

1) (a)	stem / undifferentiated ; (bone) marrow ; differentiate ; meristem(atic) / cambium ;	4	<p>Mark the first answer for each prompt line. If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = 0 marks</p> <p>ACCEPT totipotent / pluripotent IGNORE unspecialised (as specialised in the passage)</p> <p>IGNORE specialise as given in the passage</p> <p>ACCEPT callus</p>
(b) (i)	<i>idea of:</i> create flow of water / move water ;	1	<p>Mark the first answer only. If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = 0 marks</p> <p>DO NOT CREDIT ref to movement of, organism / cell IGNORE ref to liquid / food particles</p>
(ii)	strain / filter (the water) OR trap particles ; to catch food (particles) ;	1 max	<p>Mark the first answer only. If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = 0 marks</p> <p>IGNORE trap substances unqualified</p> <p>ACCEPT named suitable food particles eg bacteria IGNORE ref to preventing infection / catching pathogens IGNORE ref to nutrients unqualified as these are dissolved IGNORE ref to catching dust</p>
(c)	<p><i>xylem</i> consists of vessels ;</p> <p>one cell specialisation described ;</p> <p><u>transpiration stream</u> OR movement of, water / minerals ;</p> <p><i>phloem</i> sieve tube element(s) <u>and</u> companion cell(s) ;</p> <p>one cell specialisation described ;</p> <p><u>translocation</u> OR transports, sucrose / assimilates / products of photosynthesis / amino acids ;</p> <p>AVP ;</p>	4 max	<p>ACCEPT cells joined end to end ACCEPT continuous column / tube</p> <p>eg wall water proof / wall lignified / no end walls / (bordered) pits / hollow / no organelles / no cell contents</p> <p>IGNORE dead</p> <p>IGNORE transpiration unqualified</p> <p>ACCEPT sieve element / sieve tube, and companion cell</p> <p>eg sieve plates (between phloem elements) no nucleus / few organelles, in sieve tube (elements) little cytoplasm in sieve tube (elements) many plasmodesmata many mitochondria / dense cytoplasm, in companion cells</p> <p>ACCEPT sugar IGNORE load / unload sugars alone</p> <p><i>in either xylem or phloem</i> ref to fibres ref to, packing cells / parenchyma cells</p>
	<b>Total</b>	<b>10</b>	

2)

(a)	<p><i>magnification is</i> the number of times larger the image is compared to the object ;</p> <p><i>resolution is</i> ability to, distinguish / differentiate between, two separate points</p> <p><b>OR</b> the, level / degree, of detail that can be seen ;</p>	2	<p><b>ACCEPT</b> alternative wording that implies quantitative comparison of image size with object size <b>DO NOT CREDIT</b> comparison of object to image (wrong way round)</p> <p><b>ACCEPT</b> <math>\frac{\text{size of image}}{\text{size of object}}</math> or <math>\frac{\text{size of image}}{\text{actual size}}</math></p> <p><b>IGNORE</b> makes image bigger unqualified</p> <p><b>IGNORE</b> ref to clarity</p> <p><b>ACCEPT</b> 'how detailed the image is'</p>
(b)	<p><i>light</i> 50 - 200 nm / 0.05 - 0.2 <math>\mu\text{m}</math> ;</p> <p><i>TEM</i> 0.05 - 1.0 nm ;</p>	2	<p><b>Mark the first answer for each prompt line.</b> If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = 0 marks</p> <p><b>ACCEPT</b> a single figure within the range</p> <p>Units are required for both light &amp; TEM</p> <p><b>ACCEPT</b> 0.00005 - 0.001<math>\mu\text{m}</math> or <math>5 \times 10^{-5}</math> - <math>1 \times 10^{-3}\mu\text{m}</math></p>
(c) (i)	<p>3 dimensional / 3D, (image) ; can see the surface (detail) ;</p>	1 max	<p><b>ACCEPT</b> has depth of field / contours</p>
(ii)	<p>120 ;;</p>	2	<p><b>Award two marks for correct answer</b> if answer incorrect allow one mark for working:</p> <p><math>\frac{3\ 000\ 000}{25\ 000}</math> or <math>\frac{3}{25\ 000}</math> or evidence that candidate is dividing 3mm or 3000000 nm by 25 000</p> <p><b>OR</b></p> <p>if 3mm incorrectly converted but still divided by 25000 then allow ecf for one mark eg:</p> <p><math>\frac{3\ 00000}{25\ 000} = 12</math></p> <p><b>Note:</b> If candidate has measured the pore as 4mm and carried out the calculation using this figure allow one mark ecf</p>
(iii)	<p>allow communication between nucleus and cytoplasm <b>or</b> allow, molecules / named substances, to, enter / leave (the nucleus) ;</p>	1	<p><b>IGNORE</b> ref control</p> <p><b>Note: the term 'substances' is not sufficient on its own</b> <b>DO NOT CREDIT</b> if named example is moving in wrong direction eg, RNA / mRNA / ribosomes, entering nucleus or DNA leaving nucleus</p>
(d)	<p>(named) membranes / phospholipid bilayer ; ribosomes ; Golgi ; endoplasmic reticulum / ER / RER / SER ; cytoskeleton / microtubules / microfilaments / spindle fibres ; centrioles ; vesicles / lysosomes ; mitochondria ;</p>	2 max	<p><b>Mark the first two suggestions</b> eg plasma / cell surface / nuclear / thylakoid / cristae / tonoplast, chloroplast membrane</p> <p><b>DO NOT CREDIT</b> flagellum / chromosomes / chromatin / nucleolus</p> <p><b>IGNORE</b> ref to molecules</p>
<b>Total</b>		<b>10</b>	

3)

(a)	<p>1 form / produce / make, compartments / organelles / named organelles (within a cell) / AW ;</p> <p>2 isolation / AW, of, contents (of organelle) / substance / named substance / reactions / metabolic pathways ;</p> <p>3 site for attachment of, enzymes / other named molecules / ribosomes ;</p> <p>4 provide selective permeability / described ;</p> <p>5 creation of, concentration gradients / specific environments / described ;</p>	3 max	<p><b>Mark first three suggestions only</b></p> <p><b>DO NOT CREDIT</b> ref to cell signalling / cell recognition</p> <p><b>ACCEPT</b> vesicles as compartments eg mitochondria, ER, nucleus, lysosomes, Golgi, chloroplast <b>ACCEPT</b> compartmentalisation <b>DO NOT CREDIT</b> 'to contain an organelle'</p> <p>eg of AW include hold / contain / store / separates eg of named substance: (hydrolytic) enzymes, hormones / chemical messengers</p> <p><b>DO NOT CREDIT</b> separates cell contents</p> <p><b>IGNORE</b> ref to increasing surface area / ref to site for reactions to occur eg of other named molecules : receptors / electron carriers / photosystems / pigments</p> <p>eg controls what can enter and leave an organelle <b>DO NOT CREDIT</b> in context of materials entering and leaving the cell</p> <p>eg of specific environment = pH <b>IGNORE</b> moves substances in vesicles</p>
(b) (i)	<p>cytoskeleton / microtubule / microfilament ; provide, pathways / tracks, (for movement) ;</p> <p>(vesicle) moves along, <u>microfilaments</u> / <u>microtubule</u> ; <u>microtubules</u>, extended / broken down ;</p> <p>uses, ATP / (metabolic) energy ; AVP ;</p>	2 max	<p><b>ACCEPT</b> guide the vesicles</p> <p>Mp 3 or 4 scores 2 marks as they include mp 1 <b>IGNORE</b> moved by microtubules / microfilaments</p> <p>eg ref to (protein) motor / dynein / kinesin</p>
(ii)	<p>receptor found only on, correct / target, (named) organelle ; <i>idea that:</i> address protein provides a way of, labelling / identifying / recognising, the vesicle ; protein / COPI / COPII, has a specific shape ; (shape of) receptor and (address) protein are complementary ;</p>	2 max	<p><b>DO NOT CREDIT</b> statements that relate to events outside a cell (eg protein is a complementary shape to the receptor on the surface of a target cell) as the question is in the context of vesicles moving <i>within</i> cells.</p> <p><b>ACCEPT</b> correct target organelle is identified for each vesicle</p> <p><b>ACCEPT</b> receptor fits the shape of the, protein / COPI / COPII</p>
	<p><b>exocytosis</b> ; vesicle fuses / merges ; (with), cell surface / plasma, membrane ;</p> <p>discharging / releasing, enzyme / contents (to exterior) ;</p>	2 max	<p><b>IGNORE</b> bind / attach / join <b>IGNORE</b> ref to, cell membrane / phospholipid bilayer, unqualified</p> <p><b>IGNORE</b> secretion alone as stated in question</p>
	<b>Total</b>	<b>9</b>	

4)

(a)	(i)	<u>N</u> ;	1	IGNORE nitrogen DO NOT CREDIT n or N <sub>2</sub>
(a)	(ii)	polypeptide / protein ;	1	Mark the first answer. If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = 0 marks IGNORE peptide
(a)	(iii)	<p><i>name</i> peptide (bond / link) ;</p> <p><i>plus any two from ...</i> <i>description of formation</i></p> <p>between, amine group (of one amino acid) and carboxyl group (of another) ;</p> <p>H (from amine) combines with OH (from carboxyl) ;</p> <p>condensation (reaction) OR water, lost / eliminated / produced / created / AW ;</p>	3 max	<p>Maximum two marks for description. Name must be given to award 3 marks.</p> <p>ACCEPT marking points from diagram where amine and carboxyl groups are clearly labelled.</p> <p>Mark writing first then look at diagram.</p> <p>If diagram contradicts credible text award maximum one mark for description.</p> <p>DO NOT CREDIT dipeptide</p> <p>ACCEPT phonetic spellings of amine and carboxyl ACCEPT 'carboxylic acid' and 'amino' DO NOT CREDIT amide / carbonyl</p>
(b)	(i)	<p>V1 high latent heat of vaporisation / large amount of energy required to change from liquid to gas / AW ;</p> <p>V2 evaporation is (efficient) cooling mechanism / AW ;</p> <p>V3 example of cooling in living organism ;</p> <p>H1 high specific heat capacity / large amount of energy needed to, raise / change, temperature ;</p> <p>H2 (thermally) stable environment for, aquatic / named aquatic, organisms ;</p> <p>H3 (aquatic) organisms use less energy on temperature control ;</p> <p>H4 (internal) temperature of organisms changes only slowly ;</p> <p>H5 (biological) reactions / enzymes / metabolism, function(s) correctly ;</p> <p>F1 ice, is less dense than water / floats ;</p> <p>F2 (surface of) ice provides habitat for, organisms / named organism ;</p>	8 max	<p>Annotate property (number 1) marks with <input checked="" type="checkbox"/> 1 symbol to help distinguish marks for QWC</p> <p>All marks are stand alone</p> <p>V1 ACCEPT 'large amount of heat needed...'</p> <p>V1 ACCEPT 'high latent heat of evaporation'</p> <p>V2 ACCEPT 'evaporation removes heat from body'</p> <p>V3 e.g. sweating, panting, transpiration (as cooling)</p> <p>'high latent heat of evaporation means sweat cools you down' = 3 marks</p> <p>H1 ACCEPT 'water / it, is thermally stable'</p> <p>H1 ACCEPT 'water is slow to change temperature'</p> <p>H1 CREDIT 'the temperature of the sea does not change much'</p> <p>H2 'thermally' can be inferred from previous statement</p> <p>H5 IGNORE 'organisms function correctly'</p> <p>F1 ACCEPT 'maximum density is at 4°C'</p> <p>F2 e.g. 'polar bears on ice'</p>

<p>I1 water (beneath ice), insulated / remains liquid / doesn't freeze ;</p> <p>I2 (aquatic) organisms, do not freeze / can still swim ;</p> <p>S1 (effective) solvent ;</p> <p>S2 medium for reactions / (internal) transport medium / able to dilute toxic substances ;</p> <p>C1 cohesion / adhesion ;</p> <p>C2 example of cohesion / adhesion, in living organism ;</p> <p>T1 surface tension ;</p> <p>T2 habitat for (named) invertebrates ;</p> <p>P1 transparent ;</p> <p>P2 allows underwater photosynthesis ;</p> <p>D1 idea of high density ;</p> <p>D2 allows flotation / support ;</p> <p>U organisms can still obtain, oxygen / (named) minerals / food / carbon dioxide, from water ;</p>	<p>I2 IGNORE unqualified references to survival</p> <p>I2 ACCEPT gametes / AW, can be dispersed</p> <p>C2 e.g. transpiration stream / apoplast movement</p> <p>C2 ACCEPT descriptions</p> <p>T2 ACCEPT insects IGNORE animals</p> <p>P2 ACCEPT other example of transparency linked to survival, e.g. eyes</p> <p>D1 IGNORE references to viscosity</p> <p>U not linked to a single property and so cannot contribute to QWC</p> <p>U IGNORE nutrients / nutrition</p>	
<p><b>QWC:</b> a property mark (with number 1) and a survival mark with the same letter seen twice.</p>	1	e.g. H1 and H3 and S1 and S2

<p>(b) (ii)</p> <p>1 protein <u>secondary</u> structure / <math>\alpha</math>-helix / <math>\beta</math>-pleated sheet ;</p> <p>2 (protein) <u>tertiary</u> structure ;</p> <p>3 between polypeptide chains in (named) quaternary structure ;</p> <p>4 (between chains of) cellulose ;</p> <p>5 (between, strands of / bases in) DNA ;</p> <p>6 AVP ; ; ;</p>	<p>3 max</p> <p><b>Mark the first answer on each prompt line.</b></p> <p>3 e.g. between adjacent chains in collagen</p> <p><b>CREDIT</b> 'protein / named protein / enzyme' OR 'between amino acid R-groups' once <b>ONLY</b> if <u>none</u> of mps 1-3 have been awarded</p> <p>4 IGNORE macrofibrils</p> <p>6 e.g. between mRNA and tRNA binding between enzyme and substrate (coiling of) amylose between DNA and mRNA during transcription</p>	
<b>Total</b>	<b>17</b>	

5)			
(a)	<p>regulates fluidity of / stabilises / AW, membranes / phospholipid bilayer ;</p> <p>(converted to) steroid / named steroid, hormone(s) ; waterproofing the skin ; making Vitamin D ; making bile (salts) ;</p>	2 max	<p><b>Mark the first answer on each prompt line.</b> <b>ACCEPT</b> decreases / maintains, fluidity <b>ACCEPT</b> supports structure of membranes <b>DO NOT CREDIT</b> makes membrane rigid <b>DO NOT CREDIT</b> allows / increases fluidity</p>
(b)	(i)	<p>contains C and H and O ;</p> <p>has, OH / hydroxyl, groups ;</p> <p>hex / 6-membered, ring ;</p>	<p>1 max</p> <p><b>Mark the first answer.</b> If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = 0 marks <b>DO NOT CREDIT</b> C, H and O molecules</p> <p><b>DO NOT CREDIT</b> hexose <b>ACCEPT</b> pent ring <b>IGNORE</b> 6C ring <b>IGNORE</b> branched</p>
(b)	(ii)	<p>(saturated) lipids / fats / triglycerides ;</p> <p>protein / polypeptide ;</p>	<p>2</p> <p><b>Mark the first two suggestions</b> <b>DO NOT CREDIT</b> unsaturated (fats) <b>IGNORE</b> fatty acids / glycerol <b>IGNORE</b> amino acids / peptides</p>
	(iii)	<p><i>LDL</i></p> <p>L1 (carry cholesterol) from liver to, tissues / cells ;</p> <p>L2 receptors on (tissue) <u>cells</u> ;</p> <p>L3 raise / AW, <u>blood</u> cholesterol ;</p> <p>L4 increase / cause, deposition of, fats / lipids / triglycerides / cholesterol, <u>in</u> artery wall / under endothelium ;</p> <p>L5 form, plaques / atheromas ;</p> <p><i>HDL</i></p> <p>H1 (carry cholesterol) from, tissues / body / blood, to liver ;</p> <p>H2 receptors on, hepatocytes / liver <u>cells</u> ;</p> <p>H3 lower / reduce / decrease, (blood) cholesterol ;</p> <p>H4 reduce deposition, of fats / lipids / triglycerides / cholesterol ;</p> <p>H5 decrease, formation / risk, of, plaques / atheromas ;</p>	<p>6 max</p> <p>If it is clear that candidates get LDL and HDL the wrong way round do not award L1 or H1 or QWC and then apply ECF</p> <p><b>L3 IGNORE</b> deposits cholesterol</p> <p><b>L4 IGNORE</b> LDL / fatty acids <b>L4 ACCEPT</b> under epithelium</p> <p><b>H1 ACCEPT</b> back to liver</p> <p><b>H3 ACCEPT</b> remove from blood</p> <p><b>H4 IGNORE</b> LDL / fatty acids</p> <p><b>H5 IGNORE</b> removing atheromas</p>
		<p><b>QWC</b> – Award if you award an L mark and an H mark with the same number twice</p>	<p>1</p> <p>e.g. L1 and H1, and L3 and H3</p>

CHERRY HILL TUITION OCR BIOLOGY AS PAPER 4 MARK SCHEME (U1Ja12/2/4/6-U2JA12/1/3)

(c)	(i)	<p>(red) meat <u>contains</u> (large amounts of) <u>saturated</u>, fat / fatty acids ;</p> <p>(meat / saturated fat) associated with / leads to, increased / large amounts of, LDLs ;</p>	2	<p><b>ACCEPT</b> ora throughout for consequences of non-red meat diet                  No <b>ECF</b> from 3 (b) (iii)  <b>ACCEPT</b> animal fat is saturated fat</p> <p><b>CREDIT</b> high LDL/HDL ratio  <b>IGNORE</b> makes LDLs unqualified answer must imply increased amount</p>
	(ii)	<p>(type 2) diabetes ;</p> <p>angina / coronary heart disease / CHD / stroke / hypertension / high blood pressure / obesity ;</p>	1	<p><b>Mark the first answer.</b> If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = <b>0 marks</b></p> <p><b>DO NOT CREDIT</b> type 1 diabetes  <b>IGNORE</b> conary  <b>DO NOT CREDIT</b> chronic</p>
<b>Total</b>			<b>15</b>	