OXFORD
INTERNATIONAL
AQA EXAMINATIONS

INTERNATIONAL A-LEVEL BIOLOGY

(9610)

PAPER 3
Mark Scheme

Specimen 2018

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.

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.

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

Q	Part	Marking guidance	Total marks
01	1	Light will vary with depth; Rate of photosynthesis will affect productivity of phytoplankton;	2
01	2	Allows quantities that range over several orders of magnitude/allows large range of data to be plotted;	1
01	3	10;	1
01	4	Any two from, one mark each: Phospholipid; RNA; DNA; ATP; chlorophyll; Note: Do not allow different forms of RNA or ADP/ATP as separate substances Allow nucleic acid but not with DNA or RNA Credit any other correct answer.	2
01	5	Phosphorus is limiting up to a level of 20 arbitrary units; Because an increase in concentration increases productivity; Above 20 arbitrary units, something else is limiting;	3

Q	Part	Marking guidance	Total marks
02	1	The frequency/proportion of alleles (of a particular gene), will stay constant from one generation to the next/over generations/no genetic change over time; Providing no mutation/no selection/population large/population genetically isolated/mating at random/no migration;	3
02	2	White/deaf cats unlikely to survive/selected against; Will not pass on allele (for deafness/white fur) (to next generation)/will reduce frequency of allele;	2
02	3	In Paris/London frequencies (of these alleles) add up to more than 1	1
02	4	Two marks for correct answer of 44(.22); One mark for incorrect answer in which p/frequency of H determined as 0.67 and q/frequency of h as 0.33 OR Answer given as 0.44(22);	2

Q	Part	Marking guidance	Total marks
03	1	(Genes/loci) on same chromosome;	1
03	2	GN and gn linked; GgNn individual produces mainly GN and gn gametes; Crossing over produces some/few Gn and gN gametes; So few / fewer Ggnn and ggNn individuals;	4
03	3	(Grey long:grey short:black long:black short) =1:1:1:1	1
03	4	Chi squared test; Data in categories	2

Q	Part	Marking guidance	Total marks
04	1	F;	1
04	2	B;	1
04	3	Conversion of nitrate to nitrogen; Use nitrate for respiration;	2
04	4	Denitrifying bacteria found in anaerobic conditions; Sandy soils contain more oxygen; Accept converse argument for clay soils but answer must relate to denitrifying bacteria.	2
04	5	Two marks for correct answer of 29 (%); One mark for incorrect answer in which nitrate in soil calculated as 377 (kg ha-1) / leaching calculated as 111 (kg ha-1);	2
04	6	Suggests that less fertiliser might be applied /parts above ground not required to be ploughed in;	1

Q	Part	Marking guidance	Total marks
05	1	Ribulose bisphosphate / RuBP;	1
05	2	ATP and reduced NADP are produced in grana / thylakoids / present in A / both tubes;	1
05	3	4 000 / same as in (tube) C; Light-dependent reaction does not occur / ATP and reduced NADP are not produced;	2
05	4	(Less) glcerate 3-phosphate / GP converted to triose phosphate / TP; (Less) TP converted to ribulose bisphosphate / RuBP;	2
05	5	No / less ATP / ATP produced (during electron transport); No / less reduced NADP / reduced NADP produced (during electron transport);	2

Q	Part	Marking guidance	Total marks
06	1	0.95; In this answer, no credit is awarded for the working	1
06	2	Nitrogen available to plants as nitrate / $NO3^{-}$; Total nitrogen also involves nitrogen in organic form / nitrogen in organic matter;	2
06	3	Larger standard deviation in sand in the open and means similar; Must make some reference to means either as similar or as compared to mean	1
06	4	Shading reduces evaporation / less dense soil so less penetration by water/ more organic matter which absorbs water;	1
06	5	Soil less dense so more oxygen to roots / greater water penetration; Overlap of standard deviations suggest difference in soil moisture / organic matter not significant; Nitrogen in form that can be taken up by plants is lower under C. microphylla;	3

Q	Part	Marking guidance	Total marks
07	1	2 marks for Method of selecting a random sample with sufficient practical detail such that another student could carry it out without guidance 1 mark for Selecting a random sample but with insufficient practical detail such that another student could not carry it out without guidance 0 marks for Method that does not generate a random sample	2
07	2	Measure initial sample and second sample after incubation under required conditions for measured time. Divide increase in length by time in hours;	2
07	3	Difficult to measure accurately if root not straight;	1
07	4	Specimen tube can be maintained in a vertical position / difficult to calculate volume of water in boiling tube;	1
07	5	Establishment of principle that volume by which rod moved up = volume of water moved down; Note that the correct answer will establish this principle Working shown as; $\pi r2l = \pi R2L$ or $\pi \times 32 \times 15 = \pi \times 152 \times L$ or $L = \frac{\pi r2l}{\pi R2}$ or $L = \frac{\pi \times 32 \times 15}{\pi \times 152}$ L = 0.6 mm; Rate given with appropriate units such as 2.4 mm h-1;	4

Q	Part	Marking guidance	Total marks
08	1	Releases energy in small / manageable amounts; (Broken down) in a one step / single bond broken; Immediate energy compound / makes energy available rapidly; Phosphorylates / adds phosphate; Makes (phosphorylated substances) more reactive / lowers activation energy; Reformed/made again;	4 max
08	2	Substrate level phosphorylation / ATP produced in Krebs cycle; Krebs cycle / link reaction produces reduced coenzyme/reduced NAD /reduced FAD; Electrons released from reduced / coenzymes/ NAD / FAD; (Electrons) pass along carriers / through electron transport chain / through series of redox reactions; Energy released; Allow this mark in context of electron transport or chemiosmosis ADP / ADP + Pi; Protons move into intermembrane space; ATP synthase;	6 max
08	3	In the dark no ATP production in photosynthesis; Some tissues unable to photosynthesise / produce ATP; ATP cannot be moved from cell to cell / stored; Plant uses more ATP than produced in photosynthesis; ATP for active transport; ATP for synthesis (of named substance);	5 max