OXFORD
INTERNATIONAL
AQA EXAMINATIONS

INTERNATIONAL A-LEVEL
Biology

BL05 - Synoptic paper

Mark scheme

9610

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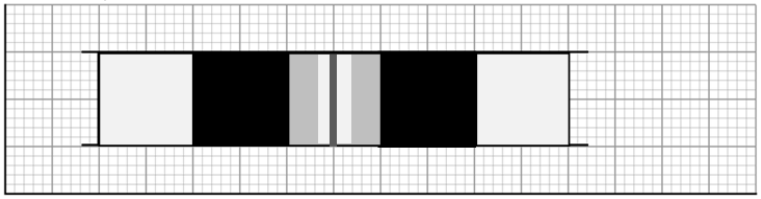
Mark schemes are prepared by the Lead Assessment Writer and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation events which all associates participate in and is the scheme which was used by them in this 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.

Further copies of this mark scheme are available from aqa.org.uk

Question	Marking guidance	Mark	Comments
01.1	**A** label to I-band **B** label to paler region of A-band **C** label to darker region of A-band	2	All 3 correct = 2 marks 2 correct = 1 mark 0 or 1 correct = 0 marks
01.2	1. One sarcomere drawn ; 2. Length = 100 mm ; 3. Banding correct and in correct proportions ± 4 mm ;	3	Example  Accept pattern shown by filaments
01.3	1. $\frac{\text{Length in } \textbf{Fig 2} \times 40\,000}{\text{Length in } \textbf{Fig 1}}$; 2. 50 000 / correct for candidate's measurements ;	2	eg $\frac{100 \times 40\,000}{80}$ Allow figures from corresponding parts of **Figure 1** and candidate's drawing Correct answer = 2 marks (Ignore working) Allow answer correct for candidate's drawing for 2 marks

Question	Marking guidance	Mark	Comments
01.4	Yes because: 1. Resolution = $\frac{500 \times 10^{-3}}{2}$ = 0.25 μm / 250 nm 2. Calculation of suitable distance, eg I-band = 32mm ≡ $\frac{32\,000}{40\,000}$ ≡ 0.8μm / 800 nm; 3. So it is possible as separation > 0.25 μm / 250 nm ;	3	Units must be included Allow alternatives, eg A-band = 48 mm ≡ $\frac{48\,000}{40\,000}$ ≡ 1.2 μm /1200 nm **or** sarcomere = 80 mm ≡ $\frac{80\,000}{40\,000}$ = 2 μm / 2000 nm
Total		**10**	

Question	Marking guidance	Mark	Comments
02.1	1. Prepare correct range of IAA concentrations from 10^{-3} to 100 ppm ; 2. Extra detail of how serial dilution is performed ; 3. Cut portions of coleoptiles all the same length from same region ; 4. In batches of, say, 10 coleoptiles for each IAA concentration ; 5. Add same volume / excess of IAA solution to each batch **or** Keep at same temperature in an incubator **or** Leave for same length of time **or** Sterile conditions **or** Constant light / no light ; 6. Control with just water / no IAA ; 7. Length with a ruler **or** Mass with a balance after blotting dry ; 8. Calculate % change ;	6 max	eg 100, 10, 1, 10^{-1}, 10^{-2}, 10^{-3} eg 10 mm Allow control of any suitable variable If a temperature suggested, in range 20 – 30 ^{o}C Time = 1 – 4 days

Question	Marking guidance	Mark	Comments
02.2	1. Plot line graph of length change / mass change against concentration; 2. Reference to mean values; 3. And error bars to represent standard deviation / standard error; 4. Line graph plotted because the two variables are continuous;	4	Allow scatter graph Allow growth Allow change minus any change in control with water Allow average Allow range bars
02.3	Assess the probability that the results are due to chance / statistically significant using: 1. Standard error and 95% confidence limits **or** t-test (and $P<0.05$); 2. Because investigation involves looking for <u>significant</u> <u>differences</u> (between mean values);	2	 Allow non-overlap of error bars on graph Allow standard deviation and non-overlap Allow to show <u>difference</u> is <u>not due to chance</u>
Total		**12**	

Question	Marking guidance	Mark	Comments
03.1	Avoid bias **or** To obtain more valid / representative results;	1	Do not allow more accurate
03.2	Measures flow rate at surface whereas shrimps live at bottom **or** Flow rate measured over 2m whereas sampling over 0.5m – so not necessarily where shrimps are found;	1	Allow orange may get stuck on objects in stream
03.3	Pro: 1. As flow rate increases, number of shrimps decreases **or** There is a negative correlation between flow rate and number of shrimps ; 2. **r** = (-)0.87 shows very good correlation **or r** is close to (-)1 Con: 3. Correlation does not necessarily indicate causal relationship ; 4. Other environmental factor(s) could be involved / named eg - eg food availability / predators / O_2 concentration;	3 max	For full marks answer must include at least one pro + one con Allow the value of **r** shows there is a significantly higher number of shrimps at low flow rates Allow converse Allow wide variation at low flow rates Allow only 12 results / small sample size
03.4	1. Not washed away by the stream / sheltered from water flow; 2. Food found beneath stones; 3. Less easily detected by predators;	2 max	Accept other sensible suggestions
Total		**7**	

Question	Marking guidance	Mark	Comments
04.1	Otherwise too many to count;	1	Accept reference to approx. 20 000 cells
04.2	1. Only small amount of <u>water</u> leaves cells; 2. So cells remain intact;	2	Accept converse: Much <u>water</u> would enter the cell if in water Cells would burst in water
04.3	20;	1	
04.4	1. (Allow for dilution) 20×1000; 2. (Allow for volume) $\div 0.004$ **or** $\frac{20 \times 1000}{0.004}$ **or** $\frac{20 \times 1000 \times 1000}{4}$; 3. (Correct answer) 5×10^6;	3	Allow ecf from 04.3 Allow 2 marks for 5 000 000 **or** 5 million
04.5	Would give too low an estimate; Because volume reduced slightly (and reduction amplified $\times$ 250 000);	2	

Question	Marking guidance	Mark	Comments
04.6	repeat (several times) and calculate mean ;	1	Allow average
04.7	1. Count cells at new % of NaCl ; 2. Calculate $100 - \frac{100\mathbf{n}}{\mathbf{N}}$ **or** $\frac{(\mathbf{N} - \mathbf{n})}{\mathbf{N}} \times 100$;	2	Where **N** = cell count in 0.60% NaCl and **n** = cell count in new % NaCl
04.8	Deep red solution in 0.10 and 0.20; Because (most) cells haemolyse only at these concentrations; **or** Pellet seen only at 0.20 and above; Because (most) cells are intact at these concentrations; **or** Colourless solution seen at 0.40 and above; Because (most) cells are intact at these concentrations;	2	If no concentrations are given, allow 1 mark for a described shift to lower concentrations
Total		**14**	

Question	Marking guidance	Mark	Comments
05.1	(In Table) Peptide A: +1; Peptide B: – 2;	2	
05.2	1. So that results can be compared **or** Use Asp value as a standard; 2. Distance moved is influenced by other factors - eg time / voltage / temperature;	2	
05.3	Correctly plotted on graph: Peptide A at (349,0.52) on line e = ± 1; Peptide B at (464,0.84) on line e = ± 2;	2	Allow ecf for incorrect charge from 05.1
05.4	$-\frac{2}{3}$;	1	

Question	Marking guidance	Mark	Comments
05.5	1. Mark origin in pencil; 2. Spot solution onto origin and allow solvent to evaporate between applications **or** keep spot of solution as small as possible; 3. Place one edge of paper in solvent with meniscus below origin; 4. In container with lid (to prevent evaporation); 5. Allow solvent to run up paper, remove paper and mark solvent front with pencil / measure distance solvent front moved;	4 max	Allow turn though 90º and use 2nd solvent Allow staining to visualise substances
05.6	R_f = distance moved by substance / distance moved by solvent front ;	1	
Total		**12**	

Question	Marking guidance	Mark	Comments
06.1	Diffusion – defined re. high to low concentration; Examples – glucose / amino acids into epithelium of small intestine / into body cells; Facilitated diffusion – defined re. channel proteins; Examples – glucose into epithelium co-transport with Na^+ ions / glucose into liver cells via GLUT4 channel protein; Active transport – (Specific) carrier protein; Against concentration gradient; Use of energy; Examples – amino acids into epithelium of small intestine; Phagocytosis / pinocytosis / endocytosis / exocytosis Examples – microbes by wbc / chylomicrons re. fat absorption from small intestine / secretion of acetylcholine at presynaptic membrane of synapse / secretion of digestive enzymes by pancreas / etc;	7 max	Allow other correct examples throughout

Question	Marking guidance	Mark	Comments
06.2	1. Transport over long distances; 2. Diffusion only efficient over distances < 1 or 2 mm; 3. Larger organism has smaller SA/Vol for exchange; 4. Needs transport system to maintain concentration gradient for adequate diffusion (at exchange surface); 5. Large animals are active re. movement; 6. High demand for energy – so need to supply O_2 and glucose and remove CO_2 at high rate;	5 max	Allow mass transport system helps maintain temperature

Question	Marking guidance	Mark	Comments
06.3	Similarities: Substances carried in solution; Mass flow of fluid; Vascular system / system of tubes; Differences: Animals: Blood or blood vessels transport organic / inorganic substances; Contractile pump – eg heart; Variable output re demand; O_2 (often) combined with a pigment / eg haemoglobin; Other substances dissolved in plasma; Insects: tracheal system for gas transport; Plants: Xylem – main force is transpiration pull = passive; Control by opening / closing stomata + leaf wilting ; Water and mineral ions; Phloem – main force is active transport / pressure flow due to osmosis; Small organic molecules – eg sucrose + amino acids;	6 max	For full marks, must include at least 2 similarities Allow examples of substances transported by both animals and plants – eg mineral ions / simple sugars / amino acids / water Allow named examples

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
Total		**20**	