SPECIMEN MATERIAL

GCSE
BIOLOGY

PAPER 2F

Mark scheme

Specimen 2018

Version 1.0

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.

Further copies of this mark scheme are available from aqa.org.uk

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

Marks should be awarded for each stage of the calculation completed correctly, as students are instructed to show their working.

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

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 'ecf' 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 as well, will still mean that the mark is not awarded.

Level of response marking instructions

Level of response mark schemes are broken down into levels, each of which has a descriptor. The descriptor for the level shows the average performance for the level. There are marks in each level.

Before you apply the mark scheme to a student's answer read through the answer and annotate it (as instructed) to show the qualities that are being looked for. You can then apply the mark scheme.

Step 1 Determine a level

Start at the lowest level of the mark scheme and use it as a ladder to see whether the answer meets the descriptor for that level. The descriptor for the level indicates the different qualities that might be seen in the student's answer for that level. If it meets the lowest level then go to the next one and decide if it meets this level, and so on, until you have a match between the level descriptor and the answer. With practice and familiarity you will find that for better answers you will be able to quickly skip through the lower levels of the mark scheme.

When assigning a level you should look at the overall quality of the answer and not look to pick holes in small and specific parts of the answer where the student has not performed quite as well as the rest. If the answer covers different aspects of different levels of the mark scheme you should use a best fit approach for defining the level and then use the variability of the response to help decide the mark within the level, ie if the response is predominantly level 3 with a small amount of level 4 material it would be placed in level 3 but be awarded a mark near the top of the level because of the level 4 content.

Step 2 Determine a mark

Once you have assigned a level you need to decide on the mark. The descriptors on how to allocate marks can help with this. The exemplar materials used during standardisation will help. There will be an answer in the standardising materials which will correspond with each level of the mark scheme. This answer will have been awarded a mark by the Lead Examiner. You can compare the student's answer with the example to determine if it is the same standard, better or worse than the example. You can then use this to allocate a mark for the answer based on the Lead Examiner's mark on the example.

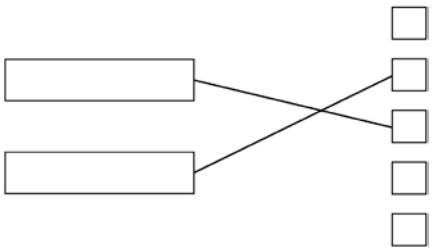
You may well need to read back through the answer as you apply the mark scheme to clarify points and assure yourself that the level and the mark are appropriate.

Indicative content in the mark scheme is provided as a guide for examiners. It is not intended to be exhaustive and you must credit other valid points. Students do not have to cover all of the points mentioned in the Indicative content to reach the highest level of the mark scheme.

You should ignore any irrelevant points made. However, full marks can be awarded only if there are no incorrect statements that contradict a correct response.

An answer which contains nothing of relevance to the question must be awarded no marks.

Question 1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.1	**A**		1	AO1/1 4.6.1.4
01.2			1 1	AO1/1 4.6.1.8 AO1/1 4.6.1.8
01.3	one x circled under mother	accept if clearly indicated choice even if not circled	1	AO1/1 4.6.1.8
01.4	XY	allow YX	1	AO1/1 4.6.1.8
01.5	50 (%)		1	AO2/1 4.6.1.8
Total			**6**	

Question 2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.1	snail **or** shrew	additional incorrect answer negates correct answer	1	AO2/1 4.7.2.1 4.7.4.1
02.2	shrew	additional incorrect answer negates correct answer	1	AO2/1 4.7.2.1 4.7.4.1
02.3	fewer shrews to eat them		1	AO2/1 4.7.4.1
02.4	population		1	AO1/1 4.7.1.1
02.5	**C**		1	AO3/2a 4.7.4.2
02.6	(11 000 × 0.1 =) 1 100 (kJ)		1	AO2/2 4.7.4.3
02.7	the snails do not eat the roots of the lettuces		1	AO2/1 4.7.4.3
02.8	any **one** from: • light (intensity) • temperature • moisture (levels) • soil pH • mineral / ion content (of soil) • wind intensity / speed • carbon dioxide (levels) • oxygen (levels)	ignore wind direction	1	AO1/1 4.7.1.2
Total			**8**	

Question 3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.1	measure the length / area of the field		1	AO1/2 4.7.2.1
03.2	use (a) random number(s) (generator) **or** use coordinates method explained		1	AO3/3b 4.7.2.1
03.3	compare their results with another student's results place more quadrats		1 1	AO3/3b 4.7.2.1 AO3/3b 4.7.2.1
03.4	0.25 × 5 = 1.25 500/1.25 = 400 (40 × 400 =) 16 000	 allow 16 000 with no working shown for **3** marks	1 1 1	AO2/2 4.7.2.1 AO2/2 4.7.2.1 AO2/2 4.7.2.1
03.5	11		1	AO2/1 4.7.2.1
03.6	(quadrat) 5 very few or only 2 growing (here)	both quadrat number and correct reason must be given for **1** mark	1	AO3/2b 4.7.2.1
Total			**9**	

Question 4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.1	liver		1	AO1/1 4.5.3.2
04.2	insulin	do **not** accept glucagon	1	AO1/1 4.5.3.2
04.3	kidney		1	AO1/1 4.5.3.3
04.4	to replace water / ions / salt (that is) lost in sweat		1 1	AO2/1 4.5.3.3 AO2/1 4.5.3.3
Total			**5**	

Question 5

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.1	(140 + 240 + 380 + 450 =) 1210		1	AO2/2 4.7.3.4
05.2	the local people decided to farm cattle		1	AO2/1 4.7.3.4
	a company starts growing plants for biofuels		1	AO2/1 4.7.3.4
05.3	carbon dioxide	in this order only	1	AO1/1 4.7.3.4
	photosynthesis		1	AO1/1 4.7.3.4
05.4	animals and birds migrate because there is less food		1	AO1/1 4.7.3.4
	more habitats are destroyed		1	AO1/1 4.7.3.4
05.5	any **one** from: • breeding programmes (for endangered species) • regeneration (programmes) • reintroduction of field margins / hedgerows • awareness raising with politicians / public • recycling		1	AO1/1 4.7.3.6
Total			**8**	

Question 6

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.1	grown down	allow longer	1	AO2/1 4.5.4.1
	towards gravity / gravitropism	allow geotropism	1	AO2/1 4.5.4.1
06.2	grow up		1	AO2/1 4.5.4.1
	towards the light	allow phototropism	1	AO2/1 4.5.4.1
06.3	3		1	AO3/1a 4.5.4.1
06.4	repeat the experiment		1	AO2/2 4.5.4.1
06.5	seeds germinate sooner so growing season is longer		1	AO3/3a 4.5.4.2
Total			**7**	

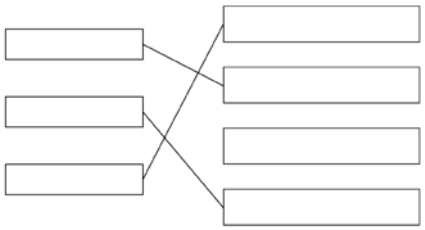
Question 7

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.1	any **two** from: • drop the ruler from the same height • use the same / dominant hand each time • thumb same distance from ruler at the start • use same type / weight of ruler • drop the ruler without any force each time • keep arm resting on the edge of the table		2	AO2/2 4.5.2.1
07.2	8	allow 8.0	1	AO2/2 4.5.2.1
07.3	2 (in test number 2)		1	AO3/1a 4.5.2.1
07.4	12		1	AO2/2 4.5.2.1
07.5	(12 + 13 + 13 + 9 + 8 / 5 =) 11		1	AO2/2 4.5.2.1
07.6	0.15 − 0.12 (s) 0.03 (s)	 allow 0.03 (s) with no working shown for **2** marks	1 1	AO2/2 4.5.2.1 AO2/2 4.5.2.1
07.7	carry out more repeats		1	AO3/3b 4.5.2.1

Question 7 continued

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.8	caffeine speeds up reflex actions **or** reduces reaction time		1	AO3/2b 4.5.2.1
Total			**10**	

Question 8

Question	Answers	Extra information	Mark	AO / Spec. Ref.
08.1			1 1 1	AO1/1 4.6.3.1 AO1/1 4.6.3.2 AO1/1 4.6.3.3
08.2	a gene	allow allele	1	AO1/1 4.6.1.4
08.3	4		1	AO3/1a 4.6.1.5
08.4	correct derivation of children's genotypes identification of children with cystic fibrosis (dd) 0.25	 allow ecf allow ¼ / 25% / 1 in 4 / 1:3 do **not** accept 1:4	1 1 1	AO2/1 4.6.1.6 AO3/1b 4.6.1.6 AO2/1 4.6.1.6
08.5	heterozygous		1	AO2/1 4.6.1.6
Total			**9**	

Question 9

Question	Answers	Extra information	Mark	AO / Spec. Ref.
09.1	**A** – pituitary		1	AO1/1 4.5.3.4
	B – adrenal		1	AO1/1 4.5.3.1
09.2	ovary		1	AO1/1 4.5.3.4
09.3	diaphragm	allow phonetic spelling	1	AO3/2a 4.5.3.5
09.4	condom		1	AO2/1 4.5.3.5

Question 9 continues on the next page

Question 9 continued

Question	Answers	Mark	AO / Spec. Ref.
09.5	**Level 2:** A detailed and coherent evaluation is provided which considers a range of advantages and disadvantages and comes to a conclusion consistent with the reasoning.	3–4	AO3/1b 4.5.3.5
	Level 1: An attempt to describe the advantages and disadvantages is made, which may not come to a conclusion. The logic may be inconsistent at times.	1–2	AO3/1a 4.5.3.5
	No relevant content	0	
	Indicative content **advantages of the plastic IUD:** • is effective for longer than the copper IUD • does not need to be replaced as often as the copper IUD • although the pain of periods are more severe, the pain with the copper IUD is likely to be worse • can reduce the bleeding during a period • most of the possible side effects are not serious, eg feeling sick, acne and headaches. **disadvantages of the plastic IUD:** • needs to be implanted for a period of time before it is effective ie not emergency contraception • can make the pain of period more severe • can cause more side effects than the copper IUD • can cause some more severe side effects such as cysts on the ovaries an understanding that the side effects are only possible and may not necessarily occur **additional examiner guidance:** • pupils should add value to the points in the table and should not just be copies verbatim • credit can also be given for other correct advantages and disadvantages from the candidates' own knowledge and understanding • allow converse points if clearly made		

Total			9

Question 10

Question	Answers	Extra information	Mark	AO / Spec. Ref.
10.1	(Jean Baptiste) Lamarck	allow phonetic spelling	1	AO1/1 4.6.3.1
10.2	(snake is) covered in sediment / mud **or** sinks into the mud		1	AO2/1 4.6.3.5
	(then) the soft parts decay / are eaten **or** bones / hard parts do not decay		1	AO2/1 4.6.3.5
	(so) minerals enter bones **or** bones are replaced by minerals		1	AO1/1 4.6.3.5

Question 10 continues on the next page

Question 10 continued

Question	Answers	Mark	AO / Spec. Ref.
10.3	**Level 3:** A detailed and coherent explanation is provided. Logical links between clearly identified, relevant points explain how the rat snake evolved through the process of natural selection.	3–4	AO2/1 4.6.3.1
	Level 2: Simple statements made, but not precisely. The logic is unclear.	1–2	AO1/1 4.6.3.1
	No relevant content	0	
	Indicative content **statements:** • there are lots of different colours of snakes • some shades of green are closer to the colour of the environment (in Japan) than others • survivors (in each generation) will breed and produce offspring **explanations:** • different colours are controlled by different genes / alleles / are caused by mutations • being green means they are best suited to grassy / green environments • being green means they are camouflaged • those that are camouflaged best will be able to catch more food • those that are camouflaged best will be able to avoid being eaten • survivors' offspring will inherit the genes / alleles / mutation for the shade of green colouration **additional examiner guidance:** • allow converse points relating to the Texas rat snake if they clearly identify the reasons why this snake was at an evolutionary disadvantage, ie more likely to be caught and eaten by a predator • a good level 2 answer will clearly link survival and breeding to the passing on of the advantageous genes / alleles / mutations and link the idea of colour (AO2) to a correct explanation of its significance for survival		

Question 10 continued

Question	Answers		Mark	AO / Spec. Ref.
10.4	any **one** from: • changes to the environment • new predators • new diseases • new (more successful) competitors • catastrophic event / described event		1	AO1/1 4.6.3.6
Total			**9**	

Question 11

Question	Answers	Extra information	Mark	AO / Spec. Ref.
11.1	methane is produced which is a greenhouse gas / causes global warming	ignore bad smell	1 1	AO1/1 4.7.2.3 AO1/1 4.7.3.5
11.2	(9.80/0.20 = 49 therefore) 49:1		1	AO2/2 4.4.1.3
11.3	horse (manure) closest to 25:1 (ratio)	allow ecf from **11.2**	 1	 AO3/2a 4.7.2.3

Question 11 continued

Question	Answers		Mark	AO / Spec. Ref.
11.4	**Level 3:** A detailed and coherent explanation is given, which logically links how carbon is released from dead leaves and how carbon is taken up by a plant then used in growth.		5–6	AO1/1 4.4.1.1 4.4.1.3 4.4.2.1 4.7.2.2
	Level 2: A description of how carbon is released from dead leaves and how carbon is taken up by a plant, with attempts at relevant explanation, but linking is not clear.		3–4	
	Level 1: Simple statements are made, but no attempt to link to explanations.		1–2	
	No relevant content		0	
	Indicative content **statements:** • (carbon compounds in) dead leaves are broken down by microorganisms / decomposers / bacteria / fungi • photosynthesis uses carbon dioxide **explanations:** • (microorganisms) respire • (and) release the carbon from the leaves as carbon dioxide • plants take in the carbon dioxide released to use in photosynthesis to produce glucose **use of carbon in growth:** • glucose produced in photosynthesis is used to make amino acids / proteins / cellulose • (which are) required for the growth of new leaves			
11.5	any **three** from: (storage conditions) • (at) higher temperature / hotter • (had) more oxygen • (had) more water / moisture • (contained) more microorganisms (that cause decay)	allow reference to bacteria / fungi / mould	3	AO2/1 4.7.2.3
Total			**13**	

Question 12

Question	Answers	Extra information	Mark	AO / Spec. Ref.
12.1	any **two** from: • so that they do not have specific genetic defects • to produce docile cats or so they are not aggressive • for aesthetic reasons	allow descriptions of aggression such as biting and scratching allow descriptions of suitable aesthetic reasons	2	AO1/1 4.6.2.3
12.2	(cats) are more likely to pass on (recessive) disorders **or** more likely to be susceptible to diseases		1	AO1/1 4.6.2.3
12.3	**Level 2:** A detailed and coherent explanation is given, which logically links the process of selective breeding with explanations of how this produces cats that do not cause allergic reactions.		3–4	AO2/1 4.6.2.3
	Level 1: Simple statements are made relating to process of selective breeding, but no attempt to link to explanations.		1–2	
	No relevant content		0	
	Indicative content **process:** • parents with the desired characteristic are selected • the parents are bred together to produce offspring • offspring with the desired characteristics are selected and bred • this is repeated over many generations. **explanations:** • parents who produce the least Fel D1 are initially selected • in their offspring there will be individuals with differing amounts of Fel D1 produced • of these, in each generation, the lowest Fel D1 producing individuals are chosen • care is taken to ensure cats are healthy and avoid possible problems associated with selective breeding • over time the population of (selectively bred) cats will produce less Fel D1			
Total			**7**	

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