Question			Answer	Marks	Guidance
1	(a)	(i)	budding **;**	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** mitosis / asexual
		(ii)	mitosis **;** swelling / bulge, in (surface of) the cell **;** nucleus moves into, swelling / bulge / bud **;** idea that, bulge / bud, nips / pinches / breaks off / cleaves **;** ref to uneven distribution of cytoplasm **;**	2 max	Ensure this is in context of before nucleus moves into bud **IGNORE** bud / growth **IGNORE** DNA / genetic material **IGNORE** 'separates' / 'detaches'
	(b)	(i)	35 / 36 **; ;**	2	Correct answer = 2 marks If not whole number e.g. 35.79 or 35.8 = 1 mark If answer incorrect allow one mark for seeing: $4 \times 3.14 \times 1.5^2 \div 3.14 \times 0.5^2$ **OR** $4 \times 1.5^2 \div 0.5^2$ **OR** $4 \times 2.25 \div 0.25$ **OR** $\frac{4 \times 3.14 \times 2.25}{3.14 \times 0.25}$

Question			Answer	Marks	Guidance
		(ii)	new bud cannot occur, on / close to, old scar **;** not enough space between scars for another bud **;** yeast cell not a true sphere **;** (gene) mutation / DNA damage **;**	1 max	**CREDIT** idea that some of surface between scars is not used / ref to unable to tessellate / scars not closely packed **IGNORE** 'covered in scars' OR ref to scar size **IGNORE** ref to chromosome numbers
	(c)		(cells) **differentiate(d)** / **specialise(d) ;** (groups of) cells form **tissue**(s) **;** (groups of) tissues form **organ**(s) **;** (groups of organs) form **organ system**(s) **;** (group of) cells / tissues / organs / organ systems, work together / interact **;** named example of a tissue / an organ /an organ system **;** QWC **;**	4 max 1	**IGNORE** 'system' alone **ACCEPT** same job / same task / same function It should be clear whether they are naming a tissue, an organ or a system **NOTE e.g.** cells work together to form tissues = 2 marks (mp2 and 5) **two** terms used appropriately and spelled correctly **ACCEPT** correct derivations of these terms: **differentiate**, **specialise / specialize**, **tissue**, **organ**, **organ system**
			Total	**11**	

Question			Answer	Marks	Guidance
2	(a)	(i)	mitosis **;**	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**
		(ii)	*idea that:* cells, genetically identical / have same DNA **;** so both (daughter) cells receive a full, copy / complement **;**	2	**ACCEPT** in context of identical to each other or identical to parent **ACCEPT** 'same genetic information/material' **ACCEPT** same / correct amount of DNA **ACCEPT** same / correct number of chromosomes **IGNORE** ref to clones unqualified **IGNORE** 'new cells need genetic material' without ref to full amount daughter cells have all the identical genetic material = 2 marks (mp 1 and 2)
	(b)		**1** one maternal and one paternal / AW **;** **2** carry same genes **;** **3** carry, same / different, alleles **;** **4** (usually) same / similar, length **;** **5** centromere in same position **;** **6** same banding pattern **;** **7** pair up in meiosis / form bivalent **;**	3 max	**CREDIT** 'same loci' **IGNORE** 'genetic material', 'genetically identical' 'genetic information' **ACCEPT** 'same shape' 'same size' **IGNORE** 'same pattern'
	(c)	(i)	a, group / collection, of cells **;** (cells) specialised / AW **;** to perform a function(s) / working together **;**	2 max	**IGNORE** 'same' or 'different' cells **ACCEPT** same job

<table>
<tr><th colspan="3">Question</th><th>Answer</th><th>Marks</th><th>Guidance</th></tr>
<tr><td></td><td></td><td>(ii)</td><td>
<table>
<tr><th>function</th><th>location</th></tr>
<tr><td>acts as a surface

or

short (diffusion) pathway ;</td><td>alveoli

or

cheek lining

or

in blood vessels ;</td></tr>
<tr><td>move, mucus / AW

or

secrete mucus ;</td><td>bronchioles

or

bronchi

or

trachea

or

airways ;</td></tr>
</table>
</td><td>4</td><td>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
Mark each box independently.

IGNORE description e.g. ‘one cell thick’
ACCEPT glomerulus as blood vessel

ACCEPT move fluid / liquid for mucus
IGNORE removal of germs / dirt / substances / particles

ACCEPT ‘move ovum’ and ‘in fallopian tubes’

ACCEPT removal of bacteria / fungal spores / dust if in mucus</td></tr>
<tr><td></td><td></td><td></td><td>Total</td><td>12</td><td></td></tr>
</table>

Question			Answer	Marks	Guidance
3	(a)		stem / undifferentiated **;** (bone) marrow **;** differentiate **;** meristem(atic) / cambium **;**	4	**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 **ACCEPT** totipotent / pluripotent **IGNORE** unspecialised (as specialised in the passage) **IGNORE** specialise as given in the passage **ACCEPT** callus
	(b)	(	*idea of:* create flow of water / move water **;**	1	**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 **DO NOT CREDIT** ref to movement of, organism / cell **IGNORE** ref to liquid / food particles
		(ii)	strain / filter (the water) **OR** trap particles **;** to catch food (particles) **;**	1 max	**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 **IGNORE** trap substances unqualified **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

Question			Answer	Marks	Guidance
	(c)		*xylem* consists of vessels **;** one cell specialisation described **;** transpiration stream **OR** movement of, water / minerals **;** *phloem* sieve tube element(s) and companion cell(s) **;** one cell specialisation described **;** translocation **OR** transports, sucrose / assimilates / products of photosynthesis / amino acids **;** AVP **;**	4 max	**ACCEPT** cells joined end to end **ACCEPT** continuous column / tube eg wall water proof / wall lignified / no end walls / (bordered) pits / hollow / no organelles / no cell contents **IGNORE** dead **IGNORE** transpiration unqualified **ACCEPT** sieve element / sieve tube, and companion cell 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 **ACCEPT** sugar **IGNORE** load / unload sugars alone *in either xylem or phloem* ref to fibres ref to, packing cells / parenchyma cells
			Total	**10**	

Question			Expected Answer	Mark	Additional Guidance
4	(a)		(just behind) tip / apex **,** of root **;** (just behind) tip / apex **,** of shoot **;** cambium / pericycle / vascular bundle **;** bud **;**	**max 2**	**Mark the first <u>two</u> suggestions.** **ACCEPT** behind root cap **IGNORE** root unqualified **IGNORE** stem / root unqualified / shoot unqualified **ACCEPT** between xylem and phloem
4	(b)	(i)	**1** chromosomes / chromatin / nucleus **,** can be seen / are visible **;** **2** determine / distinguish between **,** different stages (of mitosis / division / cell cycle) **;** **3** (staining) provide contrast (between cell structures) / AW **;** **4** (because) different **,** structures / chemicals **,** take up different amounts of stain **;**	**max 2**	**IGNORE** ref to organelles throughout **1** **ACCEPT** DNA for chromosomes / chromatin **ACCEPT** chromosomes / chromatin / DNA / nucleus **,** not normally visible **3** **IGNORE** different structures can be seen (this is visibility not contrast) **4** **IGNORE** different tissues or cells , take up different amounts of stain
4	(b)	(ii)	mitosis / mitotic **;**	**1**	spelling must be correct

Question			Expected Answer	Mark	Additional Guidance
4	**(c)**		***Two*** *marks for correct answer, even if no working shown* 18.00 **; ;**	**2**	**CREDIT** 18 / 18.0 If answer is incorrect or missing allow one mark for working 100 – 82 **or** 4.34.+ 3.23 + 3.23 + 7.20 **or** 18 somewhere in working
4	**(d)**		*in meiosis* (cells produced are) not <u>genetically</u> identical **;** one set of chromosomes / haploid **;** (they are) gametes **;** four cells produced **;**	**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** **IGNORE** ref to cells produced by mitosis (as qu asks about meiosis) **ACCEPT** not clones **Award** in context of genetically different from parent or from each other **ACCEPT** half number of chromosomes / half genetic material
			Total	**[8]**	

Question			Expected Answers	Marks	Additional Guidance
5	(a)		mitosis / mitotic division **;**	1	**DO NOT CREDIT** meitosis, miosis **ACCEPT** mytosis
	(b)		**N ;** **L ;** **K ;** **J ;**	4	**Mark the first answer for each stage**. If the first answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = **0 marks**.
	(c)		**1** checking, genetic material / DNA / chromatin / chromosome(s) / genes, (for errors) **;** **2** protein synthesis **;** **3** synthesis / replication / increase in number of, organelles / named organelle **;** **4** ATP production / respiration **;** **5** <u>cell</u> growth / increase in <u>cell</u>, volume / size **;**	2 max	**Mark the first two suggestions only.** **IGNORE** DNA , replication / synthesis **ACCEPT** checking for mutations **DO NOT CREDIT** check for *cell* mutations **ACCEPT** named step e.g. transcription / translation / described **CREDIT** one named organelle only **ACCEPT** centriole as organelle **IGNORE** organelle growth **IGNORE** release energy **DO NOT CREDIT** produce / create, energy (in form of ATP) **IGNORE** cytoplasm replicates

Question			Expected Answers	Marks	Additional Guidance
	(d)				**Mark the first <u>two</u> suggestions only. Read as prose unless candidate has indicated two points by bullets or numbers – in this case mark the first comment in each bullet.**
			in plant (cell), plate / wall, forms (between new cells) **;** *idea of :* cytokinesis starts from middle of cell **;** (only) occurs in meristem **;** no centrioles **;** AVP **;**	**2 max**	Assume response refers to plants unless stated otherwise. Accept reverse argument for animals. **CREDIT** in animal no cell plate **IGNORE** plants have cell walls unqualified **ACCEPT** cytokinesis starts at outer edge in animals **ACCEPT** cambium / specialised tissues / cells **IGNORE** ref (root) cap, root tip / shoot tip **CREDIT** in animals most, cells / tissues, can divide **ACCEPT** centrioles not used to pull chromatids apart **DO NOT CREDIT** no spindle fibres in plants e.g. nuclear envelope does not reform in most plant cells in telophase I (it does form in most animal cells)
			Total	**9**	