OXFORD
INTERNATIONAL
AQA EXAMINATIONS

INTERNATIONAL A-LEVEL BIOLOGY

(9610)

PAPER 5
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	Cell roughly circular in shape; clean lines and absence of shading; Three-lobed nucleus labelled, lobes of appropriate shape;	2
01	2	Scale bar 0.65 – 0.75 diameter of cell;	1
01	3	Cell surface membrane flexible / cell able to change shape; Distorted by contact with other cells;	2
01	4	Marked slide used to calibrate; Eyepiece micrometer; Cell diameter measured in eyepiece units and converted to micrometres; Measure large number of cells and calculate mean;	4

Q	Part	Marking guidance	Total marks
02	1	Prepare a range of buffer solutions of different pH; Add to Congo-red dyed fibrin and trypsin with volume/concentration specified; Incubate in waterbath/for specified/same time/ at specified temperature between 35 and 40oC; Repeats at each pH; Controls with water/boiled trypsin replacing trypsin at each pH;	4
02	2	Method would generate quantitative data relating to depth of colour of the solution; Either by: Preparing a set of standard solutions of Congo red of known dilution; Match against experimental tubes; Or by: Prepare a set of standard solutions of Congo red of known dilution and calibrate using colorimeter/zero with blank; Using colorimeter to measure absorbance; Rate calculated as amount of Congo red released per unit time;	4
02	3	Plot line graph of colour reading / rate of reaction against pH; Reference to mean values; And error bars to represent standard deviation / standard error; Line graph plotted as two variables are continuous; Assess the probability that the results are due to chance / statistically significant; Standard error and 95% confidence limits; As investigation involves looking for differences between mean values;	6 total 3 max

Q	Part	Marking guidance	Total marks
03	1	Same number of ryegrass seedlings in distilled water;	1
03	2	Produce null hypothesis; Carry out Spearman Rank correlation test / find correlation coefficient; Use values to show P < critical value / find probability of results being due to chance / biologically significant;	2 max
03	3	May be another factor / named factor (that also inhibits germination);	1
03	4	Extract inhibits ryegrass germination / extract stops ryegrass starting to grow; Inhibition of root length / causes ryegrass to have shorter roots;	2
03	5	Scientists crushed plants to get extract; Plants might not secrete substances in the extract into the soil; These substances might get broken down in the soil; Wheat and ryegrass might not grow at the same time / wheat plants Might not produce substance when ryegrass is growing; Concentration of extract in the soil might be different from that in solution;	3 max
03	6	Use no / less herbicide / weed killer; Specific explanation of how less herbicide / weed killer would benefit the environment;	2
03	7	Reduces genetic diversity / gene pool / number of different alleles; Wheat unable to adapt to new conditions / new disease;	2

Q	Part	Marking guidance	Total marks
04	1	Kills fungi/bacteria on surface of seeds or in soil; So only the added fungus has any effect;	2
04	2	So that only nitrate or ammonia/type of fertiliser affects growth;	1
04	3	So that effects of nitrate or ammonium alone could be seen; So that effects of fungus can be seen;	2
04	4	Weigh samples at intervals during drying; Until consecutive values are constant;	2
04	5	With live fungus – showing effects of the fungus: Fungus increases growth of roots and shoots in both; Produces greater growth with nitrate;	2
04	6	With heat-treated fungus – showing effects of fertiliser; Similar dry masses for roots and shoots; Overlapping standard deviations suggest no significant difference;	2
04	7	Dry mass measures/determines increase in biological / organic material; Water content varies;	2
04	8	B;	1

Q	Part	Marking guidance	Total marks
05	1	Alkaline pyrogallol contains potassium hydroxide; It would absorb carbon dioxide as well as oxygen; By measuring oxygen absorbed after carbon dioxide had been absorbed result would be for oxygen only;	2 max
05	2	Two marks for correct answer of 16.8 / 17%; One mark for incorrect answer in which Total volume of gas sample is clearly given as 107 and volume of oxygen as 104 – 86 / 18;	2
05	3	Plant respiring but not photosynthesising;	1

Q	Part	Marking guidance	Total marks
06			20
06	1	Tertiary structure 1 Tertiary structure involves the folding of the protein/ enzyme; 2 Formation of hydrogen bonds / bonds between sulphur- containing amino acids / bonds between R-groups of amino acids; 3 (Results in) active site having a specific shape; Lock and key 4 Active site has a specific shape; 5 With which a substrate binds / fit / forms an enzyme-substrate complex; Induced fit 6 Induced fit involves substrate and active site not being fully complementary; 7 Active site wraps round substrate; Properties 8 Denaturation results in loss of tertiary structure and enzyme no longer functioning;	6 max
06	2	Antibodies 1 Proteins / immunoglobulins secreted by white cells; 2 In response to stimulation by an antigen; 3 Consists of four polypeptide chains with variable region giving rise to different antibodies; Antigen-antibody complex 4 Specific binding sites allow binding to specific antigen / binding to form antigen-antibody complex; 5 Complex may be destroyed by agglutination / phagocytosis; Protection against disease	6

		6 Passive immunity involves injection of antibodies and is used against example; 7 Injected antibodies from another organism rapidly destroyed / act as antigens; 8 Monoclonal antibodies may be used in diagnosis;	

06	3	Role of sodium ions 1 Change in voltage causes sodium-ion channel proteins to open; 2 Sodium ions enter making inside less negative (compared to outside); 3 Allows more sodium ions to enter, further changing potential difference; Role of potassium ions 4 Delay in opening potassium-ion channel proteins allowing potassium ions to leave / allowing potential difference to fall; Active transport 5 Active transport involves pumping out of sodium ions and pumping out of potassium ions; 6 Involves different membrane protein; 7 Enzymes involved in respiration / production of ATP (linked to active transport);	6

06		Quality of written communication These are awarded for correct use of scientific terms and the ability to present a clear, logical account. They are not awarded for spelling, punctuation and grammar. 2 marks for an answer in which technical terms are used correctly throughout and the accounts are presented clearly and logically. 1 mark for an answer in which most technical terms are used correctly and most of the accounts are presented clearly and logically. 0 marks for an answer in which few technical terms are used correctly or the accounts are seldom presented clearly and logically.	2