



GCSE MARKING SCHEME

SCIENCE B

SUMMER 2012

INTRODUCTION

The marking schemes which follow were those used by WJEC for the Summer 2012 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.

GCSE Science B Unit 1 (Foundation Tier)

SECTION A

- Q.1** (a) All correct 3 marks; 2/3 correct 2 marks; 1 correct 1; 0 correct 0 marks
- (b) One mark can be awarded for making a correct point:
hook like beak (1)
- The second mark can only be awarded if the candidate coherently and correctly links the conclusion to the statement above.
which can tear/rip flesh (1)
- Q.2** (a) (i) $22358 - 4203 = 18155$ (1)
- (ii) 2 marks can be awarded for making 2 correct points:
Less dependent on fossil/non-renewable fuel use (1) because of the greenhouse effect (1) and reducing resources (1)
- The third mark can only be awarded if the candidate coherently and correctly link points.
- (iii) 33 GWh (1)
- (b) (i) Plants/animal waste (1)
- (ii) Biomass (1)
- (c) (i) 1000 (1)
- (ii) Nuclear (1)
- (iii) Offshore wind (1) (NOT: weather changes)
- (iv) No waste
- (d) Variable wind speed/no wind (1)
- Q.3** (a) (i) 210 (J/s) (1)
- (ii) Loft/fibre glass (1)
- (iii) Biggest energy saving (1) (or comparison showing different energy saving)
- (b) (i) 990 (J/s) (1)
- (ii) 990 (1) allow ecf W or J/s (1)
- (c) (i) 15 kWh (1)
- (ii) Subs 15 x 12 (1) 180p (1) 180 p only (2)

Q.4 (a) (i) (As population increases forest land) decreases/ less land (1)

(ii) One mark can be awarded for making a correct point:
habitat has been removed/ less food (1)

The second mark can only be awarded if the candidate coherently and correctly links the conclusion to the statement above.
therefore there will be **less** wildlife (1)

(b) (i) Two correct ticks – artificial fertilisers, artificial insecticides (1)

(ii) Larger output / less land used / less labour costs/ grows quicker – any

2 x 1

Q.5 (i) Time between 12 and 83 (1) velocity between 12 and 7 (1)

(ii) Between 2 and 4.5 (1)

(iii) No pattern (1)

(iv) Mercury or Venus (1)

(v) One mark can be awarded for making a correct point:
No (1) because e.g.

The second mark can only be awarded if the candidate coherently and correctly links the conclusion to the statement above.

Neptune more massive than Uranus but has less moons (1)
Accept appropriate statement about 2 other planets

Q.6 (a) Thousand million, expands, microwave (3)

(b) (i) UV, IR (2)

(ii) One mark can be awarded for making a correct point:

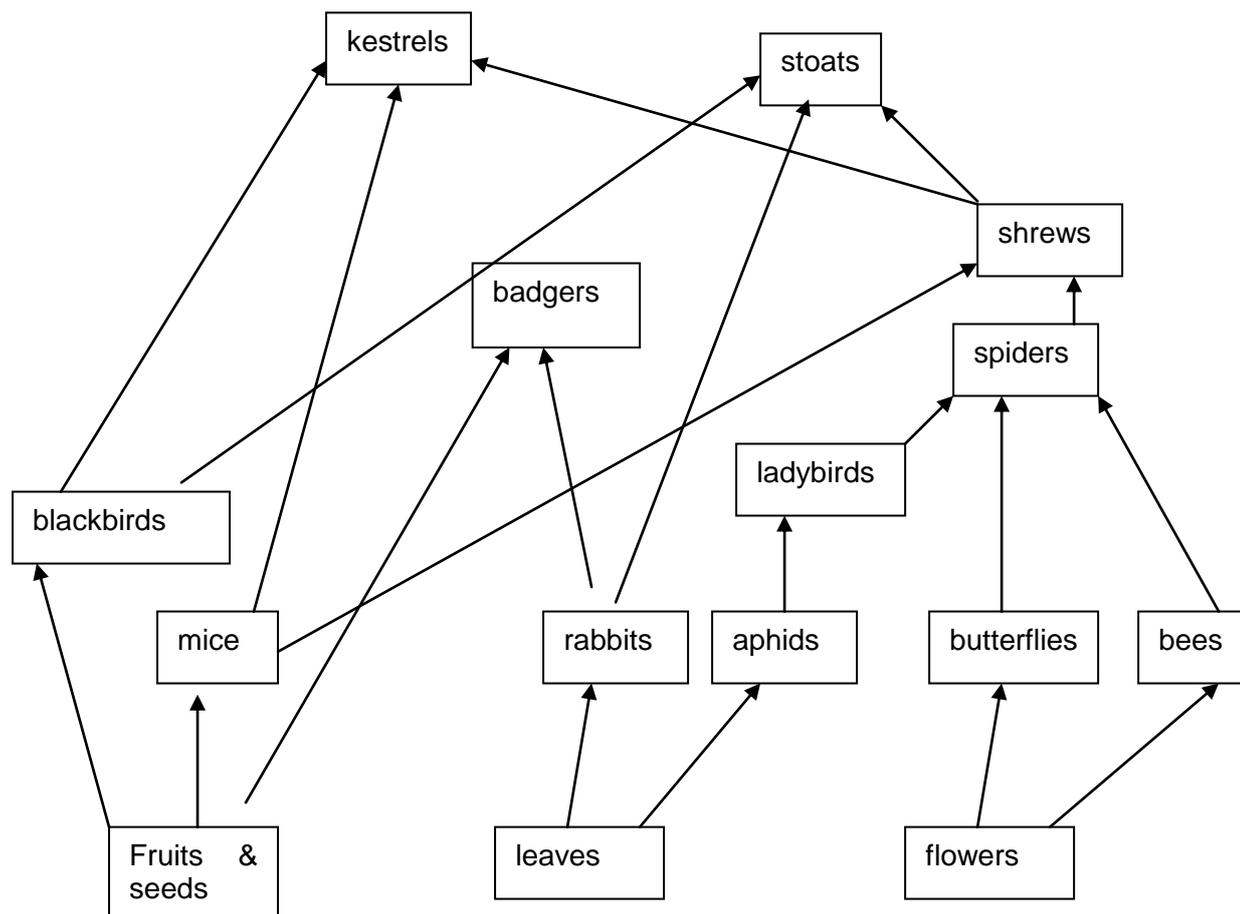
Telescope is above the atmosphere/ less light pollution (1)

The second mark can only be awarded if the candidate coherently and correctly links the conclusion to the statement above.

So less absorption of signals/therefore better signals/so can observe different parts of the em spectrum/better picture (1)

SECTION B

Q.7 (a)



Producers at start of each chain within food web (1)

Badgers, kestrels & stoats at end of a chain within web (1)

Flowers to butterflies/bees to spiders to shrews to kestrels/stoats (1)

Leaves to aphids to ladybirds to spiders (1)

Leaves to rabbits to badgers/stoats (1)

Fruits & seeds to badgers (1)

Fruits & seeds mice to shrews/kestrel (1)

Fruits & seeds to blackbirds to kestrels/stoats (1)

Maximum of 5 if arrows not put in.

- (b)
- (i) Badgers/spiders kestrels/stoats/spiders (1)
 - (ii) Blackbirds/mice/rabbits/aphids/butterflies/bees/badgers (1)
 - (iii) Kestrels/badgers/ladybirds/spiders/stoats (1)
 - (iv) Spiders/shrews (1)
 - (v) Blackbirds/mice/rabbits/aphids/butterflies/bees (1)
 - (vi) Kestrels/spiders/ladybirds/shrews/stoats (1)

(c) **Indicative Content**

Up to five of:

- Organisms that badgers feed on (rabbits, fruits & seeds) will become more plentiful
- more availability of fruits & seeds will cause an increase in herbivores that feed on them (mice & blackbirds)
- more food available for kestrels & stoats could increase their numbers
- rabbit population will increase lower supply of leaves so aphids may decrease
- result in decrease in ladybirds
- spiders will depend more on butterflies & bees so their numbers will decrease.

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

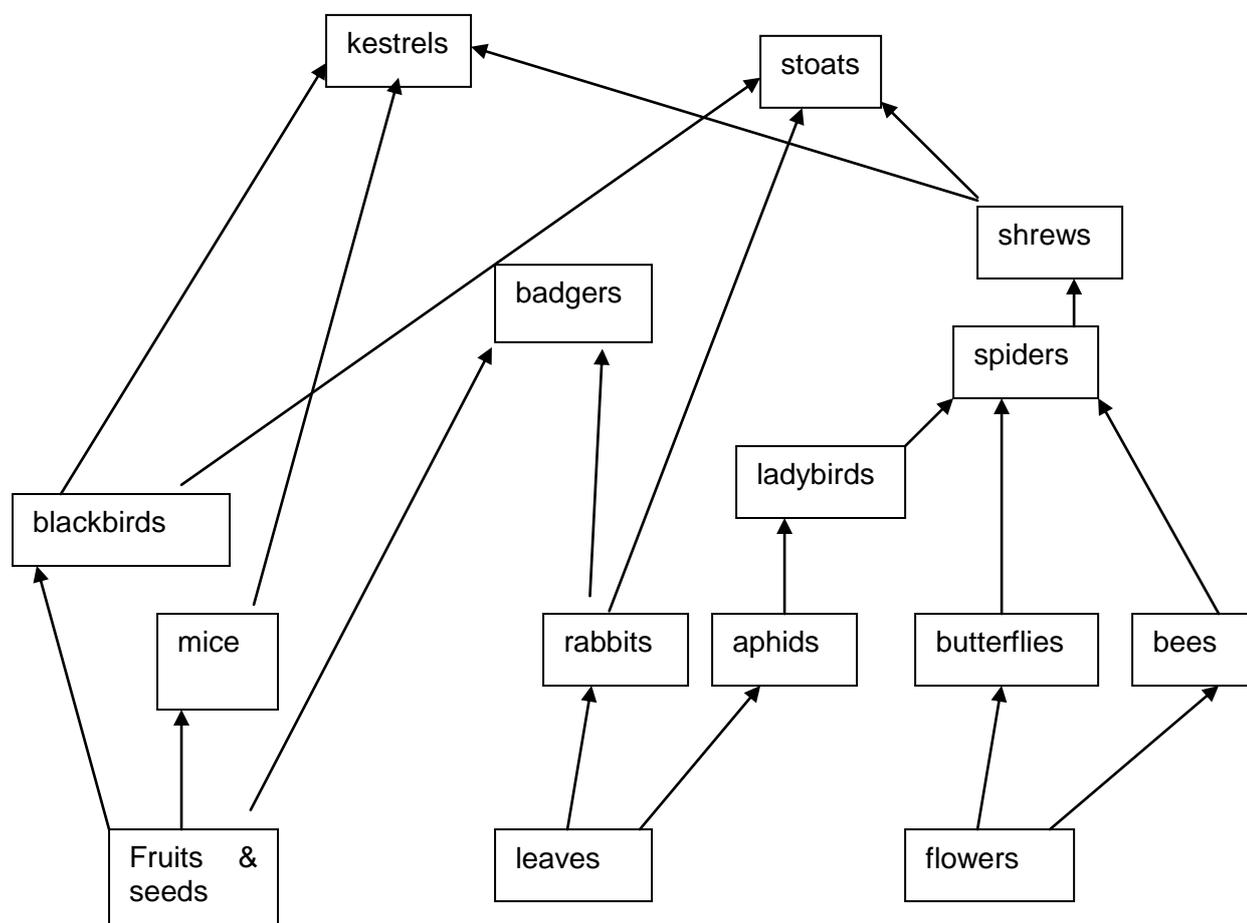
The candidate does not make any attempt or give a relevant answer worthy of credit.

- (d) (i) 50, 5, 1 all correct (1)
- (ii) Correct height (1)
Correct shape (1)
Correct ratio (1) (50 – 5 – 1) (3)
- (e) Substitution of values (23/460), answer 5% (2)

GCSE Science B Unit 1 (Higher Tier)

SECTION A

Q.1 (a)



Producers at start of each chain within food web (1)

Badgers, kestrels & stoats at end of a chain within web (1)

Flowers to butterflies/bees to spiders to shrews to kestrels/stoats (1)

Leaves to aphids to ladybirds to spiders (1)

Leaves to rabbits to badgers/stoats (1)

Fruits & seeds to badgers (1)

Fruits & seeds to mice to kestrel (1)

Fruits & seeds to blackbirds to kestrels/stoats (1) Any 6 x 1 for 6 max.

- (b) (i) Badgers/spiders/ kestrels/ stoats/spiders (1)
- (ii) Blackbirds/mice/rabbits/aphids/butterflies/bees (1)
- (iii) Kestrels/badgers/ladybirds/spiders/stoats (1)
- (iv) Spiders/shrews (1)
- (v) Blackbirds/mice/rabbits/aphids/butterflies/bees (1)
- (vi) Kestrels/ spiders/ ladybirds/shrews/ stoats (1)

(c) **Indicative Content**

Up to five of:

- Organisms that badgers feed on (rabbits, fruits & seeds) will become more plentiful
- more availability of fruits & seeds will cause an increase in herbivores that feed on them (mice & blackbirds)
- more food available for kestrels & stoats could increase their numbers
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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.

- (d) (i) 50, 20, 2 all correct (1)
- (ii) Each level of the pyramid must be of equal height, appropriate scale, correct ratio between levels (25 – 10 – 1) (3)
- (e) Substitution of values (23/460), answer 5% (2)

SECTION B

Q.2 (a) (i) Calculation of totals for 2000 – 4203 & for 2010 – 22358 (1) the subtraction to give 21550 but allow e.c.f. for their totals (1)

(ii) *Either:*

1 mark can be awarded for identifying:
offshore wind (alternative acceptable answer biomass) (1)

The second mark can only be awarded if the candidate can coherently and correctly link their identification to the data, since this shows the biggest percentage increase (1) (reasoning for biomass - biggest difference per year) (1)

(b) **Indicative Content:**

Disadvantages of wind – *Three of:* overall cost more, less power output, shorter lifetime, larger carbon footprint for offshore wind;

Advantages – *Two of:* no waste, lower carbon footprint for onshore.

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.

Q.3 (a) (i) Loft insulation (1)

(ii) Causes biggest saving in energy lost (1)

(b) (i) Differences calculated – 28270 & 34980 (1) total savings 63250J (1)

(ii) Conversion of 1 minute to 60s (1) answer $63250/60 = 1054W$ (1) allow e.c.f. from (i)

(c) (i) To gain full credit there must be a multiple of 7 used somewhere in the answer (1)

Subs into units = 1.5×10 (1) ($\times 7$) = 15 or 105

Subs into cost = 15×12 (1) = 180p/£1.80 ($180 \times 7 = 1260p/£12.60$)
 $/105 \times 12 = 1260p/£12.60$ ans & unit (1)

(ii) $1600/12.60$ (ecf) = $126.9/127$ weeks (1)

- Q.4** (a) Rotating cloud of interstellar dust and gas began separating into rings. (1)
Successively larger fragments collided with one another and became larger objects ultimately becoming protoplanets (1) (Earth was one).
- (b) (i) Earth spun and flattened so quickly (1) that it ejected a large piece of material which eventually became the moon (1)
- (ii) Ring of dust around the earth slows the moon (1), which has already formed somewhere else allowing it to be captured into the earth's gravitational field. (1)
- (iii) When a planetesimal the size of mars struck the earth ejecting large volumes of matter from the earth (1) disk of orbiting material ejected from the collision eventually condensed to form our moon (1)
- Q.5** (a) (i) One mark can be awarded for making a correct point:
As population increases forest land decreases (1)
- The second mark can only be awarded if the candidate coherently and correctly connects reasons the connection between the two trends because forests are cleared for - wood as a raw material for building/more housing/ agriculture to grow more food (1)
- (ii) Removal of habitats affects wildlife (1) reduction in photosynthesis and effect of carbon dioxide concentration in the atmosphere (1)
- (b) Reference to animal well being (1), impact of fertilisers – eutrophication (1), impact of pesticides – bioaccumulation (1), compare yield to feed increasing population (1) cost of food – is it affordable (1)
- Q.6** (a) Movement of spectral lines (1) to red end of spectrum (1)
- (b) (i) Attempt at finding gradient (1), e.g. $190000/3100$ (1) 61.3 (1)
- (ii) One mark can be awarded for making a correct point:
It is possible to draw a different line of best fit (1) which would have a different gradient (therefore giving a different H_0 value) (1)
- The second mark can only be awarded if the candidate coherently and correctly connects the two points.
- (iii) Distance = 3100 Mpc, (1) $3100 \times 333.26 = 1\,033\,106$ light years (1)

GCSE Science B Unit 2 (Foundation Tier)

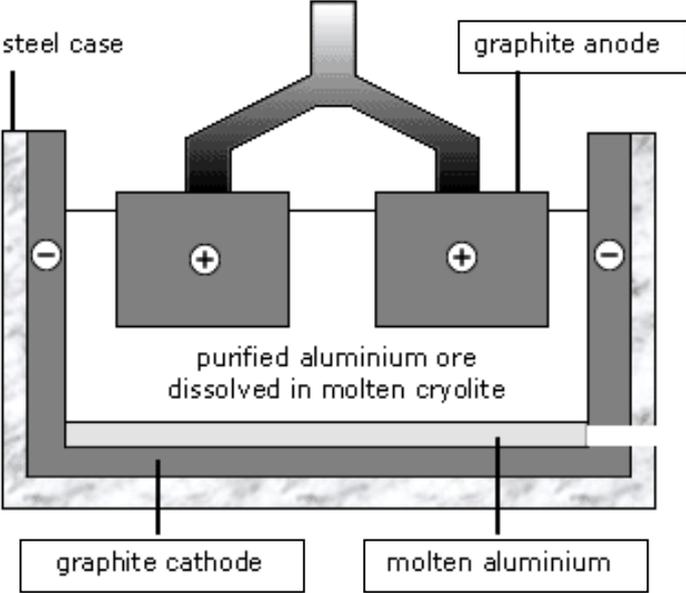
Question		Marks	
1.	(a) (i)	Radioactive	1
	(i)	Corrosive	1
	(b)	Cancer More than one circled = 0 marks	1
	(c) (i)	Broken bones	1
	(ii)	Brain tumour	1
	(iii)	Pregnancy	1
2.	(a)	Magnesium, sodium	2
	(b) (i)	Be/Mg/Sr/Ba/Ra Also accept correct name	1
	(ii)	Li/Be/C/N/O/F/Ne Also accept correct name	1
	(c) (i)	Alkali metals	1
	(ii)	Metal 1	1
	(iii)	Metal 3	1
	(iv)	Hydrogen	1
	(d) (i)	Green	1
	(ii)	Blue/navy/purple	1
	(e) (i)	Use a funnel to fill the burette More than 1 box ticked – 0 marks	1
	(ii)	Neutralisation (reaction)	1
3.	(a) (i)	Chris's blood sugar level rises/doubles (from 6 to 12 units) (1) Ben's sugar level remains constant/same (1)	2
	(ii)	Chris (1) uncontrolled/higher sugar levels/blood levels go too high	2
	(iii)	8.00 – 12.00 (Blood sugar is dropping) due to exercise/not eaten	1
	(b)	One mark can be awarded for making one of the following points: <ul style="list-style-type: none"> • insulin affects the liver • so that sugar is converted to glycogen/stores sugar The second point can only be awarded if the two points are correctly and coherently linked.	2
	(c)	Injecting insulin, low carbohydrate diet (Not: healthy diet, eat right amount of sugar)	2
	(d)	Low calorie/energy diet, exercise more. Not: healthy diet)	2

Question		Marks									
<p>4. (a)</p>	<p>1 mark each correct point</p> <p>(b) (i) Electrolysis (ii) Electrical energy/ electricity</p> <p>(c) Aluminium oxide (1) → aluminium + oxygen (1)</p>	<p>3</p> <p>1 1</p> <p>2</p>									
<p>5. (a)</p> <p>(b)</p> <p>(c) (i) (ii)</p> <p>(d)</p>	<p>8 or less</p> <p>Any two of temperature, mass of metal, surface area of metal, concentration of HCl (Not amount of acid or amount of metal or size of metal)</p> <p>Procedure 2</p> <p>Very hard to count all bubbles / may miss counting bubbles / bubbles given off too fast/bubbles are different sizes</p> <p>Magnesium+ hydrochloric acid (1)→ magnesium chloride + hydrogen (1)</p>	<p>1</p> <p>2</p> <p>1 1</p> <p>2</p>									
<p>6. (a) (i) (ii)</p> <p>(b) (i)+(ii) (iii) (iv)</p> <p>(c)</p>	<p>Ff FF</p> <p>Parents genotypes - Ff x Ff (both (i) + (ii) required) FF Ff / ff (both (iii) + (iv) required)</p> <table border="1" data-bbox="399 1724 1045 1921"> <tr> <td></td> <td>F</td> <td>F (1)</td> </tr> <tr> <td>F (1)</td> <td>(1) FF</td> <td>FF</td> </tr> <tr> <td>f</td> <td>Ff</td> <td>Ff</td> </tr> </table> <p>Chance = 0% (Must be consistent with Punnett square)</p>		F	F (1)	F (1)	(1) FF	FF	f	Ff	Ff	<p>1 1</p> <p>1 1</p> <p>3</p> <p>1</p>
	F	F (1)									
F (1)	(1) FF	FF									
f	Ff	Ff									

Question		Marks
7. (a)	Babies have higher birth weight.	1
(b)	Increase number of patients in survey, survey more areas.	2
(c)	<p>Indicative content (QWC)</p> <ul style="list-style-type: none"> • Greater awareness of diseases associated with smoking/passive smoking • Introduction of smoking bans in public places/other legislation • Warnings increased/advertising reduced • Smoking now very expensive • Unacceptable role models <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

GCSE Science B Unit 2 (Higher Tier)

Question		Marks									
1.	(a)	8 or less	1								
	(b)	Any two of: temperature, mass of metal, surface area metal, Concentration of HCl (Not: amount of acid or amount of metal or size of metal)	2								
	(c)	(i)	Procedure 2	1							
		(ii)	Very hard to count all bubbles/ may miss counting bubbles/ bubbles given off too fast/bubbles are different sizes	1							
(d)	Magnesium+ hydrochloric acid (1)→ magnesium chloride + hydrogen (1)	2									
2.	(a)	(i)	Ff	1							
		(ii)	FF	1							
	(b)	(i)+(ii)	Parents genotypes - Ff x Ff (both required)	1							
		(iii)	FF	1							
		(iv)	Ff / ff (both (iii) & (iv) required)	1							
(c)	<table border="1" style="margin-left: auto; margin-right: auto;"> <tbody> <tr> <td></td> <td style="text-align: center;">F</td> <td style="text-align: center;">F</td> </tr> <tr> <td style="text-align: center;">F</td> <td style="text-align: center;">FF</td> <td style="text-align: center;">FF</td> </tr> <tr> <td style="text-align: center;">f</td> <td style="text-align: center;">Ff</td> <td style="text-align: center;">Ff</td> </tr> </tbody> </table>		F	F	F	FF	FF	f	Ff	Ff	3
	F	F									
F	FF	FF									
f	Ff	Ff									
	Chance = 0% (Must be consistent with Punnett square)	1									
3.	(a)	Babies have higher birth rates.	1								
	(b)	Increase number of patients in survey, survey more areas.	2								
	(c)	<p>Indicative content (QWC)</p> <ul style="list-style-type: none"> • Greater awareness of diseases associated with smoking/passive smoking • Introduction of smoking bans in public places/other legislation • Warnings increased/advertising reduced • Smoking now very expensive • Unacceptable role models <p>5-6 marks</p> <p>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>	6								

Question		Marks
	<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>	
<p>4. (a)</p> <p>(b) (i)</p> <p>(ii)</p> <p>(iii)</p> <p>(c)</p>	<p>Group 3, Period 3.</p> <p>1 mark each correct point</p>  <p>(ii) Cathode/positive electrode: aluminium ions gain electrons (reduced) to form aluminium atoms. Anode/negative electrode: oxide ions lose electrons (oxidised) to form oxygen molecules / the oxygen reacts with the carbon graphite.</p> <p>(iii) $2\text{Al}_2\text{O}_3 (1) \rightarrow 4 \text{Al}(1) + 3\text{O}_2 (1)$ (1) for balancing</p> <p>(c) Energy costs much higher/ greater cost electricity</p>	<p>2</p> <p>3</p> <p>2</p> <p>2</p> <p>4</p> <p>1</p>

Question		Marks												
5. (a)	<p>Two parts must be correct for mark.</p> <table border="1" data-bbox="384 349 1182 631"> <thead> <tr> <th data-bbox="384 349 579 439">Name of polymer</th> <th data-bbox="579 349 774 439">Thermo plastic (y/n)</th> <th data-bbox="774 349 975 439">Melting point</th> <th data-bbox="975 349 1182 439">Can be remoulded</th> </tr> </thead> <tbody> <tr> <td data-bbox="384 439 579 533">Ethene</td> <td data-bbox="579 439 774 533">Yes</td> <td data-bbox="774 439 975 533">Low melting temperature</td> <td data-bbox="975 439 1182 533">Can be remoulded</td> </tr> <tr> <td data-bbox="384 533 579 631">Melamine</td> <td data-bbox="579 533 774 631">No</td> <td data-bbox="774 533 975 631">High melting temperature</td> <td data-bbox="975 533 1182 631">Can be remoulded</td> </tr> </tbody> </table>	Name of polymer	Thermo plastic (y/n)	Melting point	Can be remoulded	Ethene	Yes	Low melting temperature	Can be remoulded	Melamine	No	High melting temperature	Can be remoulded	1
Name of polymer	Thermo plastic (y/n)	Melting point	Can be remoulded											
Ethene	Yes	Low melting temperature	Can be remoulded											
Melamine	No	High melting temperature	Can be remoulded											
	(b)	3												
	<p>Thermoplastic – the polymer consists of unbranched chains/weak forces between polymer – flexible plastic/can be melted and remoulded. (Max of 2 marks)</p> <p>Thermoset – the polymer consists of branched chains with strong bonds/fixes – hard rigid plastic/cannot be melted and remoulded. (Max of 2 marks)</p>													
	(c)	3												
	<p>Advantages: crops are renewable resources/traditional plastics rely on oil/less pollution/affect on environment, bio-degradable</p> <p>Disadvantages: Need large area to grow crops, socio/ economic impact.</p> <p>Max of 2 marks for advantages/ Max 2 marks for disadvantages</p>													
6. (a)	<p>1 mark for correct point.</p> <p>A large set of data is used/ a large number of people were surveyed.</p> <p>Second mark can only be awarded for a consistent and coherent conclusion, therefore, the sample is valid.</p>	2												
	(b)	2												
	(c)	2												
	<p>Reduces chance of blood clots (1) so reducing risk of damage to heart muscle. (1)</p>													

Question		Marks
7. (a)	<p>1 mark for two correct points: Gamma radiation is high energy radiation (1) can interact (with DNA in) normal cells(1) The third mark can only be awarded for a coherent and correct conclusion so damaging cells/so causing cancer (1)</p>	3
(b)	<p>Indicative content (QWC)</p> <ul style="list-style-type: none"> • Given dose of radioisotope given to patient • Often radioisotope attached to a drug • Radioisotope targets an organ • Gamma camera forms an image of organ • Gamma camera detects gamma radiation from radioisotope <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



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