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UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

GCE Advanced Subsidiary Level and GCE Advanced Level

MARK SCHEME for the October/November 2008 question paper

9700 BIOLOGY

9700/05 Paper 5 (Practical 2), maximum raw mark 30

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began.

All Examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes must be read in conjunction with the question papers and the report on the examination.

- CIE will not enter into discussions or correspondence in connection with these mark schemes.

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International Examinations

Abbreviations, annotations and conventions used in the Mark Scheme

/ = alternative and acceptable answers for the same marking point

; = separates marking points

NOT = answers which are not worthy of credit

( ) = words which are not essential to gain credit

____ = (underlining) key words which **must** be used to gain credit

ecf = error carried forward

AW = alternative wording

ora = or reverse argument

*A comma in a mark point indicates that information on **both** sides of the comma is needed for the mark to be awarded*

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Question	Expected answer	Extra guidance	Mark
1 (a) (i)	2 of: ref. to volume/concentration of bacteria culture (added to plates); ref. to dimensions of well e.g. diameter/depth/area/volume; ref. to volume of antibiotic added; ref. to volume of agar (in each plate); Sterile technique aw; pH;	 do not allow amount for any quantity do not allow mass/weight of bacteria do not allow size allow mass ignore ref. to size of Petri dish do not allow composition/type of agar	[2]
(b) (i)	as the concentration increases the zone of inhibition increases;	allow reverse statement ignore references to **X** or other specific types of bacteria do not allow directly proportional	[1]
(ii)	4 of: *allow in either* no repeats so cannot tell if anomalous; ref. to one experimental error to do with use of cultures or antibiotic (concentrations); *could be anomalies*: ref. to none of the readings fitting the general trend; detail of any; (e.g **Z** too high at 10 g/dm^3/**Y** too low at 8 g/dm^3/**Y** should have no inhibition at 0 g/dm3/**X** too high at 0.5 g/dm^3) *may not all be anomalies:* for either **Y**/**Z** the inhibition by penicillin may still be increasing; detail of either; (e.g species **Y** at 6 g/dm^3/species **Z** at 8 g/dm^3 are anomalous for **X** there is no trend/pattern in the results)	 do not allow errors in measuring/ labelling allow errors due to contamination allow idea that **Y**/**Z** have not reached plateau do not allow answers related to resistance	[4]
		Total:	**[7]**

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2 (a) (i)	which surface/epidermis of leaf/upper or lower surface/epidermis of leaf <u>and</u> <u>number</u> of stomata (per unit area);	1 mark for both reject amount of stomata	[1]
(ii)	6 of: *ref. to varying the independent variable:* 1. (strip from) upper <u>and</u> lower epidermis; 2. (strips from 5) different leaves of same type of plant; *ref. to measuring the independent variable:* 3. use of microscope and graticule; 4. counting number of stomata visible e.g. in field of view; 5. counting/using 4 strips of epidermis from each side of the leaves; *ref. to arrangement and steps in procedure:* 6. mount epidermis in water/glycerol/(suitable) stain; 7. measuring diameter field of view using graticule; 8. calculating area field of view using formula πr^2; 9. converting from area measured to mm^2 ;	 do not allow strips of leaf ignore nail varnish impressions ignore cutting epidermis into 1 mm^2 allow use of a stage micrometer allow counting along line of stage micrometer do not penalise if no cover slip used allow moving a stage micrometer to cover 1 mm × 1 mm area	[6]
(b) (i)	**<u>35</u>**	do not allow fraction/decimal answers	[1]
(ii)	$S_M = \frac{2.96}{4.47} = 0.66$ (2) $S_M = \frac{3.04}{4.47} = 0.68$ (0)	if use 3 decimal places then penalise once	[1] [1]
(iii)	**<u>19</u>**;		[1]

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(iv)	correct value for upper epidermis mean 31; correct value for lower epidermis mean 35; same correct t value used in both calculations 2.09 (× 0.66) and 2.09 × (0.68); correct answers for both calculations = (31) ± 1.38 and (35) ± 1.42;	allow 2.10; ± 1.39 and ± 1.43 allow ecf for *t* value correctly derived from an incorrect degree of freedom must be consistent use of incorrect *t* value allow ecf from **(ii)** for 3 decimal places do not allow *t* values from 0.01 table do not allow *t* values calculated as means	[4]
		Total:	**[15]**
3 (a) (i)	very large sample/quantified example;	quantified value 1,000+ do not allow individual features	[1]
(ii)	take sample(s) from as many races/ethnic groups/as many countries as possible	do not allow individual ethnic groups	[1]
(b) (i)	3 of reference to: samples (in wells) in agarose gel/support medium; buffer solution; potential difference applied (to buffer); DNA (fragments) move to positive electrode/anode/DNA is negatively charged; fragments of different sizes move different distances/ smaller fragments move further (in given time)/faster/ora;	ignore cutting DNA/use of enzymes allow current/voltage difference do not allow electricity do not allow cathode accept on an annotated diagram	[3]
(ii)	they have complementary base sequences, that bind to (specific parts) of the gene;	allow descriptions of complementary and binding	[1]

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(iii)	2 of : ref. to the membrane alleles having equal frequency; I^a smaller/I^a more negatively charged; ref. to muscle protein alleles I^M most frequent/I^{ma} least frequent; I^{ma} smallest/I^{ma} most negatively charged; I^{mb} largest/I^{mb} least negatively charged; muscle protein alleles are different size/differently charged from membrane proteins e.g. muscle protein alleles are smaller/more negatively charged;	allow any suitable comment on the alleles related to their size or charge do not allow genes ignore references to dominance allow reverse arguments that are consistent with the gel being read bottom upwards. If only example given then allow. If two examples given then they must be consistent in their interpretation of size or charge.	[2]
		Total:	**[8]**

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