

OCR AS GCE Biology (22 pages)

F211 Cells, Transport and Exchange

Mark schemes from January 2009-June 2012

Topics:

Module 1 Cells: Cell structure, Cell diversity and cellular organisation

State the resolution and magnification that can be achieved by a light microscope, a Transmission electron microscope and a scanning electron microscope
Explain the difference between magnification and resolution
Explain the need for staining samples for use in light microscopy and electron microscopy
Calculate the linear magnification of an image
Describe and interpret drawings and photographs of eukaryotic cells as seen under an electron microscope and be able to recognize: nucleus, nucleolus, nuclear envelope, rough and smooth endoplasmic reticulum, golgi, ribosomes, mitochondria, lysosomes, chloroplasts, plasma membrane, centrioles, flagella and cilia
Outline the functions of the organelles listed in e)
Outline the interrelationship between the organelles involved in the production and secretion of proteins (no detail of protein synthesis is required);
Explain the importance of the cytoskeleton in providing mechanical strength to cells, aiding transport within cells and enabling cell movement;
Compare and contrast, with the aid of diagrams and electron micrographs, the structure of prokaryotic cells and eukaryotic cells;
Compare and contrast, with the aid of diagrams and electron micrographs, the structure and ultrastructure of plant cells and animal cells.
Define the term differentiation, with reference to the production of erythrocytes (red blood cells) and neutrophils derived from stem cells in bone marrow, and the production of xylem vessels and phloem sieve tubes from cambium;
Describe and explain, with the aid of diagrams and photographs, how cells of multicellular organisms are specialised for particular functions, with reference to erythrocytes (red blood cells), neutrophils, epithelial cells, sperm cells, palisade cells, root hair cells and guard cells;
Explain the meaning of the terms tissue, organ and organ system;
Explain, with the aid of diagrams and photographs, how cells are organised into tissues, using squamous and ciliated epithelia, xylem and phloem as examples;
Discuss the importance of cooperation between cells, tissues, organs and organ systems

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Question	Expected Answers	Marks	Additional Guidance
1	(a) (i) A smooth endoplasmic reticulum / SER B nuclear, membrane / envelope ; C mitochondrion ; D nucleolus ;	4	<i>mark first response on each line only</i> ACCEPT nucleus, membrane / envelope ACCEPT mitochondria DO NOT ACCEPT nucleolus
	(a) (ii) (mitochondria) vary in shape ; longer than wide ; cut in different planes / angles / AW ;	2 max	<i>need comparative statement</i> ACCEPT C has been cut in longitudinal plane, E has been cut in transverse, section / plane ACCEPT one cut horizontally, other cut vertically ACCEPT in different positions / one viewed from above the other from the side
	just divided / growing ; artefact / deformed during preparation of section ;		

Question	Expected Answers	Marks	Additional Guidance
1	(a) correct answer = two marks (iii) 3.75 / 3.8 ; if answer incorrect ALLOW one mark for correct working	2	ACCEPT if 3.75 or 3.8 is seen anywhere in response (even if later rounded to 4) Max 1 if response is 4 with no working how to award one mark for working e.g. candidate shows correct calculation but wrong answer actual length = $\frac{20 \times 15}{80}$ OR candidate uses magnification (x4000) in calculation: actual length = 15000 / 4000 ; length of C should be 15mm / 15000µm ACCEPT ecf for working mark if length of C is not measured correctly but incorrect figure is used in calculation correctly
1	(b) proteins moved to Golgi (apparatus / body) ; processed / modified / AW ; into vesicles ; (vesicle) moved to, plasma / cell surface, membrane ; (vesicles) fuse with membrane ; <u>exocytosis</u> ;	3 max	e.g. carbohydrate group added DO NOT ACCEPT reprocessed idea that product of processing is placed into vesicles for transport DO NOT ACCEPT vacuole – but do not penalise more than once DO NOT ACCEPT ‘cell membrane’
		[Total: 11]	

Question	Expected Answers	Marks	Additional Guidance										
4 (a)	<table border="1"> <tr> <td data-bbox="1220 371 1316 779">prokaryotic</td> <td data-bbox="1220 779 1316 1240">eukaryotic</td> </tr> <tr> <td data-bbox="1054 371 1220 779"></td> <td data-bbox="1054 779 1220 1240">as chromosomes / chromatid OR (genetic material) associated with, proteins / histones ;</td> </tr> <tr> <td data-bbox="949 371 1054 779"></td> <td data-bbox="949 779 1054 1240">(diameter of cell) 20 – 40 μm ;</td> </tr> <tr> <td data-bbox="821 371 949 779">(ribosomes) 18nm ;</td> <td data-bbox="821 779 949 1240"></td> </tr> <tr> <td data-bbox="726 371 821 779">cell wall (present) ;</td> <td data-bbox="726 779 821 1240"></td> </tr> </table>	prokaryotic	eukaryotic		as chromosomes / chromatid OR (genetic material) associated with, proteins / histones ;		(diameter of cell) 20 – 40 μm ;	(ribosomes) 18nm ;		cell wall (present) ;		4	<p>DO NOT ACCEPT chromatid</p> <p>Figures must have correct units ACCEPT any figure(s) in range 10 – 100 μm ACCEPT any figure(s) in range 10 – 20 nm ACCEPT 70 S</p> <p>DO NOT ACCEPT sometimes or usually present</p>
prokaryotic	eukaryotic												
	as chromosomes / chromatid OR (genetic material) associated with, proteins / histones ;												
	(diameter of cell) 20 – 40 μm ;												
(ribosomes) 18nm ;													
cell wall (present) ;													
(b)	(i) flagellum / cilium / microtubule / microfilament / undulipodium ;	1	ACCEPT plurals										
4 (b)	(ii) (<i>movement inside cells of</i>) chromosomes / chromatids (in cell division) ; (cytoplasm in) cytokinesis ; organelles / named organelle ; RNA (in protein synthesis) ; proteins ;	2 max	<p>DO NOT ACCEPT mitosis / cell division</p> <p>e.g. centriole / vesicle / lysosome / mitochondrion / chloroplast / ribosome</p> <p>ensure that the proteins are being moved in cytoplasm by microtubules rather than by ER or in vesicles (mark given above)</p>										
	Total	7											

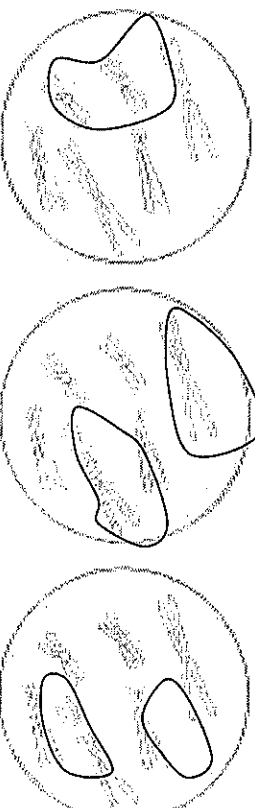
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Question	Expected Answers	Marks	Additional Guidance
1 (a)	1500 ; 500 000 ;	2	ACCEPT 1400 and 300,000 for 1 max only
1 (b)	ability to see (two) objects (that are close together) as separate objects / AW ; see detail ;	2	ACCEPT ability to distinguish two objects IGNORE clarity / clear
1 (c) (i)	transports water (up plant) ;		ACCEPT alternative wording for transport e.g. movement DO NOT ACCEPT up and down DO NOT ACCEPT water and sugars
	transports, minerals / ions, (up plant) ;		ACCEPT alternative wording for transport IGNORE ref nutrients / solutes DO NOT ACCEPT sugars
	support (plant / stem / shoot) ;	1 max	ACCEPT keeps plant upright

Question	Expected Answers	Marks	Additional Guidance
1 (c) (ii)	<p><i>Functions:</i></p> <p>F1 (lignin), strengthens / thickens, the (xylem) <u>wall</u> ;</p> <p>F2 waterproofing (wall) / AW ;</p> <p>F3 (improving) adhesion of water (molecules) ;</p> <p>F4 (spiral) pattern allows flexibility / stretching / movement;</p> <p>2 max</p>		<p>ACCEPT support only if in specific context of supporting the xylem wall</p> <p>ACCEPT waterproofs cell</p> <p>DO NOT ACCEPT adhesion and cohesion when used together</p> <p>Flexibility / stretching must ref, <i>pattern</i> of lignin laid down i.e. spirals</p>
	<p><i>Explanation:</i></p> <p>E1 prevents collapse of xylem ;</p> <p>E2 (water) under tension / at low pressure / negative pressure;</p> <p>E3 reduces (lateral) loss of water, through wall ;</p> <p>E4 increases capillarity / AW ;</p> <p>E5 prevents stem breaking / AW ;</p> <p>2 max</p>	3 max	<p><i>Award mark(s) for function and explanation independently</i></p> <p>DO NOT CREDIT loss of water unqualified</p>

Question		Expected Answers	Marks	Additional Guidance
1	(c) (iii)	(pits) allow water to move, in / out / between, vessel(s) ; to bypass blockage ; supply water to other, tissues / (other types) cells / parts of plant ;	2 max	ACCEPT lateral movement for 'out' ACCEPT bypass air lock ACCEPT any named, tissue / cells e.g. to allow water to other tissues 1 mark to allow water out to other tissues 1 mark to allow water out of vessel to other tissues 2 marks
		Total	10	

Question	Expected Answers	Marks	Additional Guidance
1 (a)	A = plasma / cell surface, membrane ; B = DNA / chromosome / chromatin / genetic material ;	2	DO NOT CREDIT membrane, cell membrane DO NOT CREDIT chromosomes (do not accept plural) CREDIT loop of / circle of, DNA DO NOT CREDIT plasmid, RNA ACCEPT nucleoid
1 (a) (ii)	production of ATP ; <u>aerobic</u> respiration ;	max 1	ACCEPT named stages of aerobic respiration e.g. Krebs cycle, oxidative phosphorylation, ETC, chemiosmosis, link reaction, substrate level phosphorylation DO NOT CREDIT glycolysis, ATP for respiration DO NOT CREDIT produce energy (in form of ATP) IGNORE provide / release energy unqualified
1 (a) (iii)	protein synthesis / translation ; photosynthesis / described ;	2	ACCEPT production / creation, of proteins / polypeptides, assembly of proteins from amino acids IGNORE autotrophic nutrition DO NOT CREDIT absorption of light unqualified
1 (b)	large surface area to volume ratio ; small so demand for, O ₂ / CO ₂ is low ; <i>idea of:</i> <u>diffusion</u> (alone) is adequate to meet needs ;	2	ACCEPT large SA:Vol or large SA/Vol ACCEPT small Vol:SA ratio or small Vol/SA DO NOT CREDIT large surface area alone IGNORE gases alone, nutrients ACCEPT <i>idea of</i> : body SA large enough to meet needs by <u>diffusion</u> ACCEPT <i>idea of</i> : <u>diffusion</u> distance short

Question	Expected Answers	Marks	Additional Guidance
4 (a)	(i) plant cell / Y, has: a wall ; chloroplasts ; vacuole ;	max 2	Credit reverse argument ACCEPT thylakoid, discs / membranes OR granum(a) IGNORE chlorophyll
4 (a)	(ii) A1 a vacuole ; E1 to take up water / to become turgid ; A2 cell wall thicker on one side ; E2 causes, cell to bend / open stoma(ta) ; A3 mitochondria ; E3 generates ATP (for active transport) ;	max 2	<i>Mark adaptation (A) as stand-alone</i> <i>Ensure explanation (E) stated is appropriately linked to adaptation</i> DO NOT CREDIT curved cell wall / thick cell wall unqualified ACCEPT close stoma(ta) if adaptation correct IGNORE ref to chloroplasts
4 (b)	(i) two homologous chromosomes circled ;	1	ACCEPT one circle around both chromosomes or two circles The two chromosomes must be of same length 

Question	Expected Answers	Marks	Additional Guidance
5 (a)	(i) nucleus / nuclear envelope / nuclear membrane / nucleolus ; membrane bound organelles / named organelle ; ribosomes larger ; (large) cell size / 20µm wide ;	2 max	Mark the <u>first two</u> suggestions. Read as prose unless candidate has indicated two points by bullets or numbers – in this case mark the first comment in each bullet. ACCEPT SER / RER / vesicle / cilia DO NOT CREDIT presence of ribosome / vacuole / flagellum / undulipodium
	(ii) Two marks for correct answer 4500 ; ;	2	No tolerance in initial measurement = exactly 90mm If answer is incorrect, allow one mark for correct working i.e. any measurement divided by 20 e.g. 8.9 / 20
	(iii) 1 provides, strength / stability / support (cell) ; 2 determines shape / changes shape / moves membrane (for endo / exocytosis) ; 3 movement of, organelles / named organelle / RNA / protein / chromosomes / chromatids ; 4 attachment to / hold, organelles / named organelle, in place; 5 make up, centrioles / spindle fibres ;	2 max	Mark the <u>first two</u> suggestions. Read as prose unless candidate has indicated two points by bullets or numbers – in this case mark the first comment in each bullet. IGNORE structure IGNORE movement of (whole) cell e.g. vesicles, cilia, mitochondria, ribosome

Question	Expected Answer	Mark	Additional Guidance
1 (a) (i)	production of vesicles / packaging proteins ; modification of / processing of / adding carbohydrate to , proteins ; production of lysosomes ;	max 1	Mark the first answer. If the first answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = 0 marks ACCEPT lipids IGNORE ref to transport / secretion / exocytosis / substances / materials DO NOT CREDIT stores proteins ACCEPT makes glycoproteins
1 (a) (ii)	allow movement (of substances) in or out of nucleus ; correctly named substance (entering or leaving nucleus) ;	max 2	IGNORE messages / information / communication IGNORE name of substance for MIP 1 IGNORE ref to mechanism of movement e.g. RNA / (m)RNA / (r)RNA (t)RNA / polymerase / nucleotides / ribosomes / helicase / proteins / (steroid) hormones IGNORE ref nutrients DO NOT CREDIT if incorrect direction of movement described (e.g. RNA into nucleus or RNA in and out of nucleus) DO NOT CREDIT DNA as named substance Note 'allows mRNA out of nucleus' = two marks e.g. RNA to ribosomes or RER helicase to DNA polymerase to , DNA / gene nucleotides to DNA (steroid) hormones to , DNA / gene / chromosome

Question	Expected Answer	Mark	Additional Guidance
1 (a) (iii)	contain / release , lysins / lytic enzymes / hydrolytic enzymes / digestive enzymes ; digest / break down , organelles / foreign objects / toxins / cells / pathogens ; apoptosis / autolysis / described ;	max 1	DO NOT CREDIT 'engulf' DO NOT CREDIT 'lysosomes are digestive enzymes' ACCEPT destroy ACCEPT ref to digestion of contents of phagocytic vesicle IGNORE ref to (unwanted) substances / materials / food IGNORE ref to acrosomes
1 (b)	idea of more than one (type of) tissue ; working together / performing a function(s) ;	2	ACCEPT named examples of tissues ACCEPT job or task

Question	Answer	Marks	Guidance
2 (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</p> <p>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</p> <p>IGNORE ref to liquid / food particles</p> <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>
	(ii) strain / filter (the water) OR trap particles ; to catch food (particles) ;	1 max	<p>ACCEPT named suitable food particles eg bacteria</p> <p>IGNORE ref to preventing infection / catching pathogens</p> <p>IGNORE ref to nutrients unqualified as these are dissolved</p> <p>IGNORE ref to catching dust</p>

Question	Answer	Marks	Guidance
(c)	<p><i>Xylem</i> consists of vessels ; one cell specialisation described ;</p> <p><i>transpiration stream</i> OR movement of, water / minerals ;</p> <p><i>phloem</i> sieve tube element(s) <u>and</u> companion cell(s) ; one cell specialisation described ;</p> <p>translocation 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	

Question	Answer	Marks	Guidance
4	<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 size of image or size of image size of object 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)	3 dimensional / 3D, (image) ; can see the surface (detail) ;	1 max	ACCEPT has depth of field / contours

Question	Answer	Marks	Guidance
(ii)	120 ::	2	<p>Award two marks for correct answer if answer incorrect allow one mark for working:</p> $\frac{3\,000\,000}{25\,000} \quad \text{or} \quad \frac{3}{25\,000} \quad \text{or} \quad \frac{3\,000\,000}{300\,000} \text{ nm by } 25\,000$ <p>OR</p> <p>if 3mm incorrectly converted but still divided by 25000 then allow ecf for one mark eg:</p> $\frac{3\,00000}{25\,000} = 12$ <p>Note: If candidate has measured the pore as 4nm and carried out the calculation using this figure allow one mark ecf</p> <p>IGNORE ref control</p>
(iii)	allow communication between nucleus and cytoplasm OR allow, molecules / named substances, to, enter / leave (the nucleus) ;	1	<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>

Question	Answer	Marks	Guidance
6 (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</p> <p>ACCEPT compartmentalisation</p> <p>DO NOT CREDIT 'to contain an organelle'</p> <p>eg of AW include hold / contain / store / separates</p> <p>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</p> <p>eg of other named molecules : receptors / electron carriers / photosystems / pigments</p> <p>eg controls what can enter and leave an organelle</p> <p>DO NOT CREDIT in context of materials entering and leaving the cell</p> <p>eg of specific environment = pH</p> <p>IGNORE moves substances in vesicles</p>
(b)	(i) cytoskeleton / microtubule / microfilament ; provide, pathways / tracks, (for movement) ; (vesicle) moves along: <u>microfilaments</u> / <u>microtubule</u> ; <u>microtubules</u> , extended / broken down ; uses, ATP / (metabolic) energy ; AVP ;	2 max	<p>ACCEPT guide the vesicles</p> <p>Mp 3 or 4 scores 2 marks as they include mp 1</p> <p>IGNORE moved by microtubules / microfilaments</p> <p>eg ref to (protein) motor / dynein / kinesin</p>

Question	Answer	Marks	Guidance
(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>
(c)	<p><u>exocytosis</u> ; vesicle fuses / merges ; (with), cell surface / plasma, membrane ; discharging / releasing, enzyme / contents (to exterior) ;</p>	2 max	<p>IGNORE bind / attach / join</p> <p>IGNORE ref to, cell membrane / phospholipid bilayer, unqualified</p> <p>IGNORE secretion alone as stated in question</p>
	Total	9	

Question	Answer	Marks	Guidance																										
(ii)	<table border="1"> <thead> <tr> <th data-bbox="1294 456 1331 786">function</th> <th data-bbox="1294 786 1331 1115">location</th> </tr> </thead> <tbody> <tr> <td data-bbox="1129 456 1166 786">acts as a surface</td> <td data-bbox="1129 786 1166 1115">alveoli</td> </tr> <tr> <td data-bbox="1066 456 1102 786">or</td> <td data-bbox="1066 786 1102 1115">or</td> </tr> <tr> <td data-bbox="970 456 1007 786">short (diffusion) pathway ;</td> <td data-bbox="970 786 1007 1115">cheek lining</td> </tr> <tr> <td></td> <td data-bbox="938 786 975 1115">or</td> </tr> <tr> <td></td> <td data-bbox="938 786 975 1115">in blood vessels ;</td> </tr> <tr> <td data-bbox="699 456 735 786">move, mucus / AW</td> <td data-bbox="699 786 735 1115">bronchioles</td> </tr> <tr> <td data-bbox="635 456 671 786">or</td> <td data-bbox="635 786 671 1115">or</td> </tr> <tr> <td data-bbox="571 456 608 786">secrete mucus ;</td> <td data-bbox="571 786 608 1115">bronchi</td> </tr> <tr> <td></td> <td data-bbox="539 786 576 1115">or</td> </tr> <tr> <td></td> <td data-bbox="539 786 576 1115">trachea</td> </tr> <tr> <td></td> <td data-bbox="507 786 544 1115">or</td> </tr> <tr> <td></td> <td data-bbox="507 786 544 1115">airways ;</td> </tr> </tbody> </table>	function	location	acts as a surface	alveoli	or	or	short (diffusion) pathway ;	cheek lining		or		in blood vessels ;	move, mucus / AW	bronchioles	or	or	secrete mucus ;	bronchi		or		trachea		or		airways ;	4	<p>Mark the first answer in each box. If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = 0 marks</p> <p>Mark each box independently.</p> <p>IGNORE description e.g. 'one cell thick'</p> <p>ACCEPT glomerulus as blood vessel</p> <p>ACCEPT move fluid / liquid for mucus</p> <p>IGNORE removal of germs / dirt / substances / particles</p> <p>ACCEPT 'move ovum' and 'in fallopian tubes'</p> <p>ACCEPT removal of bacteria / fungal spores / dust if in mucus</p>
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Total		12																											

Question	Answer	Marks	Guidance
2 (a) (i)	<p>C (secretory / Golgi) vesicle ; D plasma membrane or cell <u>surface</u> membrane ; E ribosome ;</p>	3	<p>Mark the first answer on 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 DO NOT CREDIT lysosome ACCEPT cell plasma membrane IGNORE rough endoplasmic reticulum</p>
(ii)	enzyme / (peptide) hormone / glycoprotein ;	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 ACCEPT named example e.g. insulin, mucus, cytokine, antibodies, collagen IGNORE haemoglobin, histamine, steroid hormones e.g. testosterone</p>
(iii)	<p>transport vesicles to, plasma / cell surface, membrane ; fusing vesicle to membrane / <u>exocytosis</u> ;</p>	1 max	<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 CREDIT greater detail of cytoskeleton activity e.g. role of protein motors / changing length of microtubules - 'transport' alone not enough IGNORE ref to membrane unqualified ACCEPT binding / merging IGNORE bonding</p>
(iv)	<p>1 receives proteins from the, (R)ER / ribosomes ; 2 modify / process, proteins or make glycoproteins / add named molecule(s) / described ; 3 (re)package / AW, into vesicles ; 4 make lysosomes ; 5 replenishes, plasma / cell surface, membrane ; 6 lipid synthesis ;</p>	2 max	<p>IGNORE SER eg add carbohydrate groups / sugars or fold protein modifies and packages proteins into vesicles = 2 marks ACCEPT make glycolipids</p>

Question	Answer	Marks	Guidance
(b)	(i) nucleus or nuclear envelope / pore / membrane ; mitochondrion / mitochondria ; (rough / smooth) endoplasmic reticulum / ER OR ribosomes attached to membrane ; Golgi (body / apparatus) ; (secretory) vesicle(s) ;	2 max	Mark the first two answers only. IGNORE membrane bound organelles, lysosomes, free ribosomes, ref to ribosome size
	(ii) (free / circular / naked) DNA / genetic material / nucleoid ; <u>plasmid</u> ; 18nm / 70S / smaller, ribosomes ;		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 'chromosomes', 'chromatin' IGNORE mesosome (as this is an infolding of plasma membrane and not in the cytoplasm)
	Total	10	