Cambridge International AS & A Level

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BIOLOGY **9700/52**

Paper 5 Planning, Analysis and Evaluation **March 2017**

MARK SCHEME

Maximum Mark: 30

Published

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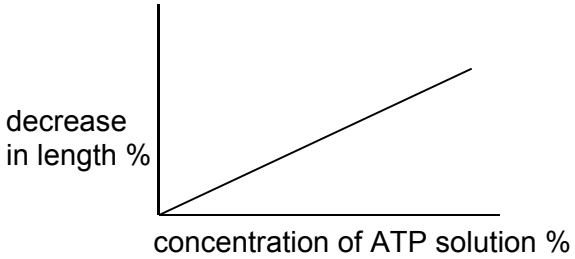
Mark scheme abbreviations:

;	separates marking points
/	alternatives answers for the same point
R	do not allow
A	accept (for answers correctly cued by the question, or guidance for examiners)
I	ignore (for answers that include irrelevant information that does not contradict the expected answer)
AW	alternative wording (where responses vary more than usual)
ORA	or reverse argument (for answers which are written as the opposite to the expected answer)
underline	actual word given must be used by candidate (grammatical variants excepted)
max	indicates the maximum number of marks that can be given

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Question	Answer	Marks
1(a)(i)	*independent*: type of (Ringer's) the solution **;** *dependent :* (change in) length of muscle, strip / fibre / tissue AW **;**	**2**
1(a)(ii)	*idea of*: the muscle fibres are different (starting) lengths **;**	**1**
1(a)(iii)	to act as a control **;** to show that Ringer's solution (alone) cannot cause contraction AW / to show that ATP is responsible for the contraction AW **;**	**2**

Question	Answer	Marks
1(b)	*six from:* 1 ref. to a method of diluting the 0.5% ATP solution (with Ringer's solution) **and** to give at least 5 dilutions **;** 2 ref. to at least 3 concentrations from 0.5% downwards with % units**;** 3 ref. to control using Ringer's solution (alone) **;** 4 ref. to method for measuring change in length of fibres **;** 5 ref. to using the same number fibres / strips for each concentration **;** 6 ref. to adding the same volume of ATP solutions for each concentration **;** 7 ref. to suitable volume of ATP solutions on a slide **;** 8 ref. to leaving all fibres for the same / fixed (stated) time **;** 9 ref. to low risk investigation / hazard and suitable safety precaution **;** 10 ref. to replicates **and** a mean OR to identify / eliminate / remove anomalies **;**	**6**

Question	Answer	Marks
1(c)	1 axes correctly orientated and labelled ; 2 % / percentage on each axis ; 3 correct line ;  	**3**
1(d)	*two from:* 1 muscle strips used are, from a dead animal / *in vitro* (so response may be different) ; 2 *idea that* in a living organism muscle contraction is under nervous control ; 3 thickness of the muscle strips used are variable / not testing individual muscle fibres ; 4 *idea that*: concentration of ATP is not the same as *in vivo* ;	**2**
1(e)	*two from:* 1 *idea of*: making Ringer's solution(s) with glucose and ATP **(and** repeating the measurements) ; 2 **(then)** comparing them with the solutions made with Ringer's solution(s) and ATP ; 3 *idea that* ATP concentration must be standardised, i.e. the same in both solutions ;	**2**

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Question	Answer	Marks
2(a)	*two from:* 1 the number of times traps used **;** 2 the type of trap used **;** 3 time (of day) moths were trapped **;** 4 time of year moths were trapped **;** 5 ref. to positioning / spacing of traps **;** 6 number of traps used **;** 7 size of area from which samples taken **;** 8 method of counting **;**	**2**
2(b)	*three from:* *description:* 1 (melanic moths) increase in frequency more in area **X** than in area **Y ;** 2 melanic moths in area **X** increase, most rapidly / linearly, and then starts to slow **and** **Y** increases more slowly at first and then increases more rapidly **;** *explanation:* 3 area **X** more polluted than **Y** so selection acts more strongly AW / ORA **;** 4 some non-melanics remain in population **X** because of breeding between heterozygotes **;**	**3**

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Question	Answer	Marks
2(c)	line starting from generation 10 **and** below **X** **and** above **Y** **and** to 24 generations **;**	**1**
2(d)	*two from:* *melanic forms / they:* 1 less predated by species other than birds / named likely predator **;** 2 less susceptible / (more) resistant, to poisoning by toxins / pollutants **;** 3 higher fitness / produce more offspring **;** 4 more resistant to disease **;** 5 better at competing with, new / alien / introduced species **;** 6 reference to climate change **;**	**2**

Question	Answer	Marks
2(e)(i)	<table><tr><td>category</td><td>O</td><td>E</td><td>$\frac{(O - E)^2}{E}$</td></tr><tr><td>melanic</td><td>56</td><td>52</td><td>0.31</td></tr><tr><td>non-melanic</td><td>48</td><td>52</td><td>0.31</td></tr><tr><td colspan="3">χ^2 =</td><td>0.62</td></tr></table> correct expected numbers, 52 and 52 ; correct values for $(O - E)^2 / E$; correct values for χ^2 ;	**3**
2(e)(ii)	difference between expected and observed is not significant because the value for chi-squared is less than the critical value at p = 0.05 / 5% or p = 0.10 / 10% ;	**1**

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