

A Level OCR Biology

2 Cell structure - answers

Question	Answers	Extra information	Mark	AO Spec reference																												
1(a)(i)	A nucleolus ✓ B rough ER ✓		2	AO1 2.1.2.d 2.1.2.g																												
(ii)	C (Golgi apparatus): modifies / packages proteins in vesicles ✓ D (mitochondria): site of aerobic respiration ✓		2	AO1 2.1.2.g																												
(b)	Any two from: (cellulose) cell wall ✓ chloroplasts ✓ large / permanent vacuole ✓		2 max	AO1 2.1.2.k																												
(c)	2000 (×) ✓	I = AM OR M = I/A 2 cm = 20 mm = 20 000 μm M = 20 000/10 2 marks for correct answer 1 mark for calculating answer without converting units (e.g., 0.2x) Do not credit wrong use of equation	2	AO2 2.1.2.e																												
2(a)	<table border="1"> <thead> <tr> <th>Organelle</th> <th>Animal cell</th> <th>Plant cell</th> <th>Prokaryotic cell</th> </tr> </thead> <tbody> <tr> <td>cell wall</td> <td></td> <td>✓</td> <td>✓</td> </tr> <tr> <td>nucleus</td> <td>✓</td> <td>✓</td> <td></td> </tr> <tr> <td>centrioles</td> <td>✓</td> <td></td> <td></td> </tr> <tr> <td>rough ER</td> <td>✓</td> <td>✓</td> <td></td> </tr> <tr> <td>mitochondria</td> <td>✓</td> <td>✓</td> <td></td> </tr> <tr> <td>chloroplasts</td> <td></td> <td>✓</td> <td></td> </tr> </tbody> </table>	Organelle	Animal cell	Plant cell	Prokaryotic cell	cell wall		✓	✓	nucleus	✓	✓		centrioles	✓			rough ER	✓	✓		mitochondria	✓	✓		chloroplasts		✓		One mark per correct row	6	AO1 2.1.2.g 2.1.2.k
Organelle	Animal cell	Plant cell	Prokaryotic cell																													
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(b)	Any five from: provide support / strength to cells ✓ change cell shape ✓ e.g., cytokinesis / phagocytosis / pinocytosis ✓ allow cell to move ✓ e.g., flagella to help sperm cells to move towards the egg' move (named) organelles within cell ✓ e.g., move vesicles within cells ✓ e.g., separate chromosomes/sister chromatids during cell division ✓		5 max	AO1 2.1.2.j												
3(a)	<table border="1"> <thead> <tr> <th>Feature</th> <th>Prokaryotic cell</th> <th>Eukaryotic cell</th> </tr> </thead> <tbody> <tr> <td>DNA structure</td> <td>Circular</td> <td>Linear</td> </tr> <tr> <td>chemical that makes up the cell wall</td> <td>Peptidoglycan</td> <td>Cellulose in plants, chitin in fungi</td> </tr> <tr> <td>size of ribosomes</td> <td>70S/smaller</td> <td>80S/bigger</td> </tr> </tbody> </table>	Feature	Prokaryotic cell	Eukaryotic cell	DNA structure	Circular	Linear	chemical that makes up the cell wall	Peptidoglycan	Cellulose in plants, chitin in fungi	size of ribosomes	70S/smaller	80S/bigger	One mark per box	6	AO1 2.1.2.k 2.1.2.i
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(b)	<p>Indicative content:</p> <ul style="list-style-type: none"> • <u>nucleus</u> contains <u>genes</u> / codes for protein • <u>transcription</u> occurs to produce <u>mRNA</u> • <u>ribosomes</u> / <u>Rough endoplasmic reticulum</u>: protein synthesis / <u>translation</u> occurs • <u>Golgi apparatus</u> modifies / packages proteins • (transport / secretory) <u>vesicles</u> transport proteins between organelles / within cell • <u>cytoskeleton moves</u> vesicles between organelles or within cell / to the plasma membrane • vesicles fuse with <u>plasma / cell-surface membrane</u> releasing amylase by exocytosis 	<p>Level 3 (5–6 marks): All organelles are correctly identified and functions are linked accurately. Answer flows logically, showing a sequence of events.</p> <p>Level 2 (3–4 marks): Most (at least 3) organelles are correctly identified and functions are linked. Answer shows some attempt of logical sequence of events.</p>	6	AO1 2.1.2.i 2.1.2.g												

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Question	Answers	Extra information	Mark	AO Spec reference
		<p>Level 1 (1–2 marks): At least 1–2 relevant organelles identified or their functions mentioned. Answer does not show logical flow of events.</p> <p>Level 0: No relevant content.</p>		
4(a)(i)	Test tube B AND Test tube A can produce glucose, which animal cells cannot do	One mark for correct tube chosen One mark correct explanation	2	AO2 2.1.2.g 2.1.2.k
(ii)	chloroplasts		1	AO2 2.1.2.g 2.1.2.k
(iii)	ribosomes ✓ mitochondria ✓ nuclei ✓	One mark per correct component	3	AO2 2.1.2.g 2.1.2.k
(b)(i)	ribosomes ✓		1	AO2 2.1.2.g 2.1.2.k
(ii)	Prokaryotes have smaller / 70S ribosomes OR Eukaryotes have larger / 80S ribosomes (Therefore) the band in prokaryotic tube should be slightly higher		1 1	AO2 2.1.2.k
5(a)	Similarities – Any two of the following: transcription occurs to produce mRNA ✓ translation occurs to produce protein / polypeptide chain ✓ ribosomes are involved in translation ✓ DNA codes for sequence of amino acids ✓	Max 2 marks for similarities	4	AO2 2.1.2.g 2.1.2.i

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	<p>Differences – Any two of the following:</p> <table border="1"> <thead> <tr> <th>Prokaryotes</th> <th>Eukaryotes</th> </tr> </thead> <tbody> <tr> <td>transcription occurs in cytoplasm</td> <td>transcription occurs in nucleus</td> </tr> <tr> <td>mRNA does not need to travel</td> <td>mRNA needs to leave nucleus through nuclear pore</td> </tr> <tr> <td>free ribosomes are involved</td> <td>free ribosomes and/or ribosomes on rough ER</td> </tr> </tbody> </table>	Prokaryotes	Eukaryotes	transcription occurs in cytoplasm	transcription occurs in nucleus	mRNA does not need to travel	mRNA needs to leave nucleus through nuclear pore	free ribosomes are involved	free ribosomes and/or ribosomes on rough ER	Max 2 marks of differences		
Prokaryotes	Eukaryotes											
transcription occurs in cytoplasm	transcription occurs in nucleus											
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free ribosomes are involved	free ribosomes and/or ribosomes on rough ER											
(b)(i)	Any two from: Makes organelles visible ✓ To identify organelles ✓ Provides contrast ✓		2 max	AO1 2.1.2.b 2.1.2.c								
(ii)	3.75 μm ✓ ✓ ✓	<p>Calibration: 10 μm on micrometer = 40 graticule divisions Each graticule division = 10 ÷ 40 = 0.25 μm</p> <p>Calculate size of cell: Cell spans across 15 graticule divisions Size of cell = 15 × 0.25</p> <p>Max 2 marks if answer in mm Max 2 marks if wrong number of graticule divisions counted once</p> <p>Max 1 mark if both graticule divisions counted incorrectly</p>	3	AO2 2.1.2.e								

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6(a)(i)	arranged into chromosomes ✓ wrapped around histones ✓		2	AO1 2.1.2.g synoptic
(ii)	bacterial DNA is circular ✓ animal DNA is linear ✓ bacterial DNA does not have histones (animal ones do) ✓		1 max	AO1 2.1.2.k
(b)(i)	D and F ✓		1	AO1 2.1.2.g synoptic
(ii)	C and G ✓		1	AO1 2.1.2.g synoptic
(iii)	A and C and E ✓		1	AO1 2.1.2.g synoptic
(iv)	A and B and C ✓		1	AO1 2.1.2.g synoptic

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Skills box answers

Question	Answer
1	2.5×10^4
2	6.75×10^8
3	7.8×10^{-5}
4	0.0000428
5	970000000000
6	0.0000002473