

GCSE 2004

June Series



Mark Scheme

Biology Specification B

3411/F

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

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of candidates' 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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GCSE BIOLOGY

INFORMATION FOR 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 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

- 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 lines 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 / ; e.g. allow smooth / free movement.)

3. Marking points

3.1 Marking of Quality of Written Communication

Where *Quality of written communication* appears in the mark scheme, one mark is to be awarded for either of the following points:

- Using correct scientific terms
- Correct sequencing or linking of ideas or points

The mark scheme will specify which of the points is to be awarded in a particular question. A QoWC mark can be awarded for a scientific answer, even if it is not accurate. It cannot be awarded for a nonsensical or non-scientific answer.

On the script, the QoWC tick should be identified by a ‘q’ written next to it.

3.2 Marking of lists

This applies to questions requiring a set number of responses, but for which candidates 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)

| Candidate | Response | Marks awarded |
|-----------|----------|---------------|
| 1 | 4,8 | 0 |
| 2 | green, 5 | 0 |
| 3 | red*, 5 | 1 |
| 4 | red*, 8 | 0 |

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

| Candidate | Response | Marks awarded |
|-----------|------------------------|---------------|
| 1 | Pluto, Mars, Moon | 1 |
| 2 | Pluto, Sun, Mars, Moon | 0 |

3.3 Use of chemical symbols/formulae

If a candidate 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.

3.4 The marking of quantitative relationships

Full credit can be given for a correct quantitative relationship expressed in:

- named units;
- physical quantities;
- standard symbols;
- a combination of physical quantities and units.

No credit can be given for any quantitative relationship expressed in terms of:

- a combination of physical quantities, units and symbols;
- a diagram, e.g. the ohm's law triangle, unless the rest of the answer shows clearly that the candidate understands the relationships involved.

3.5 Marking procedure for calculations

3.5.1 Full marks can be given for a correct numerical answer, as shown in the column 'answers', 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;
- if the answer is correct, but an incorrect relationship is written in the working, then no marks can be awarded (see 3.5.2).

3.5.2 Where calculations are based on incorrectly recalled relationships, neither the incorrectly recalled relationship, nor the resulting calculation based on the incorrect relationship, will be credited.

3.6 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.

3.7 Errors carried forward

There should be no error carried forward from a previous answer which has been based on wrong science. Any error in the answers to a structured question should be penalised once only.

Examples

- (a) A candidate who calculates average speed using $\text{speed} = \text{time}/\text{distance}$ **and** then proceeds to use this incorrect answer to calculate an acceleration based on the correct quantitative relationship should be given credit for the use of the correct acceleration relationship but none for either numerical answer.
- (b) A candidate who incorrectly calculates average speed using $\text{speed} = \text{distance}/\text{time}$ and then proceeds to use this incorrect value to calculate an acceleration based on the correct quantitative relationship, should be given credit for the use of both correct quantitative relationships **and** for the correct substitution and use of the incorrect value in the calculation of the rate of acceleration.

Papers should be constructed in such a way that the number of times errors can be carried forward are 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.

3.8 Phonetic spelling

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

3.9 Brackets

(.....) is 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.

3.10 Interpretation of marginal points

There will be times when the answer is almost, but not quite, correct. Some examiners would award a mark while others would not. In any one script, an attempt should be made to balance these nearly correct answers by giving the mark on some occasions but not on others. If this is not done, the marking would end up being too lenient or too harsh.

3.11 Unexpected Correct Answers not in the Mark Scheme

The Examiner should use professional judgement to award credit where a candidate has given an unexpected correct answer which is not covered by the mark scheme. The Examiner should consult with the Team Leader to confirm the judgement. The Team Leader should pass this answer on to the Principal Examiner with a view to informing all examiners.



GCSE Biology
Foundation Tier 3411/F

3411F Q1

| question | answers | extra information | mark |
|----------|-----------------------|-------------------|------|
| | <u>In sequence:</u> | | |
| | retina | | 1 |
| | (optic) nerve | | 1 |
| | iris | | 1 |
| | sclera | | 1 |
| | (suspensory) ligament | | 1 |
| total | | | 5 |

3411F Q2

| question | answers | extra information | mark |
|----------|----------------------------|---|------|
| (a)(i) | A = nucleus | | 1 |
| | B = (cell) <u>membrane</u> | | 1 |
| (ii) | (cell) membrane | | 1 |
| (b) | 70 | if correct answer, ignore working or lack of working $\frac{63 + 78 + 69}{3}$ for 1 mark | 2 |
| total | | | 5 |

3411F Q4

| question | answers | extra information | mark |
|----------|---|----------------------------|-------------|
| (a) | <u>In sequence:</u> (ribcage) up / out (diaphragm) down / flatter | | 1 1 |
| (b)(i) | <u>On diagram:</u> oxygen arrow to blood from air and CO ₂ arrow to air from blood oxygen arrow to red blood cell CO ₂ arrow from plasma | | 1 1 1 |
| (ii) | diffusion | | 1 |
| (iii) | large surface or large area | do not accept space | 1 |
| total | | | 7 |

3411F Q5

| question | answers | extra information | mark |
|----------|---|---|------|
| (a) | <u>In sequence:</u> heron frog slug lettuce | | 1 |
| (b)(i) | light / sun | ignore photosynthesis / respiration cancel mark if water / ions etc given do not accept heat | 1 |
| (ii) | traps / absorbs light | accept energy for light do not accept collects / attracts do not accept 'traps sun' | 1 |
| (iii) | 162 | if correct answer, ignore working / lack of working $\frac{10 \times 1620}{100}$ for 1 mark | 2 |
| total | | | 5 |

3411F Q6

| question | answers | extra information | mark |
|----------|---|-------------------|----------------------------|
| | <u>In sequence:</u> light gravity moisture hormones dark more | | 1 1 1 1 1 1 |
| total | | | 6 |

3411F Q7

| question | answers | extra information | mark |
|----------|--|------------------------------|------|
| (a) | (in table) 4920 | | 1 |
| (b) | exercise produces heat or causes rise in body temperature / makes athlete hot | named activity produces heat | 1 |
| | needs to cool or needs to maintain temperature or sweat helps to cool the body | | 1 |
| (c) | more / a lot of <u>water</u> lost in sweating / breathing | | 1 |
| | replace water / prevent dehydration | | 1 |
| total | | | 5 |

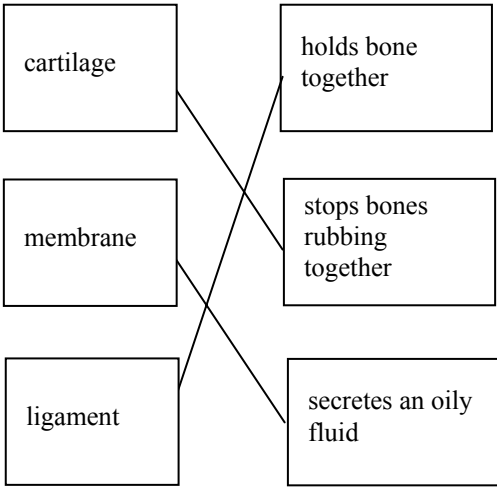
3411F Q8

| question | answers | extra information | mark |
|----------|---|--|------|
| (a)(i) | increases | | 1 |
| (ii) | decreases | | 1 |
| (b) | any two from: <ul style="list-style-type: none"> • competition for water • competition for ions / minerals / salts / nutrients • competition for light | accept correct named example do not accept food do not accept <u>all</u> ignore space | 2 |
| (c) | kills / harms other / named organisms | | 1 |
| total | | | 5 |

3411F Q9

| question | answers | extra information | mark |
|----------|---|-------------------|--------|
| (a) | X (no mark) X is more visible or Y is more camouflaged | | 1 |
| (b)(i) | so camouflage not changed or so not easier to see | | 1 |
| (ii) | 25 7 | | 1 1 |
| (iii) | any one from: • eaten (by birds) / died • mixed in with large number of unmarked moths • moved away | | 1 |
| (c)(i) | DNA | | 1 |
| (ii) | the <u>gene</u> / <u>allele</u> for being dark / dominant | | 1 |
| total | | | 7 |

3411F Q10

| question | answers | extra information | mark |
|----------|---|--|--------------------|
| (a) | any two from: <ul style="list-style-type: none"> • provide support / shape / structure • muscle attachment • movement | allow reference to protection (of vital organs) and blood cell production | 2 |
| (b) |  | | 3 |
| (c)(i) | bones (forced out of) joint / out of place | | 1 1 |
| (ii) | ligaments / other tissues torn / damaged | must be referring to an appropriate tissue | 1 1 |
| (d) | (muscles) kept toned / slightly tensed / ready to contract / improved strength / prevents stiffness or soreness after exercise / prevents cramp / reduces chance of pull or strain any one from: <ul style="list-style-type: none"> • improves blood flow / strengthens heart (muscle) • reduces blood pressure • reduces incidence of heart disease | allow 'builds up muscles' allow 'prevents muscles seizing up' do not accept keeps heart healthy | 1 1 |
| total | | | 11 |

3411F Q11

| question | answers | extra information | mark |
|----------|--|-------------------------------|--------|
| (a) | to penetrate skin | | 1 |
| (b) | secrete saliva / anticoagulant (into capillaries) suck <u>blood</u> (from capillaries) | | 1 1 |
| (c) | help to draw <u>blood</u> in / suck <u>blood</u> or create low pressure so <u>blood</u> flows in | allow help to pump out saliva | 1 |
| total | | | 4 |

3411F Q12

| question | answers | extra information | mark |
|----------|--|---|--------|
| (a) | bacteria / fungi / microbes / microorganisms | do not allow germs, but only penalise once throughout whole question | 1 |
| (b)(i) | to kill bacteria / fungi / etc (already present in solution) | allow 'to sterilise it' | 1 |
| (ii) | bacteria / fungi / etc can get in (through straight tube) | | 1 |
| (iii) | bacteria / fungi etc get stuck / can't get in in curved part of tube / because of the shape | | 1 1 |
| total | | | 5 |

3411F Q13

| question | answers | extra information | mark |
|----------|---|--|------|
| (a) | urea | | 1 |
| (b) | any four from: <ul style="list-style-type: none"> • suitable for short term • no long term drug treatment • no rejection chance • no / less risk during surgery • operations unsuitable / risky for weakness / old age • risk of infection • no (suitable) kidneys available for transplant / long waiting list / • less painful | accept reverse arguments with respect to transplants accept risk of anaesthetic | 4 |
| total | | | 5 |

3411F Q15

| question | answers | extra information | mark |
|----------|--|---|------|
| (a)(i) | protease | accept peptidase or named protease e.g. pepsin / trypsin allow 'proteinase' | 1 |
| (ii) | amino acids | accept peptides / polypeptides / peptones | 1 |
| (b) | points plotted accurately | $\pm \frac{1}{2}$ square deduct 1 mark per error | 2 |
| | best fit curve or ruled point-to-point | if double line within $\frac{1}{2}$ square allow sharp apex do not allow single straight line if no points line defines points if (5,0) not plotted only penalise 1 mark bar graph wide bars – no marks bar graph $\pm \frac{1}{2}$ square max 2 for points | 1 |
| (c)(i) | 2 or correct from candidate's graph | $\pm \frac{1}{2}$ square | 1 |
| (ii) | stomach | | 1 |
| (d) | proteins are large / product is small | | 1 |
| | proteins (may be) insoluble / product is soluble | | 1 |
| | cannot be absorbed / cannot enter blood or cannot pass through gut lining | accept reverse referring to product | 1 |
| total | | | 10 |

3411F Q16

| question | answers | extra information | mark |
|----------|--|---|------|
| (a) | burning fossil fuels / named example | accept <u>driving</u> cars / lorries etc burning fuels in power stations ignore combustion unqualified do not accept catalytic converter on its own or emissions from power stations | 1 |
| (b)(i) | pollutants / smoke <u>breathed in</u> | | 1 |
| (ii) | SO ₂ and deaths rise (and fall) at same times or SO ₂ and deaths parallel each other / show same pattern | | 1 |
| (iii) | no – could be due to some other factor / pollutant / to smoke or correlation not precise / described | explanations must come to a conclusion named examples must be plausible allow ‘coincidence’ | 1 |
| total | | | 4 |

3411F Q18

| question | answers | extra information | mark |
|----------|---|--|------------|
| (a)(i) | lower – B loses less (water / mass) than C or described in terms of petroleum jelly | accept converse re Leaf C | 1 |
| (ii) | yes - B and C lose less than D or B and C lose more than A or D loses the <u>most</u> or A loses the <u>least</u> | do not accept just ‘all leaves lose some weight’ | 1 |
| (b)(i) | X = stoma Y = guard cell | accept stomata / stomatal pore do not accept air space | 1 1 |
| (ii) | petroleum jelly blocks stomata / pores or petroleum jelly prevents water loss or petroleum jelly waterproofs water (mainly) lost via stomata / pores / X or stomata on lower surface only | allow pores are blocked in B | 1 1 |
| total | | | 6 |

3411F Q19

| question | answers | extra information | mark |
|----------|--|---|------|
| (a) | A = protein (coat) | accept capsid / capsomere | 1 |
| | B = DNA / gene(s) / genetic material / nucleic acid | allow RNA do not allow chromosome | 1 |
| (b)(i) | any two from: <ul style="list-style-type: none"> • skin • scabs / clot • mucus • stomach acid / gut protease | allow tears | 2 |
| (ii) | diagram shows extensions of intact cell membrane around viruses | | 1 |
| (iii) | antibodies | allow enzymes re (ii) allow interferon ignore antitoxins / proteins | 1 |
| (c) | <u>virus</u> is transferred | | 1 |
| | (virus in) blood / body fluids – transfer (via needles) | | 1 |
| total | | | 8 |

3411F Q20

| question | answers | extra information | mark |
|----------|--|--|------|
| (a) | antibiotics diffuse / pass (into agar) | do not allow into dish | 1 |
| | kill / prevent growth of bacteria or destroy cell wall / bacteria | accept bacteria are dead | 1 |
| (b) | it / higher concentration kills more bacteria or causes less growth | do not accept anything referring to size of circle | 1 |
| | levels off (at 6 units) | accept above 4 units | 1 |
| (c) | Quality of written communication: for correct sequencing or linking of ideas or points | this mark can only be awarded for a plausible attempt (not necessarily biologically correct) to link a precaution to a purpose | 1 |
| | <u>Loop flamed</u> | Q ✓ or Q ✗ | |
| | to sterilise it / kill unwanted microorganisms | accept so no bacteria present do not accept to clean it | 1 |
| | <u>Lid taped</u> | | |
| | prevent bacteria getting in / out or prevent someone touching bacteria | accept microorganisms/fungi for bacteria do not accept viruses or germs | 1 |
| | <u>25°C</u> | | |
| | prevents / reduces <u>growth</u> of / reproduction | | 1 |
| | harmful bacteria / microorganisms or pathogens | | 1 |
| (d) | any two from: <ul style="list-style-type: none"> • to avoid over-use of antibiotics or use no / less / low concentration antibiotics • select antibiotic that is most effective • finish the course • don't give or use for animals • develop new antibiotics or alternatives | | 2 |
| total | | | 11 |

3411F Q21

| question | answers | extra information | mark |
|----------|--|---|------|
| (a) | warmer when leaving | | 1 |
| | (heat produced) by (metabolic) reactions / respiration / fermentation | | 1 |
| (b) | provide oxygen | | 1 |
| | for respiration (of microorganisms) | aerobic respiration = 2 marks | 1 |
| (c) | any two from: <ul style="list-style-type: none"> • pH • temperature • nutrients or named ones • oxygen • protein concentration / amount • speed of paddles or stirring | do not accept conditions before fermenter | 2 |
| (d) | curve / line from bottom left to top right | going upwards must extend to at least 4.5 days | 1 |
| | shape a mirror image of graph (sigmoid curve) | ignore time lag reasonable attempt | 1 |
| (e) | no air / oxygen | | 1 |
| total | | | 9 |