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INTERNATIONAL QUALIFICATIONS

INTERNATIONAL A-LEVEL

BIOLOGY (9610)

BL04

Unit 4 Control

Mark scheme

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241XBL04/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	**A** = relay neurone **B** = sensory neurone **E** = motor neurone;;	2	Allow **A** = intermediate neurone Allow **E** = effector neurone 3 correct = **two marks** 2 correct = **one mark** 0 or 1 correct = 0 marks

Question	Marking guidance	Mark	Comments
01.2	Avoid (further) damage;	1	Reject if refers to brain being involved in reflex

Question	Marking guidance	Mark	Comments
01.3	1. (Muscles/**C** and **D** are) antagonistic; 2. (To straighten the arm) muscle **C**/triceps/flexor contracts and muscle **D**/biceps/extensor relaxes;	2	

Question	Marking guidance	Mark	Comments
01.4	Gland;	1	

Question	Marking guidance	Mark	Comments
02.1	1. Fewer/no calcium ions enter the presynaptic neurone; 2. Fewer/no vesicles fuse with presynaptic membrane; 3. Less/no acetylcholine released into synaptic cleft; 4. Less/no acetylcholine binds with receptors on post-synaptic membrane/neurone;	4	1. Reject calcium alone 3. and 4. Reject neurotransmitter but penalise only once 4. Reject reference to signal/message

Question	Marking guidance	Mark	Comments
02.2	1. Acetylcholine stays in cleft longer/builds up/keeps binding; 2. **so** more chance of depolarising/AP being passed (so muscle fibre contracts);	2	

Question	Marking guidance	Mark	Comments
02.3	(Patient expected to suffer more serious effects of LEMS so) not safe to withhold known treatment for a longer time **OR** not ethical to leave for longer time;	1	

Question	Marking guidance	Mark	Comments
02.4	**Pros** 1. Without AFP patients perform worse (DS) and feel worse (PS); 2. (Idea of) double-blind trial; 3. Patients matched (on age/race/sex) so removes (possible) variable; 4. Assigned to groups at random; **Cons** 5. Scoring is subjective, especially patient score; 6. Patients in AFP group might think they are in the placebo group so score more harshly; 7. No information about side effects of AFP; 8. No statistics so unknown if differences are significant; 9. All patients same age/sex/race so unknown if (AFP) would work for other groups;	4 max	Must have at least **one pro** and **one con** for full marks. Do not allow short time or small number of patients as told this. 6. Accept converse for placebo group. 8. Do not allow results are significant.

Question	Marking guidance	Mark	Comments
03.1	Ethene **or** ethylene;	1	

Question	Marking guidance	Mark	Comments
03.2	1. Using tomatoes as a standard; 2. Some with substance **X**/ethene **and** some without; 3. Observe at set intervals/time/until tomatoes turn red (and compare with peppers); 4. Suitable controlled variables;	3 max	For example (3) green tomatoes in containers with ethene (3) green tomatoes in containers with air (3) green peppers in containers with ethene (3) green peppers in containers with air Observe every day for 1 week/until tomatoes go red Note when tomatoes in ethene go red / if peppers go red

Question	Marking guidance	Mark	Comments
03.3	1. Methyl groups removed from gene that codes for enzyme **H** **OR** acetyl groups added to histone proteins of gene that codes for enzyme **H**; 2. RNA polymerase can bind / mRNA produced; 3. (Translated into) more enzyme **H** so more/faster conversion of poly- to monosaccharides (so fruit tastes sweeter);	3	3. Only needs more once.

Question	Marking guidance	Mark	Comments
03.4	1. (To get green peppers) need to stop production of enzyme **G**; 2. (To get soft and sweet peppers) need to continue to produce enzymes **F** and **H**; 3. (So) siRNA made to be complementary to mRNA / bind by complementary base pairing (for enzyme **G**); 4. Breaks the mRNA up into fragments /mRNA cannot be translated (so enzyme **G** not made);	4	1. Allow silence the gene. 3 and 4. Must be clear which gene/enzyme is being referred to.

Question	Marking guidance	Mark	Comments
04.1	1. In the control/**J** the seedling grows towards the light (positive and response to light); 2. Covering tip/**K** stops response, covering base/**L** doesn't so tip is responsible for it;	2	

Question	Marking guidance	Mark	Comments
04.2	1. Grows into area with high(er) light (intensity); 2. More photosynthesis/sugar production (so more growth);	2	

Question	Marking guidance	Mark	Comments
04.3	1. (Use **Figure 7** to) find wavelengths that cause most phototropism/curvature (around 450 nm); 2. (Match with **Figure 6** to) identify pigment absorbing most at those wavelengths;	2	

Question	Marking guidance	Mark	Comments
04.4	Phototropin;	1	

Question	Marking guidance	Mark	Comments
04.5	1. **Figure 7** does not cover the whole range of wavelengths covered by Figure 6 / that absorb light; 2. Could be peak at around 675 nm / could be phytochrome; 3. **Figure 6** also shows peak around 375 nm which matches to cryptochrome; 4. **Figure 7** shows several peaks so could be combination of pigments;	1 max	

Question	Marking guidance	Mark	Comments
05.1	Enzymes: too high denature, too low and reactions too slow;	1	Allow maintains optimum temperature for enzymes.

Question	Marking guidance	Mark	Comments
05.2	1. Fat (blubber) in dolphins is (much) thicker than fat in humans; 2. (Fat and blubber) are insulators/prevent heat loss; 3. Dolphins need less heat/energy from metabolism (to maintain body temperature than human) **OR** 3. Fewer blood vessels near (skin) surface so reduces heat loss;	3	1. Allow thicker skin layer 2. Allow skin is an insulator

Question	Marking guidance	Mark	Comments
05.3	1. (Sweat glands) release sweat/water onto skin (surface); 2. (Sweat/water) <u>evaporates</u> taking heat energy away from body;	2	

Question	Marking guidance	Mark	Comments
05.4	Any **three** from: 1. Small sample size/only one dolphin/only one species; 2. Captive not wild dolphins; 3. Is this species the one found in tropical water?; 4. Only 20 minutes/brief time in warm water; 5. Temperature changed at steady rate; 6. In tank, so not moving as much as in wild;	3 max	

Question	Marking guidance	Mark	Comments
05.5	39;;;	3	**One mark** for core temp at start (37) **or** length of time (70 min/110–40) **or** 2.1 rise (0.03 × 70 min) **Two marks** for 37 + 2.1 or 39.1 Give to 2sf. So 39

Question	Marking guidance	Mark	Comments
05.6	Heat transferred into blubber as blood flows through it; **OR** Blubber insulator so heat doesn't move back into core;	1	

Question	Marking guidance	Mark	Comments
06.1	1. Max = 206.9 – (0.67 × 20) = 194; 2. Moderate range 124–147 **and** Intense range 149–180;	2	**One mark** for correct max and 1 correct range.

Question	Marking guidance	Mark	Comments
06.2	1. Carotid/aorta; 2. Medulla (oblongata); 3. Parasympathetic/vagus; 4. Sinoatrial node/SAN;	4	

Question	Marking guidance	Mark	Comments
06.3	Men's mean resting heart rate is 5 bpm lower than women **OR** Men's mean resting heart rate is 78 bpm **and** women's is 83 bpm;	1	

Question	Marking guidance	Mark	Comments
06.4	1. Men 174–151 or 23 beats decrease in 1 min and Women 171–140 or 31 beats decrease in 1 min; 2. Calculate HRR: Men = 0.38 and women = 0.52 **OR** Calculate values for each category: Poor = 12, Good = 18 Excellent = 30 bpm; 3. Women show excellent fitness, men show good;	3	**One mark** for correct values from graph/differences **One mark** for calculation **One mark** for stating excellent and good 3. Allow incorrect groups if matches calculated HRR

Question	Marking guidance	Mark	Comments
06.5	**One** from CHD, diabetes, smoking, drinking (alcohol), diet, ethnicity, bodyweight, BMI, medication/drugs;	1	

Question	Marking guidance	Mark	Comments
07.1	1. Overlap of SD means results are not/are unlikely to be significantly different OR No overlap of SD means results are/are likely to be significantly different;	1	1. Allow SD can be used to do a statistical test Reject result are significant/insignificant

Question	Marking guidance	Mark	Comments
07.2	1. (Water) blood glucose concentration stays high/decreases slightly but are still above range (by 4 hours); 2. (Glibenclamide OR onion): blood glucose concentration within range by 4 hours; 3. Only glibenclamide mean + SD still within range (at 4 hours) **OR** Onion: plus SD is above 120 mg 100cm^{-3}/outside range (at 4 hours);	3	

Question	Marking guidance	Mark	Comments
07.3	443;;	2	**One mark** for correct answer but not to whole number

Question	Marking guidance	Mark	Comments
07.4	1. In group **P**/control mean blood glucose concentration remains stable <u>and</u> in group **Q** mean blood glucose concentration increases during test; 2. Group **P** 85–90 mg 100 cm^{-3} <u>and</u> Group **Q** 350-410 mg 100 cm^{-3}/ **or** increases by 50 / 1.1x; 3. **Q** = mean blood glucose concentration is higher than **P** at all times;	3	2. Allow values for **P** 80-95 mg 100cm^{-3} Allow values for **Q** 345-355 and 405-415 100cm^{-3}

Question	Marking guidance	Mark	Comments
07.5	**Yes**, 1. (Table 4 shows that) raw onion does lower blood glucose concentration; 2. (Figure 12 shows that) freeze dried onion lowers blood glucose concentration **OR** heat dried onion prevents increase seen in untreated; **No**, 3. Dried only tested on rats; 4. Raw onion was only tested on Type 2 **OR** don't know what type of diabetes rats had; 5. Small sample size in raw onion OR don't know sample size in rats; 6. No statistics/no error bars in rat study so unknown if differences are significant; 7. Different time scales/don't know how long/how often you have to eat the onions; 8. Investigation 1 used 100 g of raw onion but don't know how much onion was added to rat diet; 9. Onion (+SD) is not within 80-120 mg 100 cm^{-3} range for blood glucose concentration;	3	Must have at least 1 **yes** for full marks If 1 or 2 not awarded allow 1 mark maximum for onion (unqualified) does lower blood glucose concentration;

Question	Marking guidance	Mark	Comments
07.6	1. Idea that Type 1 = not enough insulin <u>and</u> Type 2 = cells unresponsive to insulin; 2. α cells produce glucagon not insulin so quercetin won't help Type 1; 3. Idea that increased hormone receptors/increased glycogenesis so Type 2 respond to insulin/reduces blood glucose concentration;	3	