OXFORD AQA
INTERNATIONAL QUALIFICATIONS

INTERNATIONAL A-LEVEL

BIOLOGY

BL05 (9610)

Unit 5 Synoptic paper

Mark scheme

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241XBL05/MS

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 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 oxfordaqa.com

Question	Marking guidance	Mark	Comments
01.1	Higher magnification than SEM **or** light microscope; Internal details visible **or** high resolution **or** high definition;	2	Allow high magnification Ignore magnification = ×27 500 Ignore only 2-D, ignore not in colour

Question	Marking guidance	Mark	Comments
01.2	Drawing large and clear; Correct shape with envelope and grana; Correct internal details – thylakoids in grana and intergranal regions, vesicles, lipid droplet;	3	Smooth lines, not sketchy

Question	Marking guidance	Mark	Comments
01.3	$\frac{160 \times 1000}{27\ 500}$ 5.82 / 5.8 / 6;	2	Allow **one mark** if wrong order of magnitude Allow ± 1 mm for measured length Allow **one mark** for answer correctly derived from incorrect measurement

Question	Marking guidance	Mark	Comments
01.4	To prevent denaturation of proteins / enzymes / cytochromes;	1	ignore optimum pH

Question	Marking guidance	Mark	Comments
01.5	1. Lose (only) a little <u>water</u> by osmosis/diffusion; 2. Chloroplasts remain intact **or** do not burst;	2	1. Allow so there is no (net) gain of <u>water</u> by osmosis 1. Ignore reference to isotonic 2. Allow do not shrink too much 2. Ignore reference to cells

Question	Marking guidance	Mark	Comments
01.6	1. So (opposite) tubes are balanced in the centrifuge; 2. Does not damage centrifuge; **OR** 1. Different volumes would have different numbers of chloroplasts; 2.Which would give different rates of reaction **or** would prevent valid comparisons;	2	

Question	Marking guidance	Mark	Comments
01.7	Each tube differs in one way from Tube **1**; To show the need for the missing factor in the reaction;	2	Allow named factors: 2 chloroplasts + 3 light + 4 DCPIP

Question	Marking guidance	Mark	Comments
01.8	1. Electrons/H^+ ions from water; 2. Electrons excited by light; 3. Electrons lost from chlorophyll; 4. Electrons and H^+ ions combine with DCPIP to decolourise DCPIP **or** to leave the green colour of the chloroplasts / chlorophyll;	4	1. Allow photolysis of water 2. Allow light raises electrons to higher energy level

Question	Marking guidance	Mark	Comments
02.1	1. Constant volumes of potato filtrate and buffer solution; 2. Incubate potato filtrate + buffer in water bath / at 25°C (for 5–10 min); 3. Inject H_2O_2 solution and measure volume of O_2 in given time; 4. Raise syringe so levels inside and out are same before measuring; 5. Repeat at least twice more and calculate mean (and SD) for each concentration; 6. Repeat with same vol. of different concentrations of H_2O_2 solution; 7. Further detail – eg cleaning test tube between experiments **or** method of filling syringe with water by opening tap and submerging **or** method of diluting H_2O_2;	7	

Question	Marking guidance	Mark	Comments
02.2	1. Plot line graph of volume of oxygen against concentration of H_2O_2 ; 2. Add error bars to represent standard deviation; 3. Line graph plotted because the two variables are continuous;	3	1. must distinguish dependent and independent variables

Question	Marking guidance	Mark	Comments
02.3	Overlap of SDs; Use of data: (at 40%) 8.0+0.61 = 8.61 and (at 60%) 9.2–0.62 = 8.58;	2	

Question	Marking guidance	Mark	Comments
03.1	Reverse transcriptase;	1	

Question	Marking guidance	Mark	Comments
03.2	Restriction endonuclease **OR** Restriction enzyme;	1	

Question	Marking guidance	Mark	Comments
03.3	To join pieces of DNA which are complementary (by base pairing);	1	

Question	Marking guidance	Mark	Comments
03.4	4;	1	

Question	Marking guidance	Mark	Comments
03.5	2 bands merge **OR** only 4 bands; New band formed at heavier position **OR** nearer to origin;	2	 Allow new band formed higher up

Question	Marking guidance	Mark	Comments
04.1	**Cross 1** / **Cross 2** Parental genotypes: **X^BY and X^bX^b** / **X^bY and X^BX^B** Gametes: **X^B Y** / **X^b** / **X^b Y** / **X^B** F_1 genotypes: **X^BX^b** / **X^bY** / **X^BX^b** / **X^BY** Phenotypes: Tortoiseshell / Orange / Tortoiseshell / Black Sex: female / male / female / male	4	**Cross 1** P genotypes + gametes correct = **one mark** F_1 genotypes + phenotypes correct = **one mark** **Cross 2** P genotypes + gametes correct = **one mark** F_1 genotypes + phenotypes correct = **one mark**

Question	Marking guidance	Mark	Comments
04.2	Yes, because: 1. With 3 degrees of freedom; 2. Closest to χ^2 = 2.60 is χ^2 between 0.352 and 6.25 **or** P between 0.95 and 0.10 / P > 0.05 **or** χ^2 < critical value of 7.81; 3. So expect this <u>difference</u> from expected result due to chance **or** So this <u>difference</u> from expected result is not significant **or** So accept null hypothesis;	3	If incorrect number of degrees of freedom, still allow mp2 and mp3 with appropriate values 3. Ignore 'results' are due to chance 3. Ignore the 'results' are not significant

Question	Marking guidance	Mark	Comments
05.1	1. Chromatids/chromosomes cannot be separated by microtubules / spindle **or** Chromatids/chromosomes cannot join to microtubules; 2. Prevents mitosis / cell division;	2	If neither 1. nor 2. given, allow **one mark** for prevents spindle formation

Question	Marking guidance	Mark	Comments
05.2	Reduces/prevents mutation in proto-oncogene **or** in tumour suppressor gene;	1	Allow prevents activation of proto-oncogene **or** prevent inactivation of tumour suppressor gene

Question	Marking guidance	Mark	Comments
05.3	1. Mice vary in size / mass; 2. Gives same concentration in (body fluids of) each mouse; 3. Otherwise could not compare **or** could not obtain valid results;	3	

Question	Marking guidance	Mark	Comments
05.4	As a control (since resveratrol is dissolved in DMSO) **or** because group 2 has resveratrol **and** DMSO; Otherwise could not tell if effect (in group 2) was due to resveratrol or to DMSO;	2	

Question	Marking guidance	Mark	Comments
05.5	1. Vincristine is better than resveratrol – mice survive longer; 2. Resveratrol is ineffective as it gives similar results to control / DMSO; --- 3. None survive more than 31 days so neither is very useful; 4. Dose of vincristine is much lower than dose of resveratrol (only 1/20); --- 5. Only investigated one form of cancer / only leukaemia; 6. Do not know of any side effects; 7. Only tested on mice so do not know effect on humans; 8. Only 16 mice in each group or 48 total – may not be representative;	4 max	For full marks, must have at least one point from each of the 3 groups and any one other

Question	Marking guidance	Mark	Comments
06.1	**Making carbohydrates available**: 1. Digestion – starch to maltose using amylase in saliva **or** in pancreatic juice; 2. Digestion – maltose to glucose by membrane-bound maltase in small intestine; 3. Absorption – active transport **or** facilitated diffusion **or** co-transport with Na^+ ions; 4. Transport from gut to cells in solution **or** in blood plasma; 5. Enters body cells by facilitated diffusion **or** via transport proteins **or** by active transport; **Uses of carbohydrates**: 6. Glucose as a source of energy/ATP – via respiration; 7. Glycogen (animals) for energy storage; 8. Glucose used for making other **named** substances; 9. Antibodies = glycoprotein – immune response to pathogens; 10. Antigens – eg ABO blood group antigens 11. Ribose in RNA / ATP / NAD(P); 12. Deoxyribose in DNA – genes and their expression; 13. Glucose for maintenance of osmotic potential of blood – maintain osmotic balance for body cells;	6 max	For full marks, must consider both making carbohydrates available and uses of carbohydrates 2. Allow references to other membrane-bound disaccharidases 6. Allow references to glycolysis / anaerobic and Krebs cycle / aerobic 6. Do **not** allow making energy 6. Allow further details, eg phosphorylation, oxidation via NAD, FAD, ETS 8. Allow conversion to glycerol and fatty acids and lipids Allow conversion to amino acids and proteins

Question	Marking guidance	Mark	Comments
06.2	Remove sample for testing 1. For starch: add I_2/KI solution; 2. Blue-black = positive for starch; (Filter remainder to remove starch) Test sample of filtrate with I_2 /KI solution If blue-black, re-filter until turns yellow remove sample from (starch-free) filtrate 3. Test for reducing sugar: Benedict's solution + heat; 4. Orange = positive for reducing sugar; 5. Spin down pellet of precipitate using centrifuge **or** filter Remove supernatant and add HCl + heat (Cool and) neutralise with alkali (test with indicator paper); 6. Add Benedict's solution + heat turns orange = positive for non-reducing sugar;	6	1. Allow iodine solution 4. Allow red/yellow 6. Only allow mp6 if an attempt to remove reducing sugars has been made

Question	Marking guidance	Mark	Comments
06.3	**If glucose concentration is too high, it is lowered by**: 1. Pancreas (detects and) releases <u>insulin</u> 2. Insulin combines with cell-surface membrane receptor 3. Glucose channel proteins inserted into membrane causing glucose uptake 4. Enzyme (/ phosphorylase) activated 5. Glucose turns into glycogen / glycogenesis 6. Glucose turns into fatty acids / lipid 7. Glucose used in respiration **If glucose concentration is too low, it is raised by**: 8. Pancreas (detects and) releases <u>glucagon</u> **or** Adrenal glands release <u>adrenaline</u> 9. Glucagon/adrenaline combines with cell-surface membrane receptor 10. Activates enzyme (/ adenylate cyclase): ATP turns into cAMP 11. (cAMP) activates (kinase) enzyme: glycogen produces glucose (phosphate) / glycogenolysis 12. Glycerol / fatty acids / AcCoA produces glucose **or** amino acids produce glucose / gluconeogenesis	6 max	Max 3 marks for lowering glucose concentration Max 3 marks for raising glucose concentration

Question	Marking guidance	Mark	Comments
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	Award mark for overall performance in 06.1, 06.2 and 06.3