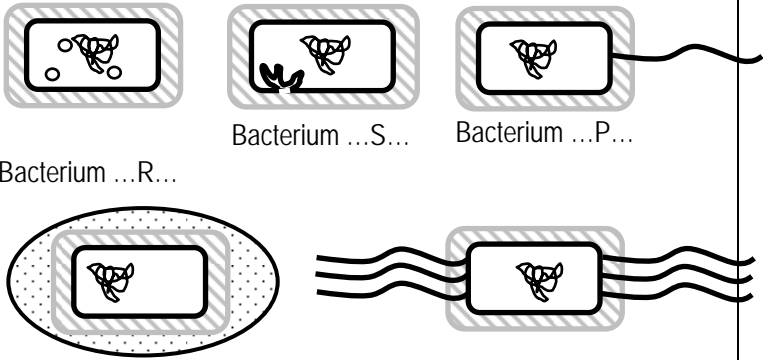


6BI02/01
Development, Plants & the Environment

Question Number	Answer	Mark
1(a)(i)	1. circular DNA box ; 2. small / 70s ribosomes box;	(2)

Question Number	Answer	Mark														
1(a)(ii)	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">Features present in mitochondria</th> <th style="width: 50%;">Feature also present (✓) or absent (✗) in chloroplasts</th> </tr> </thead> <tbody> <tr> <td>Surrounded by a double membrane</td> <td style="text-align: center;">✓</td> </tr> <tr> <td>Crista present</td> <td style="text-align: center;">✗</td> </tr> <tr> <td>Circular DNA</td> <td style="text-align: center;">✓</td> </tr> <tr> <td>Matrix</td> <td style="text-align: center;">✗</td> </tr> <tr> <td>Glycogen granule</td> <td style="text-align: center;">✗</td> </tr> <tr> <td>Stalked particles</td> <td style="text-align: center;">✗</td> </tr> </tbody> </table> <p>1 mark for any two correct ;;;</p>	Features present in mitochondria	Feature also present (✓) or absent (✗) in chloroplasts	Surrounded by a double membrane	✓	Crista present	✗	Circular DNA	✓	Matrix	✗	Glycogen granule	✗	Stalked particles	✗	(3)
Features present in mitochondria	Feature also present (✓) or absent (✗) in chloroplasts															
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Question Number	Answer	Mark
1(b)	 <p>The diagram illustrates five different bacterial structures, each enclosed in a rectangular box with diagonal hatching. Inside each box is a simplified drawing of a bacterium with internal organelles.</p> <ul style="list-style-type: none"> Bacterium ...R...: A rod-shaped bacterium with several small circular granules inside. Bacterium ...S...: A rod-shaped bacterium with a flagellum extending from one end. Bacterium ...P...: A rod-shaped bacterium with a long, wavy flagellum extending from one end. Bacterium ...T...: A rod-shaped bacterium inside a larger, oval-shaped structure with a dotted pattern, representing a spore. Bacterium ...Q...: A rod-shaped bacterium with multiple long, wavy flagella extending from both ends. 	(4)

Question Number	Answer	Mark
2(a)(i)	organ has {many / eq} functions, tissue has {one / fewer / eq}, organ has {many / several / eq} {cell types / tissues}, tissue has {one / fewer / eq} ;	(1)

Question Number	Answer	Mark
2(a)(ii)	both have cells {working together / for the same function / eq} ;	(1)

Question Number	Answer	Mark								
2(b)	<table border="1"> <thead> <tr> <th>Description of Organelle</th> <th>Name of Organelle</th> </tr> </thead> <tbody> <tr> <td>Several curved membrane-bound sacs of decreasing size</td> <td>golgi (apparatus / body) ;</td> </tr> <tr> <td>A pair of cylinders arranged at right-angles to each other</td> <td>{centrioles / centrosome / eq} ;</td> </tr> <tr> <td>Small spheres with a single membrane that are filled with hydrolytic enzymes</td> <td>lysosome(s) ;</td> </tr> </tbody> </table>	Description of Organelle	Name of Organelle	Several curved membrane-bound sacs of decreasing size	golgi (apparatus / body) ;	A pair of cylinders arranged at right-angles to each other	{centrioles / centrosome / eq} ;	Small spheres with a single membrane that are filled with hydrolytic enzymes	lysosome(s) ;	(3)
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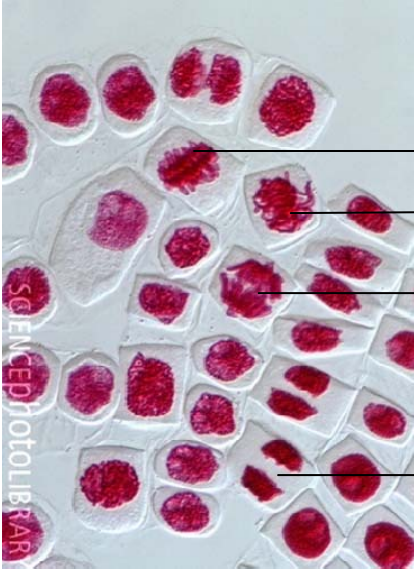
Question Number	Answer	Mark
2(c)	<p>Drawing (max 2):</p> <ol style="list-style-type: none"> 1. {double membrane / nuclear envelope} obvious ; 2. nuclear pores shown ; 3. (1 or more) nucleoli present ; <p>Labels (max 2):</p> <ol style="list-style-type: none"> 4. (nuclear) envelope / <u>double</u> membrane / {<u>inner</u> / <u>outer</u>} (nuclear) membrane ; 5. (nuclear) pore ; 6. nucleolus ; 7. correct reference to chromatin / nucleoplasm ; 	max (4)

Question Number	Answer	Mark		
3(a)	<table border="1"> <thead> <tr> <th data-bbox="422 338 778 405">Name of adaptations</th> <th data-bbox="783 338 1160 405">Example</th> </tr> </thead> </table>	Name of adaptations	Example	
	Name of adaptations	Example		
	physiological ;	Some metabolic reactions become less efficient in cold weather so the organism generates more heat to keep warm		
	behavioural ;	Sheep learn to ignore sounds that have no importance to them		
	anatomical ;	The ears of African elephants are larger than those of Asian elephants, due to differences in the environment		
physiological ;	Formation of a sun tan when human skin is exposed to sunlight			
		(4)		

Question Number	Answer	Mark
3(b)	<p>N.B. D = description; E = explanation Points to be paired i.e. cannot score three marks for three D points</p> <p>1D {haploid / 23 chromosomes / half set of chromosomes in } nucleus ; 1E so that {{diploid / eq} number / full complement / 46 chromosomes} restored(at fertilisation) ;</p> <p>2D lipid droplets / food store / eq ; 2E supplies {energy / nutrients} for division / eq ;</p> <p>3D large (cell) {size / surface area / eq} ; 3E increased chance of fertilisation / eq ;</p> <p>4D reference to {cortical granules / lysosomes / zona pellucida} (in cytoplasm) ; 4E to prevent {more sperm entry / polyspermy / eq} ;</p> <p>5D reference to {release / eq} of a {chemical / eq} ; 5E to attract sperm / chemotaxis / eq ;</p> <p>6D membrane with '(sperm) receptors' on surface / eq ; 6E to allow sperm to {bind / eq} ;</p> <p>7D {much / eq} mRNA present ; 7E to allow early translation of transcription factors / eq ;</p>	max (4)

Question Number	Answer	Mark
3(c)	<ol style="list-style-type: none"> 1. {pine needles /extract / filter paper soaked in extract} placed on {agar plate / in wells / eq} ; 2. with bacterial {lawn / eq} ; 3. reference to sterile/aseptic approach e.g. appropriate reference to sealing ; 4. reference to an appropriate time (for incubation) e.g. 24 hours, 1 week ; 5. (incubate at) a sensible temperature suggested e.g. 25°C ; NOT 37°C / human body temp 6. (looking for) {clear area / inhibition zone / loss of cloudiness /reduced cell number/ eq} (around pine needles, extract / filter paper / wells) ; 7. (clear area) shows no bacteria / eq ; 8. reference to suitable control ; 	<p>max (5)</p>

Question Number	Answer	Mark										
4(a)	<table border="1"> <tr> <td>Statements about cell division</td> <td>Meiosis is involved</td> </tr> <tr> <td>Required for both sexual and asexual reproduction</td> <td></td> </tr> <tr> <td>Produces gametes</td> <td>✓ ;</td> </tr> <tr> <td>Crossing over can occur</td> <td>✓ ;</td> </tr> <tr> <td>Occurs in mammals but not flowering plants</td> <td></td> </tr> </table>	Statements about cell division	Meiosis is involved	Required for both sexual and asexual reproduction		Produces gametes	✓ ;	Crossing over can occur	✓ ;	Occurs in mammals but not flowering plants		(2)
Statements about cell division	Meiosis is involved											
Required for both sexual and asexual reproduction												
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Occurs in mammals but not flowering plants												

Question Number	Answer	Mark
4(b)	 <p>A - metaphase ; B - prophase ; C - anaphase ; D - telophase ;</p>	(4)

Question Number	Answer	Mark
4(c)(i)	site of {cell division / mitosis / actively dividing cells / meristem / eq };	(1)

Question Number	Answer	Mark
4(c)(ii)	to {soften the material / macerate / break middle lamella / eq};	(1)

Question Number	Answer	Mark
4(c)(iii)	{(acetic) orcein / lacto-propionic orcein / toluidine (blue) / Schiffs / eq} ;	(1)

Question Number	Answer	Mark
4(c)(iv)	<p>each mark is for the risk + appropriate precaution</p> <ol style="list-style-type: none"> 1. cut and appropriate precaution ; 2. acid and appropriate precaution ; 3. heat and appropriate precaution ; 4. stain and appropriate precaution ; 5. coverslip and appropriate precaution ; 	max (2)

Question Number	Answer	Mark
5(a)(i)	reference to {chemical / air / gravity / light / eq} ;	(1)

Question Number	Answer	Mark
5(a)(ii)	<ol style="list-style-type: none"> 1. idea of {breakdown / digestion / eq} of style ; 2. (breaks down) protein / pectin / middle lamella ; 3. reference to hydrolysis / eq ; 4. easier for pollen tube to grow / reduced resistance / eq ; 5. supplies {nutrients / named nutrient / energy} for (pollen tube) growth / eq ; 	max (3)

Question Number	Answer	Mark
5(b)	<ol style="list-style-type: none"> 1. photosynthesis ; 2. {component / eq} of {cytoplasm / sap} ; 3. water as a solvent /eq ; 4. water as a transport medium /eq ; 5. involved in thermoregulation / eq ; 6. reference to role in structural support ; 7. reference to involvement in hydrolysis ; 8. reference to turgor changes ; 	max (3)

Question Number	Answer	Mark
6(a)(i)	1. A ; then any two from: 2. height controlled by {many / eq} genes / polygenic inheritance / eq ; 3. reference to continuous variation ; 4. reference to normal distribution / eq ;	max (3)

Question Number	Answer	Mark
6(a)(ii)	1. water / humidity ; 2. light ; 3. minerals / soil type / pH ; 4. CO ₂ ; 5. temperature ; 6. altitude ;	max (2)

Question Number	Answer	Mark
6(b)(i)	height of bar must be at 50 i.e. 2 ½ little squares above 40 ;	(1)

Question Number	Answer	Mark
6(b)(ii)	1. height (of yarrow plant) decreases (as altitude increases) ; 2. non-linear /eq ; 3. correct manipulation of the data ;	max (2)

Question Number	Answer	Mark
6(c)(i)	{no change in / same} height of plants at 700m / reached their maximum height (of 50cm) / eq ;	(1)

Question Number	Answer	Mark
6(c)(ii)	{decrease in / lower / different} height of plants at 3000m / 25cm at 3000m and 50cm at 700m / eq ;	(1)

Question Number	Answer	Mark
6(c)(iii)	removal of genetic variation / they are all genetically identical / eq ;	(1)

Question Number	Answer	Mark
6(c)(iv)	to act as a control / to see if there is a difference at the other heights / as a comparison / to check that the clones grow the same as the parent plants / eq ;	(1)

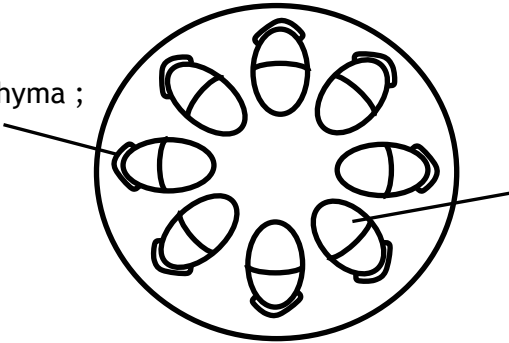
Question Number	Answer	Mark
7(a)	<ol style="list-style-type: none"> 1. some people with (new) drug and some without (new) drug / eq ; 2. use placebo / description (e.g. sugar-coated dummy pill) / old drug ; 3. {doctors / eq} and {subjects / eq} do not know who is on (new) drug or who is not /eq ; 4. to see if new drug works better than {placebo / old drug}/eq ; 5. reduces bias /eq ; 	max (3)

Question Number	Answer	Mark
7 (b)(i)	glycosidic ;	(1)

Question Number	Answer	Mark
7(b)(ii)	{ α / alpha } glucose ;	(1)

Question Number	Answer	Mark
7(b)(iii)	<ol style="list-style-type: none"> 1. {bioplastic / starch} comes from {plants / eq} ; 2. {plants / starch} are renewable ; 3. oil-based plastic is from non-renewable resource / eq ; 	max (2)

Question Number	Answer	Mark
7(b)(iv)	will not accumulate / not contribute to landfill / can be decomposed / eq ;	(1)

Question Number	Answer	Mark
7(c)	 <p>sclerenchyma ;</p> <p>xylem ;</p>	(2)

Question Number	Answer	Mark
8(a)	<ol style="list-style-type: none"> 1. protein release from ribosome / eq ; 2. enter the rER {lumen / eq} ; 3. becomes packaged into (rER) vesicles ; 4. (vesicles / proteins) move to Golgi (apparatus) / {vesicles fuse with / protein enters} Golgi ; 5. protein {modified / carbohydrate added / named carbohydrate added} / eq ; 6. then become packaged into (secretory) vesicles / eq ; 7. glycoprotein becomes part of (vesicle) membrane ; 8. vesicles {move towards / fuse with} the cell (surface) membrane ; 	max (5)

Question Number	Answer	Mark
8(b)(i)	<ol style="list-style-type: none"> 1. totipotent (stem cells) can give rise to {all / any / 216} cell types / eq ; 2. (stem cells) are {undifferentiated / unspecialised} / eq ; 3. can keep dividing / eq ; 	max (2)

Question Number	Answer	Mark
8(b)(ii)	they can {give rise to / eq} white blood cells / eq ;	(1)

Question Number	Answer	Mark
8(b)(iii)	possible route to {infection / eq} / rejection by recipient / increased chance of becoming cancerous / eq ;	(1)