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Mark Scheme (Results)

Summer 2012

GCE Biology (6BI02) Paper 01
Development, Plants & 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.

Quality of Written Communication

Questions which involve the writing of continuous prose will expect candidates to:

- Write legibly, with accurate use of spelling, grammar and punctuation in order to make the meaning clear
- Select and use a form and style of writing appropriate to purpose and to complex subject matter
- Organise information clearly and coherently, using specialist vocabulary when appropriate.

Full marks will be awarded if the candidate has demonstrated the above abilities. Questions where QWC is likely to be particularly important are indicated (QWC) in the mark scheme, but this does not preclude others.

Question Number	Answer	Mark
1(a)	1. A = rough endoplasmic reticulum / RER / rER ; 2. B = mitochondrion / mitochondria ; 3. C = nucleolus ;	**(3)**

Question Number	Answer	Mark
1 (b)	G ;	**(1)**

Question Number	Answer	Mark
1 (c)	C ;	**(1)**

Question Number	Answer	Mark
1 (d)		**(2)**

Statement	**Yes**	**No**
The structure labelled D is present in both animal and plant cells	☒	
The structure labelled E is the outermost layer in both animal and plant cells		☒

Question Number	Answer	Mark
2	1. glucose ; 2. cellulose ; 3. hydrogen / H ; 4. pits ; 5. plasmodesmata/ plasmodesma ;	**(5)**

Question Number	Answer	Mark
3 (a) (i)	Idea of removing genetic variation e.g. same genotype OR fibres {grown in same conditions / same composition /same age} OR to give {comparison/ results} that are valid ;	**(1)**

Question Number	Answer	Mark
3 (a) (ii)	1. (fibre) length / eq ; 2. (fibre) diameter / width/ thickness / circumference / SA of cross section / eq ; 3. (fibre) mass / weight ; 4. age (fibre) / collected at same time / eq ; 5. idea that came from same region of the plant / eq ;	**(2)**

Question Number	Answer	Mark
3 (a) (iii)	the idea that temperature is a variable e.g. results reliable, same effect on structure of fibre;	**(1)**

Question Number	Answer	Mark
3 (b)	idea that protect eyes from fibre when it breaks ; NOT just to protect eyes – must state what they are protected from.	**(1)**

Question Number	Answer	Mark
3 (c) (i)	1. idea that (mean) force needed to break wet fibres was greater (than dry fibres) / eq ; 2. correct manipulation of the mean data for example 1100 au difference / 40% (39.8%) more force needed to break wet fibres compared to dry fibres/ 28.5% less to break dry fibres compared with wet fibres / 1.4 times more force required to break wet fibres ;	**(2)**

Question	Answer	Mark

Number		
3 (c) (ii)	1. wet (fibres) / eq ; 2. wet fibre data has a wide range / eq ; 3. correct manipulation of data e.g. 1100 (au) for wet AND 300 (au) for dry OR wet range is 800 (au) more than dry ; 4. wet {sample 5 / 3100} may be {anomalous / outlier} ;	**(3)**

Question Number	Answer	Mark
3 (d)(i)	Idea of lower values for 3 AND 4 compared to 1 AND 2 ;	**(1)**

Question Number	Answer	Mark
3 (d)(ii)	idea that sample 1 (without a knot) was the same as sample 5 ;	**(1)**

Question Number	Answer	Mark
4 (a) (i)	as a comparison / as a control / to show that it is {incubation temperature / not some other factor} affecting spindle fibre formation ;	**(1)**

Question Number	Answer	Mark
4 (a) (ii)	1. as temperature increases (from 25^{o}C) to 33°C the number of cells showing spindle fibre formation increases / positive correlation between 25^{o}C and 33°C ; 2. as temperature increases from 33°C (to 37°C) there is no effect on number of cells showing spindle fibre formation / same values at 33°C and 37°C ; 3. credit correct manipulation of the data e.g. with a rise in temperature of 5^{o}C (between 28 and 33^{o}C) the number of cells showing spindle formation rises by 3 ;	**(2)**

Question Number	Answer	Mark
4 (b) (i)	1. idea that (only) 35°C statement is supported ; 2. idea that data either side of 35^{o}C both show all 5 (cells undergoing spindle fibre formation) ; 3. idea that only from 33^{o}C do all 5 (cells show spindle fibre formation) ;	**(2)**

Question Number	Answer	Mark
4 (b) (ii)	1. idea that 31°C statement may not be supported ; 2. idea that it could be between 2 and 5 ;	**(2)**

Question Number	Answer	Mark
*** 4 (c) QWC**	Take into account quality of written communication when awarding the following points. **Mark as pairs** 1. shape qualified e.g. hydrodynamic, streamlined ; 2. idea of reduced resistance ; 3. {*acrosome* / *vesicle*} containing {*enzyme* / *acrosin*}; 4. involved in {digestion / break down} of the {*zona pellucida* / jelly layer} ; 5. {*haploid* / eq} *nucleus* ; 6. allows restoration of {diploid / full complement / 46 / eq} *chromosomes* at *fertilisation* ; 7. *mitochondria* qualified e.g. large number, correct location ; 8. to supply {ATP / energy} for {movement / eq} ; 9. {*flagellum* / eq} present ; 10. for propulsion / swimming / motility / eq ; 11. {markers / receptors} in cell surface *membrane* ; 12. to bind to egg cell surface *membrane* / detect chemicals released by *ovum* / eq ;	**(6)**

Question Number	Answer	Mark
5 (a)	1. idea of half the number of chromosomes found in a {normal body cell/somatic cell / eq} ; 2. idea of containing one chromosome from each homologous pair; 3. the type of nucleus found in {gametes / sex cells / eq} ; 4. a nucleus is (an organelle / (double) membrane-bound structure / eq) ;	**(2)**

Question Number	Answer	Mark
5 (b)	1. idea that pH increases then decreases; 2. correct manipulation of figures in an appropriate context e.g. overall 0.2 change / eq ;	**(2)**

Question Number	Answer	Mark
*** 5 (c) QWC**	**Take into account quality of written communication when awarding the following points.** 1. idea of amino acids transported to rER e.g. tRNA {binding to/ transporting} amino acids (in cytoplasm) ; 2. reference to involvement of ribosomes ; 3. amino acids {being joined by peptide bonds / forming polypeptide chains / forming primary structure of protein / eq} ; 4. {folded into 3-D shape / secondary or tertiary structure} in rER ; 5. packaged into vesicles at the end of the rER / eq ; 6. vesicles {move to / transported to / fuse with / eq} the Golgi apparatus ; 7. idea that protein modified in Golgi apparatus ; 8. (modified protein / enzyme / eq) packaged into (secretory) vesicles (by Golgi apparatus) eq ; 9. vesicles {move towards / fuse with} cell surface membrane / correct reference to exocytosis / eq ;	**(5)**

Question Number	Answer	Mark
5 (d)	1. one (nucleus) fuses with the {egg nucleus / female gamete } / eq ; 2. one (nucleus) fuses with the (two) polar nuclei / eq ;	**(2)**

Question Number	Answer	Mark
6 (a) (i)	B ;	**(1)**

Question Number	Answer	Mark
6 (a) (ii)	A ;	**(1)**

Question Number	Answer	Mark
6 (b)	1. C ; 2. largest group / <u>most</u> people involved / eq ;	**(2)**

Question Number	Answer	Mark
6 (c)	1. mean (improvement of) drug P greater than drug Q / drug P has the highest mean (improvement) / eq ; 2. credit correct manipulation of the data e.g. 3% greater improvement with drug P compared to drug Q ; 3. narrower range of data (for drug P); 4. idea that this range suggests better {reliability / consistency} for drug P ;	**(4)**

Question Number	Answer	Mark
6 (d)		**(3)**

Statement	**Tick (✓) or cross (✗)**
Correct dosage investigated	✓ ;
Tested on animals	✗ ;
A double blind trial was undertaken	✗ ;

Question Number	Answer	Mark
7 (a)	1. idea of a {group / number / collection / eq} of cells ; 2. idea of working together to carry out the {same / specific / one / eq} function ;	**(2)**

Question Number	Answer	Mark
7 (b) (i)	C ;	**(1)**

Question Number	Answer	Mark
7 (b) (ii)	B ;	**(1)**

Question Number	Answer	Mark
7 (c) (i)	1. idea of preventing {microbes / bacteria / fungi} FROM {contaminating / escaping / entering / eq} ; 2. reference to {harmful / pathogenic / eq} {micro-organisms / eq} ;	**(2)**

Question Number	Answer	Mark
7 (c) (ii)	idea of allowing light in (for photosynthesis) / reducing water loss / prevent entry of organisms (that would affect plant growth) ;	**(1)**

Question Number	Answer	Mark
7 (c) (iii)	1. (tissue R) is xylem ; 2. (tissue R) is dead / eq ; 3. no genetic material / DNA /genes / no nucleus present ; 4. (tissue R) is not totipotent / eq ; 5. it is already {differentiated / specialised) ; 6. unable to {divide / undergo mitosis} / eq ;	**(3)**

Question Number	Answer	Mark
8 (a) (i)	(7mm / largest seed size) because has greatest germination success ;	**(1)**

Question Number	Answer	Mark
8 (a) (ii)	1. correct values from graph, i.e. 4 (au) and 20 (au) ; 2. correct subtraction e.g. 20 - 4 = 16 ; 3. (change ÷ original) X 100 to give correct answer, e.g. (16 / 4) x 100 = 400% ; For correct answer of 400% - 3 marks	**(3)**

Question Number	Answer	Mark
8 (a) (iii)	1. idea of maintaining or increasing {genetic diversity / size of gene pool / genetic variation} ; 2. idea of more chance of having beneficial alleles / eq ; 3. increases chance of future survival {if environment changes / due to higher adaptability } / eq ; 4. less chance of all being susceptible to a disease / eq ;	**(3)**

Question Number	Answer	Mark
8 (b)	1. details of assessment of seed viability e.g. only select seeds with a living embryo, use of X ray (to detect embryo presence) / eq ; 2. idea of {cleaning seeds / surface sterilisation / eq} ; 3. idea of drying (of the seed) ; 4. idea of storing at low temperatures ; 5. idea of regularly testing viability (during storage of seed) ; 6. idea of what to do if viability decreases, e.g. if less than 75% germinate collect fresh seed for storage ;	**(4)**

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