

Question	Answers	Extra information	Mark	AO / Specification reference
01.1	sugar concentration		1	AO2 1.3.2
01.2	any <b>two</b> from: <ul style="list-style-type: none"> <li>• volume of sugar solution</li> <li>• mass of potato at start</li> <li>• size / surface area of potato chips</li> </ul>		2	AO2 1.3.2
01.3	$3.5 - 3.3 = 0.2$ $\frac{0.2}{3.3} \times 100 = 6.1\%$		1 1	AO1 AO2 1.3.2 MS1c
01.4	all marks correctly pointed correct line of best fit	allow 1 mark for 2 correctly plotted points	2 1	AO2 AO1 1.3.2 MS 4a, 4b
01.5	3.5 %	accept answer in range 3.0–4.0%	1	AO2 1.3.2 Ms4a
01.6	repeat the experiment with the same apparatus check results are the same / similar		1 1	AO3 1.3.2
02.1	hypertonic (solution)	accept a solution that has a higher salt concentration than the cell	1	AO2 1.3.2

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02.2	any <b>six</b> from: <ul style="list-style-type: none"> <li>cell has a higher water content / cell is less concentrated than the solution</li> <li>water leaves the cells</li> <li>by osmosis</li> <li>cells become flaccid / soft</li> <li>as no pressure on cell walls</li> <li>(if more water is lost) vacuole and cytoplasm shrink</li> <li>cell membrane pulls away from cell wall</li> <li>this is called plasmolysis</li> </ul>		6	AO1×3 AO2×3 1.3.2
02.3	cell would die (unless osmotic balance restored quickly)		1	AO1 1.3.2
03.1	the (passive) transfer of gases across a surface by diffusion		1	AO1 1.3.1
03.2	any <b>two</b> from: <ul style="list-style-type: none"> <li>have a large surface area</li> <li>thin membrane or short diffusion distance</li> <li>efficient blood supply</li> <li>good water supply</li> </ul>		2	AO2 1.3.1

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03.3	for the fish to acclimatise to the temperature of the water		1	AO2 1.31
03.4	the higher the water temperature the more breaths the fish takes / the higher the breathing rate		1	AO3 1.3.1
03.5	The oxygen content of water decreases as temperature increases		1	AO3 1.3.1
04.1	salt is more concentrated outside the body salt needs to be moved against a concentration gradient / from an area with a lower salt concentration to an area with a higher concentration		1 1	AO2 1.3.3
04.2	process of active transport requires energy energy transferred by respiration, which takes place inside the mitochondria many mitochondria are required to supply enough energy to allow active transport to occur		1 1 1	AO2 1.3.3
04.3	any <b>one</b> from: <ul style="list-style-type: none"> <li>increase likelihood of finding food source / prey</li> <li>wider availability of breeding sites</li> </ul>	accept any other appropriate suggestion	1	AO3 1.1.3
05	<b>Level 3:</b> All key steps are identified and logically sequenced. Details are given of how the data should be used to determine sucrose concentration.		5–6	AO1 4.1.3.2
	<b>Level 2:</b> Most steps are identified, but the method is not fully logically sequenced. Some details are given of how the data should be used to determine sucrose concentration.		3–4	

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	<p><b>Level 1:</b> Some relevant steps are identified, but links are not made clear. Little or no attempt to give details of how the data should be used to determine sucrose concentration.</p>		1–2	
	<p><b>No relevant content.</b></p> <ul style="list-style-type: none"> <li>• cut identical sized diameter pieces of each apple using the potato borer</li> <li>• cut apple samples to an identical / named length</li> <li>• check mass of samples using balance</li> <li>• adjust mass so all are identical by trimming sample(s) using scalpel. note starting mass value.</li> <li>• add fixed volume distilled water to first test tube (and place in rack)</li> <li>• using measuring cylinder, add same volume of each concentration of sucrose solution to other test tubes (and place in rack)</li> <li>• place apple sample in each test tube.</li> <li>• leave for fixed time (e.g. 1 hour)</li> <li>• dry apple samples</li> <li>• re-take mass of each sample</li> <li>• calculate percentage change in mass for each sample</li> <li>• plot sucrose concentration (x-axis) v percentage change in mass (y-axis)</li> </ul> <p>sucrose concentration determined from where graph crosses x-axis</p>		0	
<b>06.1</b>	cell B has a smaller surface area-to-volume ratio than cell A.		1	4.1.3.1

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06.2	SA of cell B = 5027 ( $\mu\text{m}^2$ ), volume of cell B = 33 510 ( $\mu\text{m}^3$ ) SA : volume ratio of cell B = 0.15 : 1 SA : volume ratio relative to that of cell A = $\frac{1}{4}$ or 0.25× diffusion rate = $\frac{1}{4}$ or 0.25×, so diffusion time = 4 × longer time = 20 ms	accept either calculation for 1 mark	1 1 1 1 1	AO2 4.1.3.1
07.1	movement of water from a high concentration / concentrated solution to a low concentration / dilute solution through a partially permeable membrane		1	AO1 4.1.3.2
07.2	C greatest difference in salt concentrations		1 1	AO2 4.1.3.2
07.3	any <b>two</b> from: <ul style="list-style-type: none"> <li>• long hollow tubes</li> <li>• made up of dead cells</li> <li>• lignin in the cell walls</li> <li>• makes vessels very strong / able to withstand water pressure</li> </ul>		2	AO1 4.1.1.3
08.1	larger surface area through which molecules can move more molecules (of concentrated area) in contact with less concentrated area		1 1	AO1 4.1.3.1

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08.2	any <b>one</b> suggestion + explanation from: <ul style="list-style-type: none"> <li>thin membrane – so the diffusion path is short</li> <li>efficient / rich blood supply – to maintain a steep diffusion / concentration gradient</li> </ul>	adaptation must be linked to correct explanation for 2 marks	2	AO1 4.1.3.1
08.3	radius = 150 $\mu\text{m}$ surface area = 282 743 volume = 14 137 167 SA : volume ratio = 1:50	accept $\frac{282\,743}{14\,137\,167}$ or 0.02 for 1 mark	1 1 1 1	AO2 4.1.3.1 MS1C
09.1	0.0 M		1	AO2 4.1.3.2
09.2	the potato had a higher salt concentration than the solution it was placed in water moves into the potato (by osmosis)		1  1	AO1 4.1.3.2
09.3	0.5 M potato does not gain or lose water / mass, and chef does not want the consistency / water concentration of the potato chip to change		1 1	AO3 4.1.3.2
10.1	the movement of oxygen from the lungs into the bloodstream – diffusion the movement of mineral ions from the soil into a plant root system – active transport the movement of water into a plant cell – osmosis	accept one or two answers correct for 1 mark	2	AO1 4.1.3.1 4.1.3.2 4.1.3.3

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10.2	many energy		1	AO1
			1	4.1.3.3
10.3	glucose concentration higher in bloodstream than in the intestinal cells glucose needs to be moved against concentration gradient which requires energy		1	AO1
			1	AO2
			1	4.1.3.3