INTERNATIONAL A-LEVEL

BIOLOGY

(9610)

PAPER 4
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	Rapid response; Short duration;	2

Q	Part	Marking guidance	Total marks
01	2	<table><tr><td></td><td>1</td><td>2</td><td>3</td></tr><tr><td>Percentage</td><td>80</td><td>0</td><td>0</td></tr></table>	1

Q	Part	Marking guidance	Total marks
02	1	1. Eaten; 2. Containing carbohydrate/sugar; 3. Glucose absorbed from intestine/into blood; 4. Long time after insulin injection/needs more insulin/has not taken insulin; 5. Does not convert glucose to glycogen/glucose not taken up from blood;	2 max

2	2	1. Shows positive correlation/directly proportional; 2. A range of results for a particular value/values (for different colours) overlap; 3. Urine test only an arbitrary scale/not directly related to concentration/colour is subjective/few colour values;	3

2	3	1. Glycogen to glucose/glycogenolysis; 2. By activating enzymes; 3. Gluconeogenesis;	2 max

Q	Part	Marking guidance	Total marks
03	1	1. chloroplast, so cell photosynthesises; 2. moves to optimum/best light intensity for photosynthesis; 3. avoids damage due to bright light;	2 max

Q	Part	Marking guidance	Total marks
03	2	2700	1

Q	Part	Marking guidance	Total marks
03	3	$\dfrac{242 \times 7500 \times 900}{60}$ = 27 225 000 / 27 × 10⁶ = *2 marks* *(allow 1 mark for principle:* $\dfrac{amino\ acids \times proteins}{time}$ *)*	2

Q	Part	Marking guidance	Total marks
03	4	1. rate slightly slower / not affected in first 20/30 minutes / lower peak than control 2. then decreases/ much lower (than control);	2

Q	Part	Marking guidance	Total marks
03	5	1. actinomycin has no effect (on growth of flagella); 2. even though mRNA production / transcription prevented; 3. (re)growth little affected by puromycin at first; 4. protein synthesis inhibited, so likely to be using proteins present;	4

Q	Part	Marking guidance	Total marks
04	1	1. (Ion) channel proteins open; 2. Sodium in; 3. Changes membrane potential/makes inside of axon less negative/positive/depolarisation/reaches threshold; 4. More channels open/positive feedback;	3 max
04	2	1. Potassium channels open; 2. Potassium out; 3. Sodium channels close;	3 max
04	3	1. Pump/active transport/transport against concentration gradient; 2. Of sodium from axon/sodium out/of potassium in;	2

Q	Part	Marking guidance	Total marks
05	1	1 and 2 share neurones but 2 and 3 have separate neurones (to brain);	1
05	2	1. 1 unit is sub-threshold / 3 units are above threshold / give sufficient depolarisation; 2. (1 unit) No impulses / no action potential / in (sensory) neurone / does not stimulate (sensory) neurone / 3 units → impulses; 3. (Spatial) summation / sufficient neurotransmitter released / from 3 receptors / insufficient N-T from one;	3
05	3	(Three) <u>different types</u> of (cone) cells / types 6 and 7 sensitive to <u>different </u>wavelengths / <u>different</u> frequencies / <u>different</u> colours;	1
05	4	Impulses along separate neurone from each receptor cell / each receptor cell connects to separate neurone;	2

Q	Part	Marking guidance	Total marks
06	1	1. Myosin filaments drawn longitudinally in A-band region; 2. Actin filaments drawn longitudinally from Z-line to edge of H-zone;	2
06	2	Electron microscope has greater resolution / able to tell two close objects apart better / electrons have shorter wavelength/ higher frequency;	1
06	3	Correct answer = 20; Allow 1 mark for: $\dfrac{16 \times 1000}{8000}$; OR $40 \div \dfrac{16}{8000}$	2

Q	Part	Marking guidance	Total marks
07	1	(Individual) plant growth substances have a wider range of Function / elicit a range of responses; Plant growth substances are mainly associated with the control of growth; Plant growth substances are not produced by glands; Plant growth substances may act at their site of production; (Different) plant growth substances may act together;	2 max

Q	Part	Marking guidance	Total marks
07	2	Qualitative description gains 1 mark Overall pattern described in terms of low initial concentration, rising, remaining constant then rising again; Quantitative description gains 2 marks; Pattern describe as above with specific reference to 2 and 5 days;	2

Q	Part	Marking guidance	Total marks
07	3	Over the first 2 days there is a positive correlation between the concentrations of ACC and ethene / as ACC rises, so does ethene; However this does not mean a causal relationship as another factor may be involved / as another [named] factor may be involved; After day 5, steep rise in ACC but ethene falls;	3

Q	Part	Marking guidance	Total marks
07	4	Add ACC to unripe fruit; Should produce an increase in ethene concentration;	2

Q	Part	Marking guidance	Total marks
07	5	The concentration of ACC continues to increase after day 5 but the concentration of ethene falls;	1

Q	Part	Marking guidance	Total marks
08	1	A cytosine-phosphate-guanine sequence is the sequence of bases on a single strand of DNA; Bases are separated by a phosphate group; In a cytosine-guanine base pair, bases are complementary, are on different strands;	3
08	2	The enzyme / HDAC has a specific tertiary structure; Active site of the enzyme has a specific shape; Only complementary / will only form enzyme-substrate complex with methylated bases;	3
08	3	Tumour suppressor genes limit / control mitosis / cell division;	1
08	4	Prevents HDAC from binding (to methylated CpG sequence; Allows transcription of tumour suppressor gene; Protein produced that controls / limits cell division / causes cell death / apoptosis;	3

Q	Part	Marking guidance	Total marks
09	1	Randomly collected/collected from many ponds/same species/same time of year;	1
09	2	9;	1

09	3	1. Curve/line of best fit;
		
		2. Shows upward slope/positive correlation/description of positive correlation;
		
		3. Correlation does not necessarily mean causation;
		
		4. Some other factor might be involved;
		
		5. Some ponds had no worms but had frogs with deformed legs;
		
		        Q No mark awarded for "yes"
		        or "no"
			4 max

09	4	Sample too small to establish a pattern/to be representative/ to identify anomalies;	1
09	5	1. Must compare like with like/must be a fair test; 2. Some factors differ in mountains/named factor differs in mountains;	2
09	6	1. 27% of the frogs had deformed legs in pond 2; 2. Agricultural run-off and cage mesh diameter of 500 µm;	2

09	7	1. Worms cause deformed legs;	4 max
		2. Deformed legs in 500 µm mesh cages /deformed legs when worms in cage;	
		3. Run off (on its own) does not cause deformed legs;	
		4. No deformed legs with run off and 75 µm mesh/no worms;	
		5. When run off present makes effect of worms worse;	
		6. Quantitative statement e.g. increased by factor of 7 to 8 times;	