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Mark Scheme (Results)

Summer 2015

Pearson Edexcel International Advanced Level in Biology (WBI02) Paper 01 Development, Plants and the Environment

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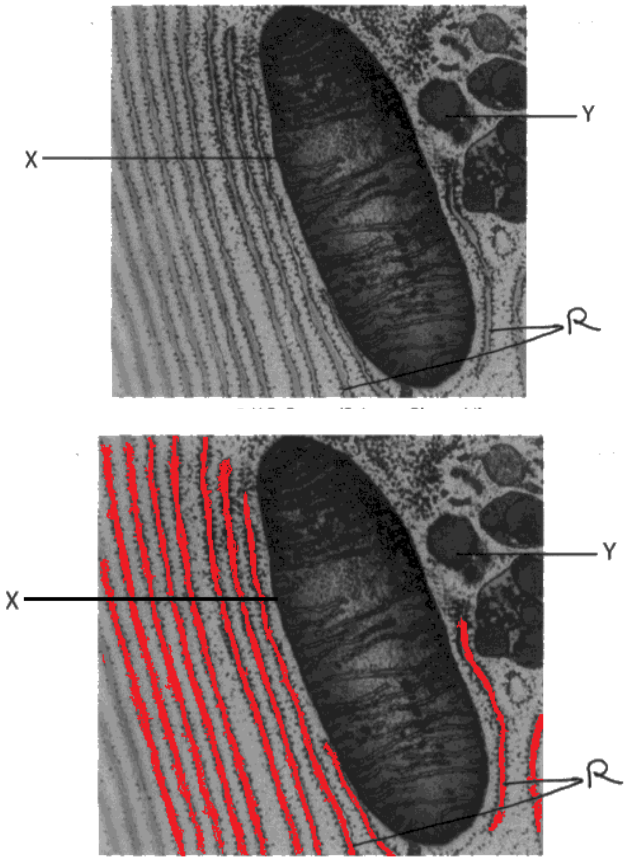
General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

Question Number	Answer	Mark
1(a) (i)	C - a mitochondrion ;	(1)

Question Number	Answer	Additional Guidance	Mark
1(a) (ii)	rER correctly labelled ;	<u>example of correct response</u> 	(1)

Question Number	Answer	Additional Guidance	Mark
1(b) (i)	1. idea that ribosomes synthesise the { polypeptide / protein / eq } ; 2. proteins { move into / transported through / eq } (the rER) ; 3. protein is folded / forms { 3-D shape / secondary structure / tertiary structure } ; 4. idea that vesicles (containing the protein) are formed by rER ;	ACCEPT reference to enzyme or a hormone instead of protein for MP1 to MP4 1. ACCEPT ribosome as site of translation 2. ACCEPT proteins move through cisternae 3. IGNORE quaternary 4. IGNORE secretory	(3)

Question Number	Answer	Additional Guidance	Mark
1(b) (ii)	1. idea that these vesicles move from Golgi (body) to the cell (surface) membrane ; 2. idea that the (secretory) vesicle fuses with cell (surface) membrane ; 3. by exocytosis ;	3. NOT <u>both</u> exocytosis and endocytosis	(2)

Question Number	Answer	Mark
2(a) (i)	B - centromeres ;	(1)

Question Number	Answer	Mark
2(a) (ii)	A - anaphase ;	(1)

Question Number	Answer	Mark
2(a) (iii)	D - telophase ;	(1)

Question Number	Answer	Additional Guidance	Mark
2(b)	1. removal of { last 5-10 mm of root tips / (apical) meristem } ; 2. idea of use of (hydrochloric) acid to { separate cells / break down middle lamella / break down pectin / macerate tissue / soften tissue / eq } ; 3. addition of appropriate stain, e.g. toluidine (blue), orcein ; 4. idea of heating slide to intensify the { colour / stain } ; 5. idea of placing the root tip on microscope slide, covering and squashing (to separate the cells) ;	2. ACCEPT HCl 3. ACCEPT Feulgens, Schiffs reagent, acetocarmine	(4)

Question Number	Answer	Additional Guidance	Mark
2(c)	1. anaphase ; 2. idea that the smallest number of cells are at this stage ; 3. number of cells at each stage is proportional to the duration of that stage OR idea that cells spend the shortest length of time at this stage ;	3. ACCEPT anaphase is the fastest / quickest stage	(3)

<table>
<tr><th>Question Number</th><th>Answer</th><th>Additional Guidance</th><th>Mark</th></tr>
<tr><td>3(a)(i)</td><td>
<table>
<tr><th></th><th>Cellulose only</th><th>Starch only</th><th>Both starch and cellulose</th></tr>
<tr><td>Polymer of α-glucose</td><td></td><td>☒</td><td></td></tr>
<tr><td>Polymer of β-glucose</td><td>☒</td><td></td><td></td></tr>
<tr><td>Contains 1,4 – glycosidic bonds</td><td></td><td></td><td>☒</td></tr>
<tr><td>Contains 1,6 – glycosidic bonds</td><td></td><td>☒</td><td></td></tr>
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;
;
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</td><td></td><td>(4)</td></tr>
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Question Number	Answer	Additional Guidance	Mark
3(a)(ii)	1. made up of { many / eq } (α) glucose (monomers) ; 2. reference to energy storage / glucose is the respiratory substrate / eq ; 3. it is { large / insoluble } so has no osmotic effect / eq ; 4. amylose is coiled AND amylopectin is { branched / has 1,6 glycosidic bonds } ; 5. compact so that more can be stored { in a small space / eq } ; 6. { branches / 1,6 glycosidic bonds / eq } for rapid hydrolysis (to release glucose) / eq ;	1. ACCEPT polymer of glucose IGNORE polysaccharide 6. ACCEPT breaks down / easily hydrolysed	(4)

Question Number	Answer	Additional Guidance	Mark
3(b)	1. idea that starch is a { sustainable / renewable } resource / bioplastic comes from a { sustainable / renewable } resource ; 2. more plants can be grown ; 3. plastic comes from a non-renewable resource / oil { is non-renewable / will run out / eq } ; 4. bioplastics are biodegradable / eq ;	1. NOT bioplastics are renewable 4. ACCEPT converse statement	(3)

Question Number	Answer	Additional Guidance	Mark
4*(a)(i)	(QWC – Spelling of technical terms must be correct and the answer must be organised in a logical sequence) 1. idea of standardisation of extraction method ; 2. same { volume of extract / diameter of wells in agar / size paper discs } ; 3. idea of different agar plates for the { 14 / all / eq } microorganisms ; 4. description of aseptic technique, e.g. use of sterile equipment ; 5. incubated at the same temperature AND for the same length of time OR in range 20 to 30°C AND stated time in range 1 to 7 days ; 6. measure zone of inhibition ; 7. replication qualified e.g. repeats { for each extract / for each microorganism / to calculate mean } ;	QWC emphasis is logical sequence 1. e.g. made from same mass of cloves and herbs, extracts have same concentration, extracts made using same volume of solvent NOT 'amount' 6. IGNORE observe 7. NOT repeat the experiment	(5)

Question Number	Answer	Additional Guidance	Mark
4(a)(ii)	1. clove is { most effective / effective against more species of microorganism / eq } ; 2. basil is the least effective (extract) / eq ; 3. manipulation of data, e.g. the difference in percentage effectiveness between cloves and another named extract ;	3. e.g. 58% difference between clove and basil, 43% between clove and lemon balm, 50% between clove and rosemary or 36% between clove and thyme	(2)

Question Number	Answer	Additional Guidance	Mark
4(b)	1. both possess cell surface membrane ; 2. both contain ribosomes / bacterial cells have smaller ribosomes / eq ; 3. bacterial cells contain { circular DNA / nucleoid / plasmid } AND yeast have DNA that is { linear / contained in a membrane / in a nucleus } ; 4. bacterial cells do not contain membrane bound organelles ; 5. both have a cell wall ;	ACCEPT reference to eukaryotic cell instead of yeast 4. ACCEPT named membrane bound organelle 5. IGNORE description of difference in cell wall composition	(4)

Question Number	Answer	Additional Guidance	Mark
5(a)(i)	Independent: (incubation) temperature ; Dependent: length of pollen tube ;	IGNORE mean, growth	(2)

Question Number	Answer	Additional Guidance	Mark
5(a)(ii)	1. figures from graph 0.2 and 0.9 ; 2. calculation { 0.9 minus 0.2 / 0.7 } divided by 0.2 ; 3. 350 (%) ;	$\frac{(0.9-0.2)}{0.2}$ or $\frac{0.7}{0.2}$ correct answer gains 3 marks	(3)

Question Number	Answer	Additional Guidance	Mark
5(a)(iii)	1. { no significant / little difference } at { 15 °C / 35 °C } ; 2. idea of a positive correlation between temperature and pollen tube length in A and B up to 30 °C ; 3. idea of greater effect (of temperature) on A than on B / pollen tubes of A grew longer than B at all temperatures ; 4. idea of 30 °C as optimum temperature for both A and B ;	4. ACCEPT pollen tubes the longest at 30 °C	(3)

Question Number	Answer	Additional Guidance	Mark
5(b)	1. reference to { nuclei / (generative) nucleus / gametes } ; 2. idea of { creating / digesting / eq } a pathway through the style ; 3. (from stigma) to { micropyle / embryo sac / ovule / egg cell } ;	3. IGNORE ovum / ovary	(2)

Question Number	Answer	Additional Guidance	Mark
5(c)	1. idea of producing haploid { nuclei / cells } ; 2. genetic variation through { crossing over / independent assortment } / eq ; 3. independent assortment gives rise to { new / different / eq } combinations of (paternal and maternal) chromosomes ; 4. crossing over involves swapping of { sections / eq } of chromatids ; 5. new combinations of alleles produced ;	1. ACCEPT halving the chromosome number 2. & 3. ACCEPT random assortment 4. NOT chromosome	(3)

Question Number	Answer	Additional Guidance	Mark
6(a)(i)	1. (counting) { number / range / variety } of species ; 2. in a { known / given / stated } area of land ; 3. genetic diversity within a species / number of different alleles in a { species / gene pool} ;	2. references to quadrats must be qualified with measuring an area	(2)

Question Number	Answer	Mark
6(a)(ii)	endemic / endemism / endemic species ;	(1)

Question Number	Answer	Additional Guidance	Mark
6(b)	(QWC – Spelling of technical terms must be correct and the answer must be organised in a logical sequence) 1. increase { numbers / population size / eq } ; 2. { maintain / increase } genetic diversity / reduce genetic drift / eq ; 3. exchange of { macaques / gametes } between zoos ; 4. using { stud books / DNA profiling / eq } (for selection of mates) ; 5. preparation for reintroduction to the wild described ; 6. idea of selection of safe area for reintroduction e.g. national park or reserve ; 7. idea of protecting from { predators / poachers / eq } (once released) ;	QWC – Emphasis on clarity of expression 2. IGNORE genetic variation 3. ACCEPT animals 5. e.g. idea of reinforcing wild behaviour or reduce food intake or encourage hunting	(5)

Question Number	Answer	Additional Guidance	Mark
7(a)	Sclerenchyma / xylem ;	IGNORE reference to fibres, vessels or tissue	(1)

Question Number	Answer	Additional Guidance	Mark
7(b)(i)	the { force / weight / strain / stress / tension } a fibre can take without breaking OR the { force / weight / strain / stress } required to make a fibre break ;	ACCEPT failing instead of breaking ACCEPT reference to load /mass instead of force	(1)

Question Number	Answer	Additional Guidance	Mark
7(b)(ii)	1. reference to { pectin / (calcium) pectate } ; 2. reference to middle lamella ; 3. idea of holding together microfibrils in cell walls ; 4. idea that the fibres are stronger if cellulose microfibrils held together more strongly ;		(2)

Question Number	Answer	Additional Guidance	Mark
7(c)(i)	1. diameter of fibres highest { in group 1 / with no mineral ions } ; 2. idea of no significant difference between { high mineral ion / group 2 } and control for fibre diameter ; 3. thickness of cell wall highest { in group 2 / with high mineral ion concentration } ; 4. idea of no significant difference between control and { group 1 / with no mineral ions } on cell wall thickness ;	1. ACCEPT higher than both the control and group 2 OR higher than the groups with mineral ions 2. ACCEPT little difference 3. ACCEPT higher than both the control and group 1 4. ACCEPT little difference	(3)

Question Number	Answer	Additional Guidance	Mark
7(c)(ii)	1. group 2 has more magnesium / control has less magnesium ; 2. magnesium required for chlorophyll (production) ;	1. IGNORE other mineral ions such as nitrate	(2)

Question Number	Answer	Mark
8(a)(i)	totipotency / totipotent ;	(1)

Question Number	Answer	Additional Guidance	Mark
8(a)(ii)	1. idea of { stimulus / chemical / hormone } ; 2. idea that some genes are { active / switched on / expressed } ; 3. idea of { transcription / mRNA produced } at active genes ; 4. mRNA is { translated / used } to produce { protein / polypeptide } ; 5. idea that this protein (permanently) modifies cell OR idea that this protein determines { cell structure / function } ;	2. IGNORE genes being 'turned on'	(3)

Question Number	Answer	Additional Guidance	Mark
8(a)(iii)	1. idea of genes being { switched off / deactivated } ; 2. idea that (cell) { permanently modified / irreversibly changed } ;		(2)

Question Number	Answer	Additional Guidance	Mark
8(b)	1. reference to peer review ; 2. idea of (other scientists) repeating the experiment ; 3. idea that same results were not achieved ;		(3)

Question Number	Answer	Additional Guidance	Mark
8(c)	1. produce transplant organs / building new organs / 3-D printing of organs / eq ; 2. repair or replace damaged tissues e.g. heart or spinal cord / replace damaged cells ;	IGNORE named condition that could be treated with stem cell therapy	(2)

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