Cedar Girls' Secondary School
PRELIM/EYE 2021
Answer Scheme and Markers' Comments

SUBJECT: BIOLOGY **LEVEL:** S4/IP4

<table>
<tr><th colspan="4">Answers</th><th>Marks</th></tr>
<tr><td>1</td><td>(a)</td><td>(i)</td><td>Fill large test-tube with water up to mark;

Volume of water measured using measuring cylinder or syringe;</td><td>1

1</td></tr>
<tr><td></td><td></td><td>(ii)</td><td>36.0</td><td>1</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td>(b)</td><td></td><td>Diffusion;</td><td>1</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td>(c)</td><td></td><td>Small intestine/duodenum/ileum;</td><td>1</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td>(d)</td><td></td><td><table><tr><td>solution / test tube</td><td>time / s</td></tr><tr><td>G4 / T4</td><td></td></tr><tr><td>G8 / T8</td><td></td></tr><tr><td>G12 / T12</td><td></td></tr><tr><td>G16 / T16</td><td></td></tr></table>
Headings – IV: solution OR test tube; DV: time / s (units included only in headings);

Organisation – 1 column per variable, IV on left, DV on right;

Recording – records times for G4, G8, G12 and G16 + recorded to the nearest 0.01s;</td><td>

1

1

1</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td>(e)</td><td></td><td>As time increases from G4 to G16, rate of movement of glucose solution from syringe into the water in the boiling tube decreases;

Time taken for first colour change to appear increases with experiment duration;

Concentration gradient for glucose becomes less steep with every transfer of syringe at the end of each 2-minute interval;

Rate of diffusion of glucose decreases with increasing time intervals;</td><td>1

1

1

1

max. 3m</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td></tr>
</table>

	(f)		Volume of water / glucose solution; To allow for <u>fair</u> comparison between the test tubes; To prove that any difference in results is caused by the difference in glucose concentration in the syringe among the 2-minute time intervals;	1 1 1 **max. 2m**
	(g)		To ensure there is direct contact between the glucose solution and water so as to allow for diffusion to occur; This <u>prevents an underestimation</u> of the time measured / <u>prevents</u> time measured from being <u>higher than expected</u>;	1 1
	(h)	**(i)**	**<u>T</u>**itles – x-axis: time / min + y-axis: rate of movement of glucose solution / au **<u>A</u>**ppropriate size/scale – at least half of grid + scale is suitable (x-axis: 5 min represented by 2 cm; y-axis: 0.05 au represented by 2cm) **<u>P</u>**oints – all correctly and clearly plotted; **<u>G</u>**raph – smooth best-fit straight curve + no extrapolation	1 1 1 1
		(ii)	shows on graph how answer is determined (line drawn at t = 5 min to find corresponding rate on y-axis)**;** correct answer for the rate of movement of glucose solution at 5 minutes from candidate's graph**;**	1 1
2	**(a)**		<table><tr><td>petri dish</td><td>colour intensity after 20 minutes</td></tr><tr><td>**A**</td><td>1</td></tr><tr><td>**control**</td><td>2 or 3</td></tr></table>	1 1
			*Control should show a darker colour intensity;	
	(b)		Yes; When hydrochloric acid is used to treat the apple slices, colour intensity is a <u>lighter</u> shade of <u>brown</u> compared to control;	1 1

			This is because the extreme low pH of hydrochloric acid <u>denatures</u> the enzyme polyphenol oxidase which is responsible for the oxidation reaction that results in the browning of the apple;	1
	(c)		To allow for comparison of setups with/without solution OR at different pH values to verify any change to the apple is due to the effect of pH on the oxidation reaction occurring; for a fair experiment;	1 1 **max. 1m**
	(d)		Oxygen (from the air) is needed for the reaction to occur;	1
	(e)		**1. [IV - ID]** ref to using at least three temperatures (values clearly stated)**;** **2. [IV – how to vary]** method described to maintain temperature(s) – e.g. use of thermostat / water bath to allow enzyme & substrate separately to reach the temperatures being investigated **3. [DV - ID]** Measure time taken for brown colour to appear OR colour intensity value reached within a set duration of 20 min **4. [DV – how to measure]** by using a stopwatch / checking in at fixed time intervals (e.g. every 5 min) OR by observing after a fixed duration of 20 min **5. [CV – ID]** *controlled variables any one from:* same concentration of enzyme / same concentration of substrate / same volume of enzyme / same volume of substrate / constant OR optimum pH**;** **6. [Ensuring reliability]** repeat (at least) twice**;** **7. [Answering experiment aim]** ref to substrate at optimum temperature turning brown first or having the highest colour intensity value**;**	1 1 1 1 1 1

				1 **max. 5m**
	(f)	**(i)**	**S**ize – at least 2/3 of space provided **L**ines – clean unbroken lines; no shading **A**ccuracy – resembles specimen + cut surface (longitudinal section) shown **P**roportion – in terms of size and numbers	1 1 1 1
		(ii)	line drawn in widest position across drawing + correct measurement recorded to nearest whole number; **W**orking – Length of drawing (mm) / length of actual specimen (mm); **A**nswer – 'x' symbol shown + calculated correctly + recorded to nearest whole number	1 1 1

End of Markers' Report