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|-----------|--|-----------|---|
| 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) | idea of: 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> |
| | Total | 10 | |

2)

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

3)

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|--------------|--|----------|---|
| (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>Mark first three suggestions only</p> <p>DO NOT CREDIT ref to cell signalling / cell recognition</p> <p>ACCEPT vesicles as compartments eg mitochondria, ER, nucleus, lysosomes, Golgi, chloroplast ACCEPT compartmentalisation DO NOT CREDIT '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>DO NOT CREDIT separates cell contents</p> <p>IGNORE 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 DO NOT CREDIT in context of materials entering and leaving the cell</p> <p>eg of specific environment = pH IGNORE 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>ACCEPT guide the vesicles</p> <p>Mp 3 or 4 scores 2 marks as they include mp 1 IGNORE 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>DO NOT CREDIT 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>ACCEPT correct target organelle is identified for each vesicle</p> <p>ACCEPT receptor fits the shape of the, protein / COPI / COPII</p> |
| | <p>exocytosis ; vesicle fuses / merges ; (with), cell surface / plasma, membrane ;</p> <p>discharging / releasing, enzyme / contents (to exterior) ;</p> | 2 max | <p>IGNORE bind / attach / join IGNORE ref to, cell membrane / phospholipid bilayer, unqualified</p> <p>IGNORE secretion alone as stated in question</p> |
| Total | | 9 | |

4)

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| (a) | (i) | <u>N</u> ; | 1 | IGNORE nitrogen DO NOT CREDIT n or N ₂ |
| (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> <u>peptide</u> (bond / link) ;</p> <p>plus any two from ... <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> |

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| <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>QWC: 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 |

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| <p>(b) (ii)</p> <p>1 protein <u>secondary</u> structure / α-helix / β-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>Mark the first answer on each prompt line.</p> <p>3 e.g. between adjacent chains in collagen</p> <p>CREDIT 'protein / named protein / enzyme' OR 'between amino acid R-groups' once ONLY if none 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> | |
| Total | 17 | |

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| 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>Mark the first answer on each prompt line. ACCEPT decreases / maintains, fluidity ACCEPT supports structure of membranes DO NOT CREDIT makes membrane rigid DO NOT CREDIT 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>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 DO NOT CREDIT C, H and O molecules</p> <p>DO NOT CREDIT hexose ACCEPT pent ring IGNORE 6C ring IGNORE branched</p> |
| (b) | (ii) | <p>(saturated) lipids / fats / triglycerides ;</p> <p>protein / polypeptide ;</p> | <p>2</p> <p>Mark the first two suggestions DO NOT CREDIT unsaturated (fats) IGNORE fatty acids / glycerol IGNORE 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>L3 IGNORE deposits cholesterol</p> <p>L4 IGNORE LDL / fatty acids L4 ACCEPT under epithelium</p> <p>H1 ACCEPT back to liver</p> <p>H3 ACCEPT remove from blood</p> <p>H4 IGNORE LDL / fatty acids</p> <p>H5 IGNORE removing atheromas</p> |
| | | <p>QWC – 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)

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| (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>ACCEPT ora throughout for consequences of non-red meat diet No ECF from 3 (b) (iii) ACCEPT animal fat is saturated fat</p> <p>CREDIT high LDL/HDL ratio IGNORE 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>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</p> <p>DO NOT CREDIT type 1 diabetes IGNORE conary DO NOT CREDIT chronic</p> |
| | | Total | 15 | |