GCSE

Additional Science / Biology

BL2FP

Mark scheme

4408 / 4401

June 2015

Version: 1.0 Final

Mark schemes are prepared by the Lead Assessment Writer and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation events which all associates participate in and is the scheme which was used by them in this examination. The standardisation process ensures that the mark scheme covers the students' responses to questions and that every associate understands and applies it in the same correct way. As preparation for standardisation each associate analyses a number of students' scripts: alternative answers not already covered by the mark scheme are discussed and legislated for. If, after the standardisation process, associates encounter unusual answers which have not been raised they are required to refer these to the Lead Assessment Writer.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of students' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

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Information to Examiners

1. General

The mark scheme for each question shows:

- the marks available for each part of the question
- the total marks available for the question
- the typical answer or answers which are expected
- extra information to help the Examiner make his or her judgement and help to delineate what is acceptable or not worthy of credit or, in discursive answers, to give an overview of the area in which a mark or marks may be awarded
- the Assessment Objectives and specification content that each question is intended to cover.

The extra information is aligned to the appropriate answer in the left-hand part of the mark scheme and should only be applied to that item in the mark scheme.

At the beginning of a part of a question a reminder may be given, for example: where consequential marking needs to be considered in a calculation; or the answer may be on the diagram or at a different place on the script.

In general the right-hand side of the mark scheme is there to provide those extra details which confuse the main part of the mark scheme yet may be helpful in ensuring that marking is straightforward and consistent.

2. Emboldening and underlining

2.1 In a list of acceptable answers where more than one mark is available 'any **two** from' is used, with the number of marks emboldened. Each of the following bullet points is a potential mark.

2.2 A bold **and** is used to indicate that both parts of the answer are required to award the mark.

2.3 Alternative answers acceptable for a mark are indicated by the use of **or**. Different terms in the mark scheme are shown by a / ; eg allow smooth / free movement.

2.4 Any wording that is underlined is essential for the marking point to be awarded.

3. Marking points

3.1 Marking of lists

This applies to questions requiring a set number of responses, but for which students have provided extra responses. The general principle to be followed in such a situation is that 'right + wrong = wrong'.

Each error / contradiction negates each correct response. So, if the number of error / contradictions equals or exceeds the number of marks available for the question, no marks can be awarded.

However, responses considered to be neutral (indicated as * in example 1) are not penalised.

Example 1: What is the pH of an acidic solution? (1 mark)

Student	Response	Marks awarded
1	green, 5	0
2	red*, 5	1
3	red*, 8	0

Example 2: Name two planets in the solar system. (2 marks)

Student	Response	Marks awarded
1	Neptune, Mars, Moon	1
2	Neptune, Sun, Mars, Moon	0

3.2 Use of chemical symbols / formulae

If a student writes a chemical symbol / formula instead of a required chemical name, full credit can be given if the symbol / formula is correct and if, in the context of the question, such action is appropriate.

3.3 Marking procedure for calculations

Full marks can be given for a correct numerical answer, without any working shown.

However, if the answer is incorrect, mark(s) can be gained by correct substitution / working and this is shown in the 'extra information' column or by each stage of a longer calculation.

3.4 Interpretation of 'it'

Answers using the word 'it' should be given credit only if it is clear that the 'it' refers to the correct subject.

3.5 Errors carried forward

Any error in the answers to a structured question should be penalised once only.

Papers should be constructed in such a way that the number of times errors can be carried forward is kept to a minimum. Allowances for errors carried forward are most likely to be restricted to calculation questions and should be shown by the abbreviation e.c.f. in the marking scheme.

3.6 Phonetic spelling

The phonetic spelling of correct scientific terminology should be credited **unless** there is a possible confusion with another technical term.

3.7 Brackets

(…..) are used to indicate information which is not essential for the mark to be awarded but is included to help the examiner identify the sense of the answer required.

3.8 Ignore / Insufficient / Do <u>not</u> allow

Ignore or insufficient are used when the information given is irrelevant to the question or not enough to gain the marking point. Any further correct amplification could gain the marking point.

Do **not** allow means that this is a wrong answer which, even if the correct answer is given, will still mean that the mark is not awarded.

Quality of Written Communication and levels marking

In Question 8 students are required to produce extended written material in English, and will be assessed on the quality of their written communication as well as the standard of the scientific response.

Students will be required to:

- use good English
- organise information clearly
- use specialist vocabulary where appropriate.

The following general criteria should be used to assign marks to a level:

Level 1: basic

- Knowledge of basic information
- Simple understanding
- The answer is poorly organised, with almost no specialist terms and their use demonstrating a general lack of understanding of their meaning, little or no detail
- The spelling, punctuation and grammar are very weak.

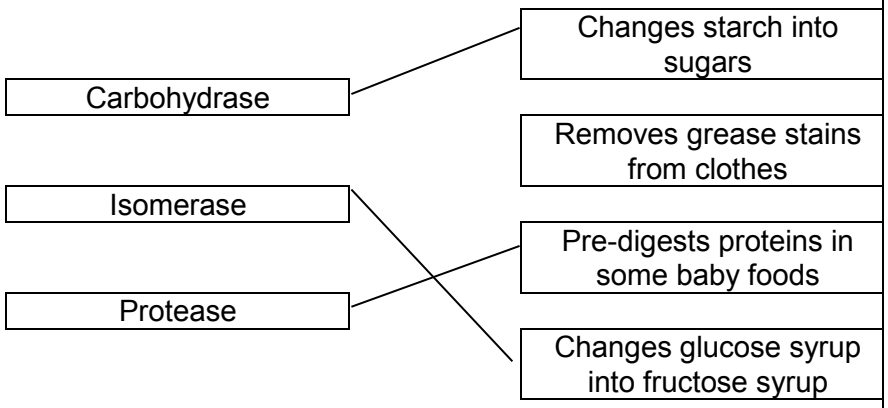
Level 2: clear

- Knowledge of accurate information
- Clear understanding
- The answer has some structure and organisation, use of specialist terms has been attempted but not always accurately, some detail is given
- There is reasonable accuracy in spelling, punctuation and grammar, although there may still be some errors.

Level 3: detailed

- Knowledge of accurate information appropriately contextualised
- Detailed understanding, supported by relevant evidence and examples
- Answer is coherent and in an organised, logical sequence, containing a wide range of appropriate or relevant specialist terms used accurately.
- The answer shows almost faultless spelling, punctuation and grammar.

Question	Answers	Extra information	Mark	AO / Spec. Ref.
1(a)	**A** = nucleus **B** = (cell) membrane	allow phonetic spelling	1 1	AO1 2.1.1a, d
1(b)	for repair / growth **or** to replace cells	ignore new cells / skin	1	AO1 2.7.1j
1(c)(i)	embryos		1	AO1 2.7.1k
1(c)(ii)	paralysis		1	AO1 2.7.1l,m
Total			**5**	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
2(a)(i)	a catalyst		1	AO1 2.5.1a,b, 2.6.1a
2(a)(ii)	protein		1	AO1 2.5.1b, 2.6.1a
2(a)(iii)	salivary glands		1	AO1 2.5.2d
2(b)	 extra lines from any enzyme cancels that mark		3	AO1 2.5, 2.5.2i
Total			**6**	

<table>
<tr><th>Question</th><th>Answers</th><th>Extra information</th><th>Mark</th><th>AO / Spec. Ref.</th></tr>
<tr><td>3(a)</td><td>
<table>
<tr><th>Structure</th><th>Organ</th><th>Organ system</th><th>Tissue</th></tr>
<tr><td>Stomach</td><td>✓</td><td></td><td></td></tr>
<tr><td>Cells lining the stomach</td><td></td><td></td><td>✓</td></tr>
<tr><td>Mouth, oesophagus, stomach, liver, pancreas, small and large intestine</td><td></td><td>✓</td><td></td></tr>
</table>
all 3 correct = 2 marks
2 correct = 1 mark
1 or 0 correct = 0 marks</td><td></td><td>2</td><td>AO1
2.2, 2.2.1a,b,c, d</td></tr>
<tr><td>3(b)(i)</td><td>diffusion</td><td>allow phonetic spelling</td><td>1</td><td>AO1
2.1.2a,b,c</td></tr>
<tr><td>3(b)(ii)</td><td>glucose</td><td></td><td>1</td><td>AO1
2.6.1b</td></tr>
<tr><td>3(b)(iii)</td><td>mitochondria</td><td></td><td>1</td><td>AO1
2.6.1b,d</td></tr>
<tr><td>Total</td><td></td><td></td><td>5</td><td></td></tr>
</table>

Question	Answers	Extra information	Mark	AO / Spec. Ref.
4(a)(i)	LHS = water RHS = oxygen	accept H_2O do **not** accept H^2O / H2O accept O_2 do **not** accept O / O^2 / O2	1 1	AO1 2.3.1a,b
4(a)(ii)	light / sunlight	ignore solar / sun / sunshine do **not** allow thermal / heat	1	AO1 2.3.1a,b
4(a)(iii)	chloroplasts	allow chlorophyll	1	AO1 2.3.1b
4(b)(i)	20		1	AO2 2.3
4(b)(ii)	any **one** from: • light (intensity) • temperature		1	AO2 2.3, 2.3.1c,d
4(c)(i)	To increase the rate of growth of the tomato plants		1	AO2 2.3, 2.3.1c,d
4(c)(ii)	Because it would cost more money than using 0.08% Because it would not increase the rate of photosynthesis of the tomato plants any further		1 1	AO2 2.3, 2.3.1c,d
Total			**9**	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
5(a)(i)	(female) has XX / only X's / no Y	allow has X chromosomes ignore ref to genes / cells	1	AO2 2.7.2b, 2.7.3a
5(a)(ii)	extra chromosome / has 47 chromosomes / one set has 3 copies no. 18	ignore reference to chromosome numbers other than 47 or no. 18	1 1	AO2 2.7.1a,e, 2.7.3a
5(b)(i)	14	allow in range of 13.5 to 14.5	1	AO2 2.7.1a,e, 2.7.3a
5(b)(ii)	7	allow in range of 6.75 to 7.25 accept ecf from 5bi	1	AO2 2.7.1a,e, 2.7.3a
5(c)	Advantages: any **two** from: • more than 1 embryo (so more chance of success) • tested at 3 days cf 10 weeks **or** tested earlier • tested before pregnancy • no termination / abortion • spare embryos have a potential use Disadvantages: any **one** from: • needs an operation • (spare) embryos / human life destroyed / harmed • higher cost • embryos might not implant / might not develop	allow method 2 may cause a miscarriage tested when only 3 days old accept described hazard of operation must be comparative	2 1	AO3 2.7, 2.7.3d
Total			**8**	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
6(a)(i)	any **two** from: • trapped / held (since sticky) • engulfed / covered by resin • prevented decay	allow engulfed / covered by amber	2	AO2 / AO3 2.8.1b
6(a)(ii)	any **two** from: • animal / plant (dies and) body covered in sediment / mud • bones / shells / hard parts do not decay • minerals enter bones / parts are replaced by other materials / mineralisation • preserved traces / footprints / burrows / rootlet traces / impressions / casts	ignore ref to rock allow covered in tar / ice	2	AO1 2.8.1b
6(b)(i)	New technology provides more valid evidence.		1	AO3 2.8

Question	Answers	Extra information	Mark	AO / Spec. Ref.
6(b)(ii)	any **three** from: examples of physical factors, eg • flooding • drought • ice age / temperature change examples of biological factors, eg • (new) predators (allow hunters) • (new) disease / named pathogen • competition for food • competition for mates • cyclical nature of speciation • isolation • lack of habitat or habitat change	accept 3 physical factors or 3 biological factors or some of each for full marks ignore pollution competition must be qualified **if no other answers given allow** natural disaster / weather change / catastrophic event / environmental change / climate change for **1** mark	3	AO1 2.8.1e
Total			**8**	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
7(a)(i)	glycerol		1	AO1 2.5.2f
7(a)(ii)	pancreas / small intestine	accept duodenum / ileum ignore intestine unqualified	1	AO1 2.5.2f
7(b)	any **two** from: • type of milk • volume / amount of milk • vol. bile equals vol. water • volume of lipase • concentration of lipase • temperature	ignore time interval ignore solution unqualified do **not** allow pH ignore starting pH ignore volume / amount of bile / water ignore concentration of bile accept amount of lipase if neither volume nor concentration given	2	AO3 2.5.2f,h
7(c)(i)	fatty acid (production)		1	AO2 2.5.2f,h
7(c)(ii)	faster reaction / digestion (with bile) **or** pH decreases faster (with bile) **or** takes less time (with bile) **or** steeper fall / line (with bile)	allow use of data ignore easier	1	AO3 2.5.2f,h

Question	Answers	Extra information	Mark	AO / Spec. Ref.
7(c)(iii)	all fat / milk digested **or** same amount of fatty acids present **or** (lower pH) denatures the enzyme / lipase	allow all reactants used up ignore reference to neutralisation allow enzyme won't work at low pH do **not** allow enzyme killed	1	AO2 2.5.2f,h
Total			**7**	

Question	Answers	Extra information	Mark	AO / Spec. Ref
8			6	AO1 / AO2 / AO3 2.4, 2.4.1a,b,prac

Marks awarded for this answer will be determined by the Quality of Written Communication (QWC) as well as the standard of the scientific response. Examiners should also refer to the information on page 5 and apply a 'best-fit' approach to the marking.

0 marks	Level 1 (1–2 marks)	Level 2 (3–4 marks)	Level 3 (5–6 marks)
No relevant content.	The apparatus needed to measure the leaf is identified **or** the apparatus needed to measure light intensity is identified **or** an appropriate use of the tape measure is identified.	There is a description of a leaf being measured at different locations **or** light being measured at different locations.	There is a description of a leaf **and** light being measured at different locations **and** repetitions are included **or** a control variable is described **or** appropriate mathematical treatment of the data is described

examples of points made in the response:

- use of tape measure to produce transect
- transect placed coming out of shady area (eg woodland) into lighter area
- repeat transects
- samples at same height above ground
- samples at same aspect (N / E / S / W) on trees
- measurement of length, or width, of leaves using ruler
- measure several leaves at each location
- use of light meter to measure light intensity
- repeat measurements of light intensity on several days
- measure light intensities at same time of day
- calculate mean for each location
- plot graph of mean leaf length, or width, vs. light intensity

extra information

allow attempt to overcome other variables – eg soil water / soil pH / temperature

Total		6

Question	Answers	Extra information	Mark	AO / Spec. Ref.
9(a)(i)	in the chromosome(s) in the nucleus	ignore genes / alleles allow nuclei allow mitochondria	1 1	AO1 2.7.2f, 2.7.1b
9(a)(ii)	the DNA / chromosomes / genes are replicated / copied / multiplied / doubled / duplicated	allow DNA is cloned ignore same DNA / chromosomes / genes if unqualified	1	AO1 2.7.1a,c,n
9(b)(i)	1 / one		1	AO2 2.7.2c,e, 2.7.3a,c
9(b)(ii)	2 / two		1	AO2 2.7.2c,d, 2.7.3a,b
9(c)	**B**		1	AO3 2.7.2i
Total			**6**	