

# **GCSE MARKING SCHEME**

## **GCSE SCIENCE B**

**JANUARY 2014** 

#### INTRODUCTION

The marking schemes which follow were those used by WJEC for the January 2014 examination in GCSE SCIENCE B. 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.

	Page
Unit 1 Science B - Foundation Tier	1
Unit 1 Science B - Higher Tier	5
Unit 2 Science B - Foundation Tier	10
Unit 2 Science B - Higher Tier	14

#### **Unit 1 Foundation Tier**

#### **SECTION A**

Q	uestic	on	Marking detail	Mark
1	(a)		Teeth - "two front teeth"	1
			Feet - the second and third digits of the feet are (completely) fused together, (except for the claw).	1
	(b)	(i)	The order	1
		(ii)	Avoids confusion from common names /same in every country	1
		(iii)	cinereus	1
		(iv)	Macropodidae Macropus	1 1
	(c)		Any <b>two</b> from:	2
			Increase in logging/agriculture, urban development, decreased the habitat, reduced food source. Not: natural disaster	
2	(a)	(i)	Substitution [1] answer = 10% [1]	2
		(ii)	Substitution [1] answer = 2.2 A [1]	2
	(b)		Conversion 500 W to 0.5 kW [1] answer = 5 kWh [1] Answer: 5000 kWh - 1 mark only	2
	(c)	(i)	10 000/0.5 [1] = 20 000 (days) [1] Answer: 200 days - 1 mark only	2
		(ii)	Decrease	1
		(iii)	Decrease	1
3		(i)	Less waste (with wood)	1
		(ii)	More phosphate (washed into streams)	1
		(iii)	Less carbon dioxide produced	1
		(iv)	Less coal/oil used to produce them [1] less heat loss through window so less gas burned [1]	2

Q	luesti	on	Marking detail		Mark
4		(i)	<ul> <li>Steady state model of the universe</li> <li>The universe looks the same at all ti</li> <li>The universe looks the same at any</li> <li>Big Bang model of the universe</li> <li>Red shift</li> <li>CMBR</li> <li>1 mark each for each point in the correct co</li> </ul>	place	4
		(ii)	Distance travelled by light in 1 year		1
5	(a)		ProcessIncreases CO₂PhotosynthesisBurning gas✓Plant respiration✓Cutting down trees	Decreases CO₂ ✓	4
	(b)	(i)	Start of plant growing season		1
		(ii)	Carbon dioxide levels over time are increas	ing / going up	1
		(iii)	400 (ppm) (allow 398-400)		1
6		(i)	Mice/rabbits/gerbils		1
		(ii)	Foxes/eagle owls/buzzards		1
		(iii)	Carnivore		1
		(iv)	Dense fur coat		1
		(v)	Hairy soles		1
		(vi)	White coat is camouflaged [1] predators have difficulty in seeing them [1]		2
		(vii)	Those eaten balanced by those born		1
		(viii)	Do not eat crops/ They eat animals that fee	d on crops	1
		(ix)	They eat animals that feed on crops		1

#### **SECTION B**

C	Question		Marking detail	Mark
7	(a)	(i)	Venus	1
		(ii)	Venus	1
		(iii)	Mercury	1
	(b)		The bigger (the diameter) [1] the more moons around a planet [1]	2
	(c)	(i)	The further from the Sun the lower the temperature	1
		(ii)	Atmosphere is mainly carbon dioxide [1] which means there is a large global warming/greenhouse effect [1]	2
			Second mark can only be awarded if it is coherently and correctly linked to the first marking point.	
	(d)	(i)	Accept value between -64 and -129°C	1
		(ii)	Accept value between 3 and 11 years	1
	(e)	(i)	Scales [1] points (+/- square) [2] curve [1]	4
		(ii)	(No) because line is curved (non-proportional)	1
	(f)	(i)	Surface covered in (thick)- clouds	1
		(ii)	Rings too faint	1
		(g)	Ellipse drawn (Not a circle, Sun not in the middle)	1

Question	Marking detail	Mark
Question 8	<ul> <li>Indicative content:         <ul> <li>by comparison</li> <li>terrestrial or rocky planets: Mercury, Venus, Earth and Mars:                 <ul> <li>rock and metal</li> <li>have relatively high densities, slow rotation solid surfaces, no rings and few satellites.</li> <li>jovian or, gas planets: Jupiter, Saturn, Uranus and Neptune:</li></ul></li></ul></li></ul>	Mark 6QWC

## Unit 1 Higher Tier

## SECTION A

Question		on	Marking detail	Mark
1	(a)	(i)	Venus	1
		(ii)	Venus	1
		(iii)	Mercury	1
	(b)		The bigger (the diameter) [1] the more moons around a planet [1]	2
	(c)	(i)	The further from the Sun the lower the temperature	1
		(ii)	Atmosphere is mainly carbon dioxide [1] which means there is a large global warming/greenhouse effect [1]	2
			Second mark can only be awarded if it is coherently and correctly linked to the first marking point.	
	(d)	(i)	Accept value between -64 and -129°C	1
		(ii)	Accept value between 3 and 11 years	1
	(e)	(i)	Scales [1] points (+/- square) [2] curve [1]	4
		(ii)	(No) because line is curved (non-proportional)	1
	(f)	(i)	Surface covered in (thick) clouds	1
		(ii)	Rings too faint	1
	(g)		Ellipse drawn	1

Question	Marking detail	Mark
Question	<ul> <li>Marking detail</li> <li>Indicative content:         <ul> <li>by comparison</li> <li>terrestrial or rocky planets: Mercury, Venus, Earth and Mars:                 <ul> <li>rock and metal</li> <li>have relatively high densities, slow rotation, solid surfaces, no rings and few satellites.</li></ul></li></ul></li></ul>	6QWC

## **SECTION B**

Question		on	Marking detail	Mark
3	(a)		Teeth - "two front teeth".	1
			Feet - the second and third digits of the feet are (completely) fused together, except for the claw.	1
	(b)	(i)	The order	1
		(ii)	Avoids confusion form common names	1
		(iii)	<u>P</u> hascolarctos <u>c</u> inereus	1
		(iv)	Macropodidae [1] Macropus rufus [1]	2
	(c)		Increase in logging/agriculture/urban development [1] which has decreased the koala's habitat/reduced food source[1] Second mark can only be awarded if it is linked to first marking point.	2

Q	uestic	on 🗌	Marking detail	Mark
4	<b>4</b> (a) (i)		Substitution [1], answer = 900 W [1]	2
		(ii)	Substitution (ecf from i) [1] answer = 3.9 A [1]	2
	(b)		Conversion 900 W (allow ecf) to 0.9 kW [1] answer = 9 kWh [1]	2
	(c)		<ul> <li>Indicative content:</li> <li>savings every day on average would be 45p.</li> <li>payback time is £10 000/0.45 which is 22 222.2 days (60.8 years)</li> <li>if electricity costs rise the payback time would decrease.</li> <li>payback time will also depend on weather since the mean daily energy production will be affected by the amount of sunshine. The sunnier the weather the higher the mean energy production and the greater the daily savings.</li> <li>No electricity at night. Depends upon the direction of roof. House consumption &gt; 3 KWh</li> </ul>	6QWC
			Marking Bands 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.	
			<b>3-4 marks</b> 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.	
			<b>1-2 marks</b> 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.	
			<b>0 marks</b> The candidate does not make any attempt or give a relevant answer worthy of credit.	

Qu	estion	Marking detail	Mark
5	(i)	Less energy used in production, use and disposal [1], Lower natural gas consumption in replacing heat lost through the window [1] Less coal and oil used in production and/or painting [1]	3
	(ii)	Water eutrophication effect /phosphates greater for wooden windows [1] causes excessive growth of algae in water [1] depletes the water of oxygen causing the death of fish [1]	3
		Third mark can only be awarded if it is correctly and coherently linked to either of other marking points.	
	(iii)	Recycling reduces need to use new resources [1] Recycling also reduces waste [1] so less rubbish in landfill/ so natural resources last longer [1]	3
		Three marks can only be awarded if it points correctly and coherently linked	
6	(i)	"Steady state" is based upon unchanging universe/ Big bang is based upon expanding universe [1] CMBR is the remains of energy created during the Big Bang [1] gamma rays stretching to microwaves due to expansion of universe [1]	3
		Third mark can only be awarded if it is correctly and coherently linked to other marking points.	
	(ii)	Red shift [1] caused due to the wavelength increase of light/movement of spectral lines to red end of spectrum [1] because galaxies moving apart [1]	3
		Third mark can only be awarded if it is linked to either of other marking points.	
	(iii)	The further away a galaxy the faster [1] it moves away [1]	2
7	(a)	Depends on plant growing season [1]. during the season rate of plant photosynthesis increase [1] so more carbon dioxide is removed from the atmosphere [1].	3
		Third mark can only be awarded if it is linked to either of other marking points.	
	(b) (i)	Carbon dioxide levels over time are increasing [1] at an increasing rate [1]	2
	(ii)	Any <b>three</b> from: Burn less fossil fuels, less deforestation, plant more trees, carbon capture	3

#### Unit 2 Foundation Tier

Q	uestie	on	Marking Details	Mark
1			Metal (1), sulfur/sulphur (1). Do not accept sulfate/sulphate	2
			KOH (1), sodium chloride (1) (Do not accept chlorine in place of chloride)	2
2	(a)		CAT Scan. CAT Scan. Gamma camera OOOO Ultrasound Virasound X-ray.	2
			All correct 2 marks; 2 or 1 correct 1 mark; 1 or 0 correct 0 marks.	
	(b)	(i)	X-ray 2D one image / CT 3D/multiple images	1
		(ii)	Cause cancer	1
		(iii) (iv)	Use lead apron/stand behind (lead) glass/screen	1 1

Q	uestic	on	Marking Details	Mark
3	(a)		Any two of:	2
			all patients 50 years / male / with normal blood pressure	
	(b)	(i)	5.5 – 5.6	1
		(ii)	Increase in cholesterol increase in risk	1
	(c)		steak - <b>reduce</b> high fibre cereal - <b>eat more</b>	2
	(d)		Any <b>two</b> of:	2
			stop smoking, reduce obesity more exercise, medication / aspirin / statin (Do not accept incorrect medication e.g. paracetamol	
4	(a)		(A)- <b>ECBD</b> (all correct 3 marks; 2 correct 2 marks; 1 correct 1 mark	3
	(b)	(i)	рН 5-6	1
		(ii)	Alkali	1
		(iii)	Yellow, pH 7-8 / 7 / 8	2
		(iv)	Potatoes/turnips	1
5	(a)		2 marks for all points correctly plotted, 1 mark if 7 or 8 points correctly plotted 0 marks if less than 7 points correctly plotted. 1 point for correctly joining up points. (Allow ecf for points incorrectly drawn)	3
	(b)	(i)	Rhys - Sugar level increases (1) returned to normal /returned to 90 / returned to start level after about an hour (1)	2
		(::)	Kevin - Sugar levels increase (1) stay high does not return to normal(1) (may use numbers in description)	2
		(ii)	2.30 pm	1
		(iii)	200 (units)	1
	(c)		Pancreas	1
	(d)		1 - <u>inject</u> insulin 2 - control carbohydrate/sugar intake (any order allowed)	2

Q	Question		Marking Details	Mark
6	(a)		Genes	1
	(b)	(i)	John - nn David – Nn	1 1
		(ii)	Lucy - Nn	1
	(c)	(i)	(Lucy) N n (David) <u>N NN Nn</u> n Nn nn	2
			Complete table for David <b>and</b> Lucy correct (1) Fill centre table correctly (1) Chance 25% (based on table - allow ecf)	1
		(ii)	(Lucy) N n (John) <u>n Nn nn</u> Construct table with Lucy and Norman (1)	2
			Fill centre correctly (1) Chance 50% (based on table - allow ecf)	1
7	(a)		$ \begin{array}{c} C_2F_4\\ H\\C=C\\ H\\H\\ \end{array} $	1
	(b)	(i)	Polymerisation	1
		(ii)	Ethene is a small molecule Polyethene is a long chain molecule	1
	(c)		Any <b>two</b> from: reduces use of crude oil/resources less waste in <u>land fill</u> , less impact - on oceans/wild life (marine)	2

Question	Marking Details	Mark
8	Indicative content <ul> <li>Correct apparatus/chemicals</li> <li>burette</li> <li>suitable named acid</li> <li>flask/container for antacid</li> </ul>	6 (QWC)
	<ul> <li>Key steps         <ul> <li>crush the tablet in given volume of water</li> <li>titrate against acid</li> <li>suitable indicator/data logger</li> </ul> </li> </ul>	
	<ul> <li>Conclusion         <ul> <li>compare titres</li> <li>high titre - more acid needed to neutralise tablet.</li> <li>therefore stronger tablet</li> </ul> </li> </ul>	
	Marking Bands	
	<b>5-6 marks</b> 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.	
	<b>3-4 marks</b> 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.	
	<b>1-2 marks</b> 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.	
	<b>0 marks</b> The candidate does not make any attempt or give a relevant answer worthy of credit	

## Unit 2 Higher Tier

Question		on	Marking Details	Mark
1	(a)		Genes	1
	(b)	(i)	John - nn/ David - Nn	1 1
		(ii)	Lucy - Nn	1
	(c)	(i)	(Lucy) N n (David) <u>N NN Nn</u> <u>n Nn nn</u>	2
			Complete table for David <b>and</b> Lucy correct (1) Fill centre table correctly (1)	
			Chance - 25% (based on table – allow ecf)	1
		(ii)	(Lucy) <u>N n</u> (John) <u>n Nn nn</u>	2
			Construct table with Lucy and John (1) Fill centre correctly (1)	
			Chance - 50% (based on table – allow ecf)	1

Question	Marking Details	Mark
2	Indicative content	6 QWC
	<ul> <li>Correct apparatus/ chemicals         <ul> <li>burette</li> <li>suitable named acid</li> <li>flask/container for antacid</li> </ul> </li> </ul>	
	<ul> <li>Key steps.         <ul> <li>crush the tablet in given volume of water</li> <li>titrate against acid</li> <li>suitable indicator/data logger</li> </ul> </li> </ul>	
	<ul> <li>Conclusion         <ul> <li>compare titres</li> <li>high titre - more acid needed to neutralise tablet</li> <li>therefore stronger tablet</li> </ul> </li> </ul>	
	Marking Bands	
	<b>5-6 marks.</b> 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.	
	<b>3-4 marks</b> 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 limited scientific terminology and inaccuracies in spelling, punctuation and grammar.	
	<b>1-2 marks</b> The candidate makes some relevant points, such as those in the indicative content, showing some reasoning. The answer addresses the question with significant omissions. The candidate uses limited scientific terminology and inaccuracies in spelling, punctuation and grammar.	
	<b>0 marks</b> The candidate does not make any attempt of give a relevant answer worthy of credit.	

Question		on	Marking Details	Mark
3	(a)	(i)	All points correctly plotted (2) Only four points correctly plotted (1) Plots joined and labelled 'non-smoker' (1)	3
		(ii)	Difference 6.3 - 4.1 = 2.2%	2
	(b)		Increase in cholesterol increase in risk smoking increases risk further	2
	(c)		Any <b>two</b> from:	2
			Patients all same age / same sex / same blood pressure / same ethnicity	
	(d)		Repeat study with many more patients / different ages / different sex / different ethnicity	1
4	(a)	(i)	C <sub>2</sub> F <sub>4</sub>	1
				1
	(b)		$-\left(\begin{array}{ccc}H&H\\-C&-C\\-C&-C\\H&H\end{array}\right)_{n}$	2
	(c)		Cross links between chains (1) are strong bonds (1) which are not broken by heating (1)	3
			Points must be correctly and coherently linked to obtain 3 marks	
	(d)		Non-stick, unreactive	2
5		(i)	$H_2SO_4$ (1) + ZnCO <sub>3</sub> →Zn SO <sub>4</sub> + CO <sub>2</sub> (1) + $H_2O$ (1) 3 marks can only be awarded if equation is correctly balanced	3
		(ii)	Potassium chloride	1
		(iii)	Nitric acid, potassium hydroxide	2
		(iv)	One from:	1
			Zinc sulfate-rayon / source of zinc in foods / fertilisers	
			One from:	1
			Potassium nitrate-fertilisers / food additive / food preservation / gun powder / fireworks	

Question		on	Marking Details	Mark
6	(a)	(i)	Radioisotope is injected / ingested (accept: radioisotope taken inside the body radioisotope) (1) the radioisotope kills cancer cells(1)	2
		(ii)	(8 hours is) the time taken for $50\% / \frac{1}{2}$ (1) of radioactive substance to decay (1)	2
			Points must be correctly and coherently linked to obtain 2 marks	
		(iii)	Correct workings (1) Correct answer 1/16 <sup>th</sup> (1)	2
	(b)		(Technicians) risk accidental / continual exposure (to iodine- 131) (1) which is a source of ionising radiation (1) that can damage cells / cause mutations/cancer (1)	3
			Points must be correctly and coherently linked to obtain 3 marks	

Question	Marking Details	Mark
<b>7</b> (a)	Type 1 - body does not produce enough insulin Type 2 - body cells do not respond to insulin	2
(b)	<ul> <li>Indicative content <ul> <li>graph 1 - insulin produced in response to increased sugar levels (Carbohydrate meal)</li> <li>blood Sugar levels fall to normal</li> <li>sugar converted to glycogen in liver</li> <li>graph 2 - diabetic</li> <li>insulin administered (injected) prior to increased blood sugar (Carbohydrate meal)</li> <li>blood sugar converted by liver to glycogen</li> </ul> </li> </ul>	6 (QWC)
	Marking Bands	
	<b>5-6 marks</b> 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.	
	<b>3-4 marks</b> 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.	
	<b>1-2 marks</b> The candidate makes some relevant points, such as those in the indicative content, showing some reasoning. The answer addresses the question with significant omissions. The candidate uses limited scientific terminology and inaccuracies in spelling, punctuation and grammar.	
	<b>0 marks</b> The candidate does not make any attempt or give a relevant answer worthy of credit.	



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