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BIOLOGY **9700/52**

Paper 5 Planning, Analysis and Evaluation **October/November 2017**

MARK SCHEME

Maximum Mark: 30

Published

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Mark scheme abbreviations

;	separates marking points
/	alternative answers for the same point
R	reject
A	accept (for answers correctly cued by the question, or extra guidance)
AW	alternative wording (where responses vary more than usual)
underline	actual word given must be used by candidate (grammatical variants accepted)
max	indicates the maximum number of marks that can be given
ora	or reverse argument
ecf	error carried forward
I	ignore
mp	marking point (with relevant number)

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<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>1(a)(i)</td><td>(weigh) 51.345 / 51.35 / 51.34 / 51.4 / 51.3 g lactose ;

1 dm^3 (distilled / deionised) water (and stir until dissolved) ;</td><td>2</td></tr>
<tr><td>1(a)(ii)</td><td>idea of using different volumes of (0.15 mol dm^{-3} / stock) solution ;

idea of adding correct volume of (distilled) water to make four dilutions each of 500 cm^3 ;

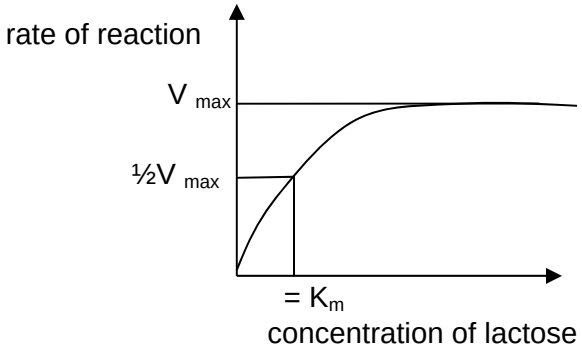
e.g. for 2 marks
<table><tr><th>vol 0.15 mol dm^{-3} / cm^3</th><th>vol. water / cm^3</th><th>(conc)</th></tr><tr><td>400</td><td>100</td><td>0.12</td></tr><tr><td>300</td><td>200</td><td>0.09</td></tr><tr><td>200</td><td>300</td><td>0.06</td></tr><tr><td>100</td><td>400</td><td>0.03</td></tr></table>
R serial dilution procedure</td><td>2</td></tr>
<tr><td>1(b)(i)</td><td>independent: pH ;

dependent : glucose concentration ;</td><td>2</td></tr>
<tr><td>1(b)(ii)</td><td>idea of
substituting the active enzyme by an unreactive substance (at all pH)
or
substituting lactose with water / 0.0M lactose or another sugar ;</td><td>1</td></tr>
</table>

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Question	Answer	Marks
1(b)(iii)	*max 5 if mp7 not given* *any 6 from*: 1 *ref. to* a suitable range of at least 5 different pH **;** **A** any 5 in the range 1–14 2 *ref to* using (same volume of each) buffer solution **;** 3 *ref. to* using same volume of lactase solution for (each) measurement **;** *total volume must not exceed 30 cm^3* 4 *ref. to* using same volume of (each) lactose concentration **;** *total volume must not exceed 30 cm^3* 5 *ref. to* maintaining a constant temperature using a suitable method **;** *procedure:* 6 *ref. to* incubating lactose and lactase solutions separately **;** 7 *ref. to* adding lactose **and** lactase solutions together and immersing glucose biosensor without delay (i.e. no additional steps / no stirring) **;** 8 *ref. to* taking a glucose reading after the same time for each solution tested (minimum of two) **;** 9 *ref. to* testing each of their concentrations of substrate at every pH **;** 10 *ref. to* a minimum of 3 replicates and a mean / find anomalies **;** 11 low risk experiment **;**	**6**

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Question	Answer	Marks
1(c)(i)	one curve drawn correctly **;** V_{max} shown **;** $½V_{max}$ shown **;** K_m shown **;**  	**4**
1(c)(ii)	**B ;** the (K_m) value is low<u>est</u> / it shows the great<u>est</u> affinity (of the enzyme) for its substrate **;**	**2**
2(a)(i)	*any 1 from:* volume of (salt) solution used for irrigation **;** time (of day or length of watering time) at which irrigated (in the field plots) **;** any other added nutrient / fertiliser used on the crop plants **;**	**1**

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Question	Answer	Marks
2(a)(ii)	*any 1 from:* 1 temperature **;** 2 (sun)light (availability) **;** 3 rainfall / soil water **;** 4 humidity / wind **;** 5 (variation in) soil pH **;** 6 other soil feature e.g. drainage / fertility / nutrients already present / aeration / type of soil **;** 7 pests / disease **;**	**1**
2(b)	*idea of* water content of the (different) crops / plants will vary **;** to allow comparison between different crops / plants **;** (dry mass) is the organic matter / biomass **;**	**2**
2(c)	plot the yields for each crop on a graph (including for control plots irrigated with water) **;** **A** annotated sketch use intercept at 50% / half the yield to find salt concentration **;** **A** annotated sketch **or** find the yield / dry mass of control **and** halve / find 50% **;** **A** in an equation showing percentage loss find which of the concentrations gives yield that is closest match to half the control **;** **A** in an equation showing percentage loss	**2**

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Question	Answer	Marks
2(d)	*any 3 from:* 1 the growth monocotyledons are less affected than dicotyledons **; ora** 2 potato growth is most decreased by salinity / most sensitive **;** 3 barley growth is least decreased by salinity / most tolerant **;** 4 all (crop / yields) are affected by / are sensitive to (saline) **;** 5 all dicotyledons are reduced by narrow(er) range of concentrations / concentrations between 1.0–1.3 g dm^{-3} **or** monocotyledons are reduced by a wide(r) range of concentrations / concentrations between 2.3–4.8 g dm^{-3} **;** 6 no crops have 50% yield reduction in concentrations below 1.0 g dm^{-3} **;**	**3**
2(e)	*any 2 from:* 1 *ref. to* different environmental conditions **;** 2 does not allow for different cultivation methods / examples of different methods of cultivation **;** 3 seeds are planted directly in saline soil / seeds are not pre-germinated in salt-free conditions **;** 4 does not allow for build-up of salinity from irrigation **;**	**2**

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