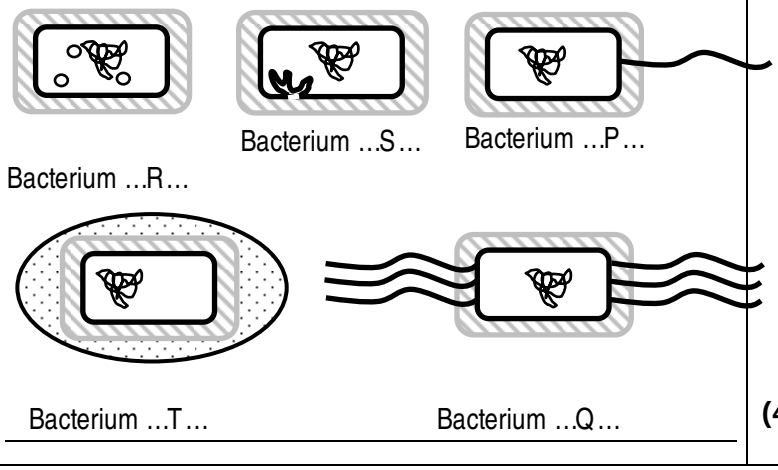
Question Number	Answer	Mark
1(a)(i)	1. circular DNA box ; 2. small / 70s ribosomes box;	**(2)**

Question Number	Answer	Mark
1(a)(ii)	<table><tr><th>**Features present in mitochondria**</th><th>**Feature also present (✓) or absent (✗) in chloroplasts**</th></tr><tr><td>Surrounded by a double membrane</td><td>✓</td></tr><tr><td>Crista present</td><td>✗</td></tr><tr><td>Circular DNA</td><td>✓</td></tr><tr><td>Matrix</td><td>✗</td></tr><tr><td>Glycogen granule</td><td>✗</td></tr><tr><td>Stalked particles</td><td>✗</td></tr></table> **1 mark** for any two correct ;;;	**(3)**

Question Number	Answer	Mark
1(b)		**(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)		**(3)**

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) ;

Question Number	Answer	Mark
2(c)	**Drawing** (max 2): 1. {double membrane / nuclear envelope} obvious ; 2. nuclear pores shown ; 3. (1 or more) nucleoli present ; **Labels** (max 2): 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)**

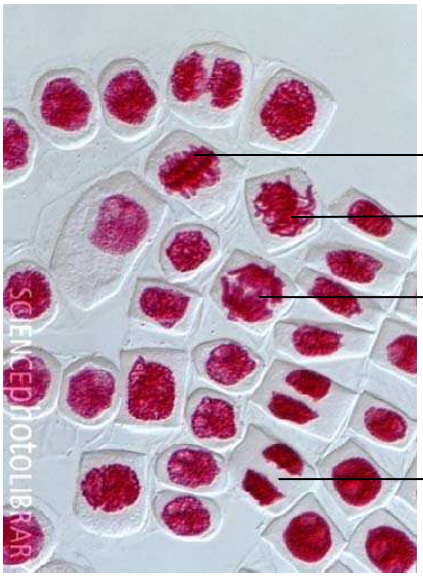
Question Number	Answer	Mark
3(a)		**(4)**

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

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

Question Number	Answer	Mark
3(c)	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 ;	**max (5)**

Question Number	Answer	Mark
4(a)	<table><tr><th>Statements about cell division</th><th>Meiosis is involved</th></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>	**(2)**

Question Number	Answer	Mark
4(b)		**(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)	each mark is for the risk + appropriate precaution 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)	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)	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)**

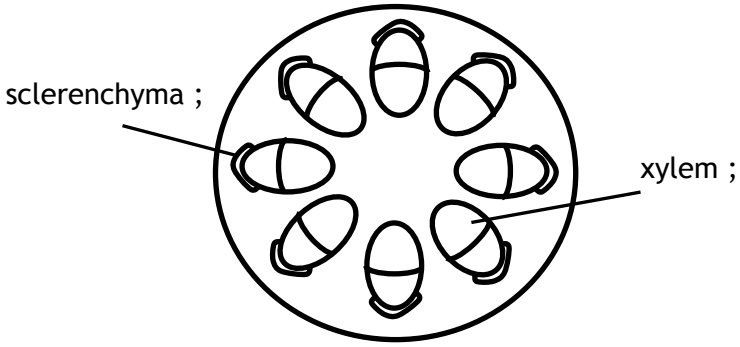
Question Number	Answer	Mark
7(a)	1. some people with (new) drug and some without (new) drug / eq ; 2. use placebo / description (e.g. sugar-coated dummy pill) /old drug ; 3. {doctors / eq} and {subjects / eq} do not know who is on (new) drug or who is not /eq ; 4. to see if new drug works better than {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)	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)		**(2)**

Question Number	Answer	Mark
8(a)	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)	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)**