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General Certificate of Secondary Education
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Biology BL3HP

(Specification 4401)

Unit 3: Biology 3

Final

Mark Scheme

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 events which all examiners 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 examiner understands and applies it in the same correct way. As preparation for standardisation each examiner 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, examiners encounter unusual answers which have not been raised 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 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

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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 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 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.

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 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.

3.6 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 is 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 3(b) candidates 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.

Candidates 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 1

question	Answers	extra information	mark
1(a)	A aorta	ignore left and right	1
	B ventricle		1
	C atrium	allow atria	1
	D vena cava		1
1(b)(i)	(coronary) artery	allow arteriole	1
1(b)(ii)	stent / description	accept (coronary) by-pass operation allow statins allow diets low in cholesterol allow balloon (angioplasty)	1
1(b)(iii)	(stent) keeps artery open **or** (by-pass) new blood vessel / vein connecting around narrowed region; **or** (statins / low cholesterol diet) remove some of the cholesterol blockage **or** (balloon) widens / opens the blood vessel which allows (more) blood through or allows blood to go around the blockage	must relate to (b)(ii) ignore reference to capillary / vein	1 1

Question 1 continues on the next page . . .

Question 1 continued

question	Answers	extra information	mark
1(c)(i)	F artery	accept arteriole / branch of pulmonary artery	1
	G capillary		1
	H vein	H accept venule / branch of pulmonary vein;	1
1(c)(ii)	F (Pulmonary artery) has less oxygen / more carbon dioxide / more glucose/sugar	accept F (Pulmonary artery) is deoxygenated accept converse for H (Pulmonary vein) 'It' refers to F	1
Total			**12**

Question 2

question	Answers	extra information	mark
2(a)(i)	rise then fall		1
	to peak at 0.48 dm^3 / after 1.2s		1
	(fall) back to 0 / (falling) back after 2.5s	allow 2.6s allow after a further 1.3s / 1.4s	1
2(a)(ii)		ignore contraction and relaxation of muscles ignore reference to pressures, ribcage expanding	
	rise / air in caused by upward/outward movement of ribcage		1
	decrease / air out caused by return of ribcage to original position/downwards		1
	and (rise / air in) by downward movement / flattening of diaphragm **or** (decrease / air out) by upward movement / doming of diaphragm		1

Question 2 continues on the next page . . .

Question 2 continued

question	Answers	extra information	mark
2(b)(i)	in iron lung atmospheric / outside pressure forces air into lungs	allow air sucked / drawn into lungs	1
	in modern respirator air forced (mechanically) into lungs		1
		allow for one mark pressures acts externally in iron lung and internally in modern ventilator	
2(b)(ii)		ignore cost	
	advantage any **one** from: • more freedom of movement for patient • more portable • does not affect blood flow in lower body		1
	disadvantage any **one** from: • (tube in trachea) uncomfortable • more difficult to eat/talk	allow it can damage / overinflate the lungs / over breathe	1
Total			**10**

Question 3

question	Answers	extra information	mark
3(a)(i)	wheat → humans chain transfers 10 times more energy than wheat → pigs → humans chain or wheat → pigs → humans chain transfers 810 000 (kJ per hectare) less	allow 10% if given as a comparison e.g. one is 10% of the other ignore less unqualified	1
3(a)(ii)	any **one** reason for energy loss from pigs e.g.: • movement • (maintaining) body temperature • waste materials • not all parts of pig eaten by human • because there is an extra stage (pigs) in the food chain and energy is lost at each stage	ignore respiration, growth ignore heat unqualified allow named examples allow longer food chain so more energy lost	1

Question 3 continues on the next page . . .

Question 3 continued

3(b)	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.		6
0 marks	**Level 1 (1-2 marks)**	**Level 2 (3-4 marks)**	**Level 3 (5-6 marks)**
No relevant content.	There is a basic description of at least one factory farming method **or** identification of an advantage or disadvantage of factory farming.	There is a description of at least one factory farming method **and** an advantage or disadvantage is explained.	There is a description of factory farming methods **and** advantage(s) and disadvantage(s) are explained.

examples of biology points made in the response:

factory farming methods e.g.:

- Kept in cramped conditions / battery hens / calf crates / pig barns / fish tanks
- Controlled temperature / heating
- Controlled feeding / modified food given / growth hormones
- Controlled lighting
- Treated with prophylactic antibiotics

Advantages e.g.:

- Increased efficiency / profit / greater food production / cheaper food / faster growth
- Farmer can have more livestock
- Less energy is lost through movement
- Less energy is used keeping warm
- (Food is high in calories / protein) so animals will grow faster / lay more eggs
- Easier to vaccinate all the animals
- Easier to protect animals from predators
- Antibiotic treatment stops infections in animals

Disadvantages e.g.:

- Stress / cruelty / inhumane / unethical
- Restricted movement / overcrowding
- Faster spread of diseases
- Antibiotics in the food chain / residual chemicals in the food chain
- Wasting fossil fuels / increasing global warming
- Increased pollution from animal waste and from additional transport

Total			**8**

Question 4

question	answers	extra information	mark
4(a)	solution in soil is more dilute (than in root cells)	concentration of water higher in the soil (than in root cells)	1
	so water moves from the dilute to the more concentrated region	so water moves <u>down</u> (its) concentration gradient **or** water moves from a high concentration <u>of water</u> to a lower concentration	1
	concentration of ions in soil less (than that in root cells)		1
	so energy needed to move ions **or** ions are moved against concentration gradient	the direction of the concentration gradient must be expressed clearly accept correct reference to water potential or to concentrations of water	1
4(b)	any **three** from: • movement of water from roots / root hairs (up stem) • via xylem • to the leaves • (water) evaporates • via stomata		3
4(c)(i)	0.67/0.7	accept 0.66, 0.6666666... or ⅔ or $0.\dot{6}$ correct answer gains **2** marks with or without working if answer incorrect allow evidence of $\frac{100}{150}$ for **1** mark do **not** accept 0.6 or 0.70	2

Question 4 continues on the next page . . .

Question 4 continued

question	Answers	extra information	mark
4(c)(ii)	during the first 30 minutes any **one** from: • it was warmer • it was windier • it was less humid • there was more water (vapour) in the leaves		1
	so there was more evaporation **or** stomata open during first 30 minutes **or** closed after 30 minutes (1) so faster (rate of) evaporation in first 30min **or** reducing (rate of) evaporation after 30min (1)	ignore 'water loss'	1
Total			**11**

Question 5

question	answers	extra information	mark
5(a)	oxygen / O_2 **or** carbon dioxide / CO_2	allow O2 do not accept O^2 allow CO2 do not accept CO^2	1
5(b)	any **four** from: • because structure X / gills has threads / filaments **or** is thin **or** tadpole has longer tail • there is an increased surface area • there is a shorter diffusion pathway • therefore an increase in exchange • eyes (now visible in older tadpole) • so that food / danger etc can be seen	ignore references to tail used for locomotion ignore reference to nostrils ignore food accept reference to a good blood supply accept increased water flow over gills / tail will increase diffusion of gases	4
Total			**5**

Question 6

question	Answers	extra information	mark
6(a)	if body temperature too high blood vessels supplying skin (capillaries) dilate / widen	do **not** accept capillaries / veins dilate/constrict	1
	if body temperature is too low blood vessels supplying skin (capillaries) constrict / narrow	do **not** accept idea of blood vessels moving (through skin) ignore expand accept arteries / arterioles for 'blood vessels' if no reference to skin allow blood vessels dilate and blood vessels constrict for one mark	1
	so more / less blood flows through skin (capillaries) or nearer the surface of the skin	must correctly relate to dilation or constriction	1
	so more / less heat is lost (from the skin by radiation)	must correctly relate to dilation or constriction	1
6(b)	sweat released		1
	cannot evaporate because of high humidity / all the water vapour in the air		1
	so less heat lost / less cooling **or** it is evaporation of sweat that cools the body		1
Total			**7**

Question 7

question	answers	extra information	mark
7(a)	(concentration high) in the hepatic portal vein is blood with glucose absorbed from the intestine		1
	concentration is lower in the hepatic vein because insulin		1
	(has caused) glucose to be converted into glycogen **or** allows glucose into liver cells		1
7(b)(i)	(after 6 hours) most of the glucose has been absorbed from the intestine **or** from food into the blood		1
7(b)(ii)		if biological terms incorrectly spelt they must be phonetically accurate	
	because glucagon (made in the pancreas) causes	do **not** accept glucagon made / produced by the liver	1
	glycogen to be converted into glucose		1
	glucose released into blood	allow the liver maintains the correct / constant level of glucose in the blood	1
Total			**7**

UMS Conversion Calculator: www.aqa.org.uk/umsconversion