i>Any two from</i> <i>Increase</i> Lack of/ less marbled cats; high rate of reproduction/ more squirrels survive; Less competition from voles and deer; <i>One from</i> <i>Decrease</i> they outgrow food supply/ competition for food/ not enough food for them;	[3]
	(b) At first, a decrease in insects leads to decrease in shrews; Then an increase due to lack of predators; And an increase in food because insects increase due to food from decaying remains of trees;	[3]
Question Total		[7]

Question	Marking details	Marks Available
Q.9.	(a) (i) The {higher temperature/ increased light} in May causes greater rate of {growth/ root formation};	[1]
	(ii) Low temperature in January slows down <u>{bacterial growth/ enzyme action}</u> ;	[1]
	(b) urease;	[1]
	(c) (i) Urea is broken down by the enzyme/ urease; to {ammonia/ ammonium compounds};	[2]
	(ii) Moist indicator paper pH7; 20cm ³ urea at 1mol/dm ³ ; 5cm ³ {boiled/ denatured} (and cooled) 1% {enzyme/ urease}; NOT no enzyme	[3]
	(iii) Leave for 1 hour/ time; at 20°C/ temperature;	[2]
Question Total		[10]

Question	Marking details	Marks Available
Q.10	<p>Indicative content Correct reference to data shows that the pesticide has been a selective pressure on a mutated gene for resistance. This results in variation and natural selection/ survival of the fittest TO BREED and the resistant genes are passed on.</p> <p>5-6 marks The candidate constructs an articulate, integrated account correctly linking relevant points, such as those in the indicative content, which shows sequential reasoning. The answer fully addresses the question with no irrelevant inclusions or significant omissions. The candidate uses appropriate scientific terminology and accurate spelling, punctuation and grammar.</p> <p>3-4 marks The candidate constructs an account correctly linking some relevant points, such as those in the indicative content, showing some reasoning. The answer addresses the question with some omissions. The candidate uses mainly appropriate scientific terminology and some accurate spelling, punctuation and grammar.</p> <p>1-2 marks The candidate makes some relevant points, such as those in the indicative content, showing limited reasoning. The answer addresses the question with significant omissions. The candidate uses limited scientific terminology and inaccuracies in spelling, punctuation and grammar.</p> <p>0 marks The candidate does not make any attempt or give a relevant answer worthy of credit</p>	[6]
Question Total		[6]

GCSE BIOLOGY 2 (NEW) MARK SCHEME - JANUARY 2013

FOUNDATION TIER

Question	Marking details	Marks Available
Q.1 (a)	Turtle dove + <u>greatest</u> decrease/ decreased the most/ highest decrease;	1
(b)	1040;	1
(c) (i)	Turtle dove/ Grey Partridge;	1
(ii)	Pied Flycatcher/ Cuckoo;	1
(d)	Decrease + {fewer/ less} species/ less biodiversity/ species die out/ fewer bird species; NOT fewer birds/ not many species	1
Question Total		[5]

Question	Marking details	Marks Available
Q.2 (a)	(i) A cytoplasm; B <u>cell</u> membrane; C <u>cell</u> wall;	3
	(ii) Chloroplast; Photosynthesis;	2
	(iii) Nucleus (allow chloroplast); NOT vacuole	1
(b)	<u>EM for dead</u> cells/ tissues only;	1
Question Total		[7]

Question	Marking details	Marks Available
Q.3 (a)	A oesophagus; B pancreas; C liver;	3
(b)	Carbohydrate/ starch; Lipase; glycerol;	3
(c)	Biuret solution (as specification);	1
Question Total		[7]

Question	Marking details	Marks Available
Q.4 (a)	Oxygen <u>and</u> carbon dioxide;	1
(b) (i)	I scale;	1
	II correct plots;	2 (-1 error)
	III line quality;	1
(ii)	I increase then plateau;	1
	II 4 – 6 days;	1
(iii)	Heat/ thermal;	1
(c)	No <u>respiration</u> (in dead peas);	1
(d) (i)	Avoid heat loss (or gain)/ avoid temperature change – due to environment/ retain heat/ prevent heat loss/ stop heat loss/ keep heat in/ insulation/ ORA e.g. glass flask allows heat to escape; NOT contain heat/ keep it warm;	1
(ii)	Prevent growth of micro-organisms/ kill bacteria/ ensure no living {bacteria/ microbe/ fungi/ micro-organism}/ destroy bacteria; NOT get rid of bacteria/ stop microbes respiring;	1
Question Total		[11]

Question	Marking details	Marks Available
Q.5 (a)	(i) Sugar; base;	2
	(ii) A and T;	1
	(iii) Twisted/ (double) helix (as spec)/ spiral;	1
(b)	Amino acids; Protein;	2
	Question 5 Total	[6]

BIOLOGY 2 (NEW) FOUNDATION AND HIGHER TIER

Question	Marking details	Marks Available
Q.6/1 (a)	Meiosis – spelling correct;	1
(b)	40 in each cell;	1
Question Total		[2]

Question	Marking details	Marks Available
Q.7/2 (a)	peristalsis;	1
(b)	<u>Muscles</u> in the wall of the oesophagus <u>contract</u> ; And { <u>push/ force</u> } the food (on to the next section);	2
Question Total		[3]

Question	Marking details	Marks Available
Q.8/3 (a)	45/ 46%;	1
(b)	(i) 65.5/ 66 years;	1
	(ii) Lung cancer/ emphysema/ walls of alveoli rupture/ owtte/ correct ref to damage to cilia/ drying mucus; NOT reference to tar alone/ bronchitis;	1
(c)	Live longer/ could expect to live to 85/ avoid earlier death; NOT less chance of dying; (Live longer) without a (smoking related) {disability/ cancer/ named damage};	2
Question Total		[5]

Question	Marking details	Marks Available
Q.9/4 (a)	To show <u>carbon dioxide</u> / CO ₂ (not CO ²) is needed for <u>photosynthesis/ starch</u> production;	1
(b) (i)	To prevent <u>soil</u> organisms affecting the experiment (OWTTE);	1
(ii)	Absorb carbon dioxide / CO ₂ ;	1
(iii)	Control/ correct ref to using B to compare to A/ to make a comparison;	1
(iv)	Form an air tight seal/ make the apparatus air tight / prevent {gases/ carbon dioxide/ air} going in or out of the apparatus; NOT oxygen (can be neutral);	1
(c)	Destarch/ remove starch;	1
(d) (i)	Apparatus A Colour – brown/ iodine colour + Reason – <u>no starch</u> present/ no photosynthesis ∴ <u>no starch</u> ; (both required for one mark)	[1]
(ii)	Apparatus B Colour – black/ blue black + Reason – <u>starch</u> present/ photosynthesis occurred ∴ <u>starch</u> present; (both required for one mark);	[1]
Question Total		[8]

Question**Marking details****Marks Available****Q.10/5***Indicative content*

Diaphragm contracts
Diaphragm flattens/moves down
Intercostals muscles contract
Rib cages moves up and out/raised
Thoracic volume/accept chest volume/accept space around the lungs increases
Pressure decreases
Lungs inflate
Air drawn into lungs through nose/nasal passages/trachea/windpipe

5-6 marks

The candidate constructs an articulate, integrated account correctly linking relevant points, such as those in the indicative content, which shows sequential reasoning. The answer fully addresses the question with no irrelevant inclusions or significant omissions. The candidate uses appropriate scientific terminology and accurate spelling, punctuation and grammar.

3-4 marks

The candidate constructs an account correctly linking some relevant points, such as those in the indicative content, showing some reasoning. The answer addresses the question with some omissions. The candidate uses mainly appropriate scientific terminology and some accurate spelling, punctuation and grammar.

1-2 marks

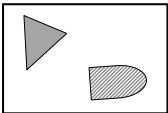
The candidate makes some relevant points, such as those in the indicative content, showing limited reasoning. The answer addresses the question with significant omissions. The candidate uses limited scientific terminology and inaccuracies in spelling, punctuation and grammar.

0 marks

The candidate does not make any attempt or give a relevant answer worthy of credit

Question Total**[6]**

BIOLOGY 2 (NEW) HIGHER TIER

Question	Marking details	Marks Available
Q.6 (a)	(i) Enzyme works in {acid pH/ lower pH/ 4.5}/ (ORA); NOT low pH	1
	(ii) Enzyme denatured or destroyed;	1
	(iii) Low temperature; Meant few collisions between enzyme and {protein/ substrate} / takes {longer to make/ less} enzyme substrate complexes;	2
(b)	As below, ignore chemical bond if drawn;	
		1
(c)	Lock and key;	1
Question Total		[6]

Question	Marking details	Marks Available
Q.7 (a)	(i) Description must include <u>DNA / RNA/ genetic material/ genes/ nucleic acid</u> ; and <u>protein {coat/ outside}</u> ;	2
	(ii) III;	1
(b)	Insects can become {resistant/ immune}/Could harm useful insects/ insecticides could enter food chain/ could bioaccumulate;	1
(c)	Biological control/ biocontrol;	1
(d)	May not be specific to target species (may use other words to convey this)/ could affect {useful/ other} insects/ could harm other animals; May not be able to {survive/ reproduce} in {environmental factors/ climate}/ reproduce successfully; Fungus could spread out of control/ could become a pest itself; Midges could become immune to the fungus;	2
Question Total		[7]

Question	Marking details	Marks Available
Q.8 (a) (i)	Lowers/ decreases;	1
	(ii) Less lactic acid; Greater volume of {air/ gas} breathed in (and out); lactic acid level drops {faster/ sooner};	3
(b)	glucose;	1
(c)	{Increased/ more} (rate of) <u>aerobic</u> respiration/ more carbon dioxide produced by <u>aerobic</u> respiration;	1
(d)	{More/ all} glucose completely broken down/ less anaerobic respiration (NOT no anaerobic respiration)/ more aerobic respiration/ no oxygen debt/ more oxygen available to repay oxygen debt/ extra oxygen breaks down lactic acid;	1
Question Total		[7]

Question	Marking details	Marks Available
Q.9 (a) (i)	$P = \frac{56 \times 48}{16} = 168;$ Method (1) Answer (1)	2
(b)	Repeat the exercise/ take {more/ larger} samples; NOT take larger sample area.	1
(c)	They are balanced/ the same/ equal/ they don't happen;	1
(d)	Could eat them/ could be predators; Could compete for food/ eat their food/ compete for <u>breeding</u> space; Could introduce disease; (in fact <i>Astacus fluviatilis</i> , the American red clawed crayfish, has introduced a fungal parasite)	3
Question Total		[7]

Question	Marking details	Marks Available
Q.10 (a)	<i>Indicative content</i>	
	<p>Fresh water decreased the concentration of salt to below the level in which oysters live. Osmosis caused water to pass into the oysters from where it was in high concentration to where it is in low concentration/ down a concentration gradient/ from a low solute potential to a high solute concentration through a selectively permeable membrane (accept semi permeable membrane). This diluted the body fluids/ blood resulting in death.</p>	
	<p>5-6 marks The candidate constructs an articulate, integrated account correctly linking relevant points, such as those in the indicative content, which shows sequential reasoning. The answer fully addresses the question with no irrelevant inclusions or significant omissions. The candidate uses appropriate scientific terminology and accurate spelling, punctuation and grammar.</p>	
	<p>3-4 marks The candidate constructs an account correctly linking some relevant points, such as those in the indicative content, showing some reasoning. The answer addresses the question with some omissions. The candidate uses mainly appropriate scientific terminology and some accurate spelling, punctuation and grammar.</p>	
	<p>1-2 marks The candidate makes some relevant points, such as those in the indicative content, showing limited reasoning. The answer addresses the question with significant omissions. The candidate uses limited scientific terminology and inaccuracies in spelling, punctuation and grammar.</p>	
	<p>0 marks The candidate does not make any attempt or give a relevant answer worthy of credit</p>	
(b) (i)	Active transport;	1
(ii)	Can carry salts/ ions against/ up a concentration gradient; Requires energy;	2
Question Total		[9]



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