

Question	Answers	Extra information	Mark	AO / Specification reference
01.1	sugar concentration		1	AO2 1.3.2
01.2	Any two from: volume of sugar solution / mass of potato at start / size / surface area of potato chips		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 x2 AO1 x3 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	<i>Euglena</i> has a large surface area : volume ratio large area over which diffusion can take place / short diffusion distance rate of diffusion / volume of oxygen which diffuses is sufficient to support euglena		1 1 1	AO2 1.3.1
03.1	Hypertonic (solution)	Accept a solution which has a higher salt concentration than the cell	1	AO2 1.3.2

03.2	Any six from: cell has a higher water content / less concentrated than the solution water leaves the cells by osmosis cells become flaccid / soft as no pressure on cell walls (if more water is lost) vacuole and cytoplasm shrink cell membrane pulls away from cell wall this is called plasmolysis		6	AO1x3 AO2x3 1.3.2
03.3	Cell would die (unless osmotic balance restored quickly)		1	AO1 1.3.2
04.1	Cell membrane		1	AO1 1.1.2
04.2	C higher concentration of substance inside cell / active transport moves substances from a dilute solution to a more concentrated solution		1 1	AO2 1.3.3
04.3	To transfer energy from respiration as active transport requires energy to move molecules against their concentration gradient		1 1 1	AO1 1.3.2
05.1	The (passive) transfer of gases across a surface by diffusion		1	AO1 1.3.1
05.2	Any two from: have a large surface area / thin membrane or short diffusion distance / efficient blood supply / good water supply		2	AO2 1.3.1
05.3	For the fish to acclimatise to the temperature of the water		1	AO2 1.3.1

05.4	The higher the water temperature the more breaths the fish takes / the higher the breathing rate		1	AO3 1.3.1
05.5	The oxygen content of water decreases as temperature increases		1	AO3 1.3.1
06.1	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
06.2	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
06.3	Any one from: Increase likelihood of finding food source / prey Wider availability of breeding sites	Accept any other appropriate suggestion	1	AO3 1.1.3

7	<p>Any six from:</p> <p>Cut identical sized diameter pieces of each apple using the potato borer</p> <p>Cut apple samples to an identical / named length</p> <p>Check mass of samples using balance</p> <p>Adjust mass so all are identical by trimming sample(s) using scalpel. Note starting mass value.</p> <p>Add fixed volume distilled water to first test tube (and place in rack)</p> <p>Using measuring cylinder, add same volume of each concentration of sucrose solution to other test tubes (and place in rack)</p> <p>Place apple sample in each test tube.</p> <p>Leave for fixed time (e.g. 1 hour)</p> <p>Dry apple samples</p> <p>Re-take mass of each sample</p> <p>Calculate percentage change in mass for each sample</p> <p>Plot sucrose concentration (x-axis) v percentage change in mass (y-axis)</p> <p>Sucrose concentration determined from where graph crosses x-axis</p>	To award full marks, answers should include details of how the data should be used to determine sucrose concentration	6	AO1 4.1.3.2
08.1	Cell A has a smaller volume than cell B.		1	AO2 4.1.3.1
08.2	<p>SA of cell B = 5027 (μm^2), volume of cell B = 33510 (μm^3)</p> <p>SA : volume ratio of cell B = 0.15 : 1</p> <p>SA : volume ratio relative to cell A = $\frac{1}{4}$ / 0.25x</p> <p>Diffusion rate = $\frac{1}{4}$ / 0.25x so diffusion time = 4 x larger</p> <p>Time = 20ms</p>	Accept either calculation for 1 mark	1 1 1 1 1	AO2 4.1.3.1

09.1	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
09.2	C Greatest difference in salt concentrations		1 1	AO2 4.1.3.2
09.3	Any two from: <ul style="list-style-type: none"> • Long hollow tubes • made up of dead cells • Lignin in the cell walls makes vessels very strong / able to withstand water pressure		2	AO1 4.1.1.3
10.1	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
10.2	Two from: Thin membrane so the diffusion path is short Efficient / rich blood supply to maintain a steep diffusion/concentration gradient	Adaptation must be linked to correct explanation for 2 marks	2	AO1 4.1.3.1
10.3	Radius = 150µm 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
11.1	0.0M		1	AO2 4.1.3.2
11.2	Potato chip had a higher salt concentration than the solution it was placed in Water moves into the potato chip (by osmosis)		1 1	AO1 4.1.3.2

11.3	0.5M Potato does not gain or lose water / mass Do not want the consistency / water concentration of the potato chip to change		1 1	AO3 4.1.3.2
12.1	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 one mark	2	AO1 4.1.3.1 4.1.3.2 4.1.3.3
12.2	many energy		1 1	AO1 4.1.3.3
12.3	Glucose concentration higher in bloodstream than in the intestinal cells Glucose needs to be moved against concentration gradient which requires energy		1 1 1	AO1 AO2 4.1.3.3

13	<p>Any six from:</p> <p>When the concentration of glucose in the villus cell is lower than in the bloodstream glucose diffuses from the blood stream into the villus</p> <p>This continues until the sugar concentrations are the same (However the body wants to absorb all the glucose available so ...)</p> <p>When the concentration of glucose is higher inside the cell than in the small intestine active transport occurs</p> <p>Active transport occurs when glucose is being moved from a low concentration to a high concentration</p> <p>Molecules need to be taken into the villus cell against the concentration gradient. (A carrier protein is used to transport molecules across the cell membrane) by active transport</p> <p>Energy is required to make the carrier protein work</p> <p>This energy comes from respiration</p> <p>(The molecules are then released from the carrier protein into the villus cell).</p>	Do not allow reference to diffusion from small intestine into villus cell	6	AO2x4 AO3x2 4.1.3.3
14.1	Controls the movement of substances into and out of the cell		1	AO1 4.1.1.2
14.2	<p>Any two from:</p> <ul style="list-style-type: none"> • Nucleus • Cytoplasm • Mitochondria <p>Ribosomes</p>		2	AO1 4.1.1.2
14.3	<p>Chloroplasts contain chlorophyll</p> <p>Which traps / absorbs light for photosynthesis</p> <p>Onion (bulb) cells are found underground so no light available</p>		3	AO2 4.1.1.2

14.4	Any four from: Water moves into plant cells by osmosis This causes the vacuole to swell It presses / pushes the cytoplasm against the cell wall This is known as turgor pressure It makes the cells hard and firm Which keeps stem rigid (and upright)		4	AO1 4.1.1.2 4.1.3.2
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