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Mark Scheme (Results)

November 2020

Pearson Edexcel International GCSE In Biology (4BI1) Paper 2BR

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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.

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Question Number	Answer	additional guidance	Mark
1(a)	• so semen contained sperm / (bull is) (sexually) mature / sperm in semen / gone through puberty / fully developed / eq	**accept converse** ignore cannot produce semen	**1 grad**

Question Number	Answer	additional guidance	Mark
1(b)	An explanation that includes two of the following points • collect semen / sperm from **penis** of bull (1) • insert **straw** into / inject semen (into cow) (1) • put (it / semen / sperm) in **vagina / uterus** /womb /cervix(1)	 semen injected into uterus scores m2 and mp3	**2 exp**

Question Number	Answer	additional guidance	Mark
1(c)(i)	• preserve (sperm)/ keep (sperm) alive / viable / prevent growth of microorganisms / slow down metabolism / eq	allow last longer ignore denatured	**1 grad**

Question Number	Answer	Mark
1(c)(ii)	• provide females (produce milk) / will produce cows / eq	**1 grad**

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Question Number	Answer	Additional guidance	Mark
1(d)	• 500 000 ÷ 2.4 million = 0.2083 • 0.2083 × 100 = **20.83% / 21.0% / 20.8%**	award full marks for correct numerical answer without working allow 1 mark for ÷ 2.4 million	**2 grad**

Question Number	Answer	Mark
1(e)	A description that makes reference to three of the following points • use semen (from each bull) to fertilise (many / similar) cows (1) • collect / measure milk yields / eq (1) • from each daughter / offspring of these cows / mother of bull (1) • select bull with highest (average) milk yield (across all daughters) (1)	**3 exp**

Question Number	Answer	Mark
1(f)	An explanation that makes reference to two of the following points: • (milk that contains) (most) fat (1) • (most) protein (1) • (most) vitamins (1) • (milk that contains) (most) calcium (1)	**2 exp**

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Question Number	Answer	additional guidance	Mark
1(g)(i)	A description that makes reference to four of the following points: • nucleus from (**body) cell of bull** (1) • insert this nucleus into enucleated egg cell (1) • electric shock (1) • mitosis / cell division (1) • <u>embryo</u> into uterus / womb (1) • surrogate mother (1)	**reject from udder** **reject egg cell from bull**	**4 exp**

Question Number	Answer	Mark
1(g)(ii)	An explanation that makes reference to two of the following points • **genetically** identical / no **genetic** variation / same (combination of) alleles (1) • quicker process (1)	**2 exp**

Total =18 marks

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Question Number	Answer	additional guidance	Mark
2(a)	An explanation that makes reference to four of the following points: • more (decomposition) /faster with warmer temperatures /eq (1) • enzymes (1) • more (decomposition)/ faster with cut material / eq (1) • more surface area (1) • fungi / bacteria (1)	 allow mass remains high in low temp mass remains high in uncut allow converse	**4 exp**

Question Number	Answer	Additional guidance	Mark
2(b)	6.0 – 3.6 = 2.4 2.4 ÷ 3 = 0.8 6.0 – 2.0 = 4.0 4.0 ÷ 3 = 1.3(3) 1.3(3) – 0.8 = 0.5(3) or could 4-2.4 = 1.6÷3 = or even 3.6-2 =1.6 ÷3 = **allow 0.5 or 0.53 or 0.533 etc for full marks**	award full marks for correct numerical answer without working allow 1 for 2.4 **and** 4.0 or 1.3 **and** 0.8 and allow 1 for dividing by 3 so can get 2 marks for (2.4 and 4.0) and dividing by 3	**3 exp**

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Question Number	Answer	additional guidance	Mark
2(c)	An answer that makes reference to two of the following points: • species/ type / of leaves / plant (1) • age of plant / leaves (1) • same (number of) / type of decomposers / eq (1) • insects or organisms that might consume leaf /eq (1)	**ignore volume of leaves**	**2 grad**

Total = 9 marks

Question Number	Answer	Mark
3(a)	The only correct answer is **D** osmosis *A is not correct as it is not how plants absorb water* *B is not correct as it is not how plants absorb water* *C is not correct as it is not how plants absorb water*	**1 comp**

Question Number	Answer	Mark
3(b)	• xylem / xylem vessels	**1 cler**

Question Number	Answer	Mark
3(c)	• transpiration / evaporation / diffusion / evapotranspiration	**1 cler**

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Question Number	Answer	Mark
3(d)	**C** low air temperature *A is not correct as it does not reduce the movement of water from the leaves into the air* *B is not correct as it does not reduce the movement of water from the leaves into the air* *D is not correct as it does not reduce the movement of water from the leaves into the air*	**1 comp**

Question Number	Answer	additional guidance	Mark
3(e)	An answer that makes reference to two of the following points: • support / turgor / eq (1) • photosynthesis / eq (1) • cooling (1) • reactions / solvent / transport of mineral ions /named/mineral ion /eq (1)	**ignore** transpiration for enzymes to work eq reactions	**2 grad**

Total 6 marks

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Question Number	Answer	Mark
4(a)	• no GH / water / saline / eq	**1 grad**

Question Number	Answer	Additional guidance	Mark
4(b)	increase in mass between 100 and 500 days divide by 400 = g per day 485-230 = 255 ÷ 400 = 0.6375 / 0.638 / 0.64 **allow any answer between 0.6375 and 0.65**	award full marks for correct numerical answer allow 1 mark for ÷ 400	**2 grad**

Question Number	Answer	Mark
4(c)	An answer that makes reference to two of the following points: • temperature (1) • (mass of) food / diet / type of food /eq (1) • water (1) • size of cage (1) • time (1) • volume of solution/eq (1)	**2 exp**

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Question Number	Answer	Mark
4(d)	An explanation that makes reference to two of the following points: • avoids making wrong conclusion based on one / few result(s) / conclusion is valid / eq(1) • can calculate mean / average (1) • results are reliable / increase reliability (1) • anomalous results recognised / eq(1)	**2 exp**

Question Number	Answer	additional guidance	Mark
4(e)	An answer that makes reference to three of the following points: • (more) mRNA made (1) • (more) translation (1) • (more) proteins / polypeptides made (1) • enzymes / muscle / tissue (1)	**ignore more cells**	**3 exp**

Total 10 marks

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Question Number	Answer	additional guidance	Mark
5(a)	A description that makes reference to six of the following points: • **virus** non-living organisms / small particles / protein coat / capsid / relies on other organisms for reproduction/ eq (1) • AIDS / eq (1) • **bacteria** microscopic single-celled / prokaryotic / no nucleus / have nucleoid / plasmids (1) • pneumonia / eq (1) • **fungus** not able to carry out photosynthesis / saprotrophic / single-celled / hyphae / cell wall chitin/eq (1) • athlete's foot / eq (1) • **protoctist / protozoa** *Plasmodium* / microscopic single-celled (1) • malaria / eq (1)	pathogen **and** description for first mark disease mark must **match pathogen** type allow plant disease eg TMV HIV / AIDS scores disease mark but not pathogen description mark Virus non-living causing cholera scores pathogen description but not disease mark	**6 exp**

Question Number	Answer	additional guidance	Mark
5(b)	An explanation that makes reference to three of the following points: • dead / weakened / harmless / attenuated pathogen / eq (1) • produce memory cells / lymphocytes (1) • (secondary) immune response (1) • **<u>faster / more</u>** antibodies production (1)	allow weakened strain	**3 exp**

Total 9 marks

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Question Number	Answer	Mark
6(a)	**A** asexual reproduction *B is not correct as it increases genetic variation* *C is not correct as it increases genetic variation* *D is not correct as it increases genetic variation*	**1 comp**

Question Number	Answer	additional guidance	Mark
6(b)	An explanation that makes reference to five of the following points: • different (sequence of) <u>bases</u> in DNA / eq (1) • changes mRNA / codons (1) • transcription (1) • change tRNA / anticodons /(sequence of)amino acids (1) • translation (1) • changes <u>structure / shape</u> of protein /eq (1) • changes active site (1) • enzyme not functional / no binding / no enzyme substrate complex formed/ eq (1)	changes shape of active site = 2 marks	**5 exp**

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Question Number	Answer	Mark
6(c)	An explanation that makes reference to four of the following points: • as some triplets / codons code for same amino acid / degenerative /eq (1) • no change in protein / polypeptide / enzyme produced (1) • active site not changed /affected (1) • mutation / allele may be recessive (1) • so not expressed in phenotype / if heterozygous / dominant allele present / eq (1) • mutation may occur in a non-coding sequence of DNA /eq (1)	**4 exp**

Total 10 marks

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Question Number	Answer	additional guidance	Mark
7(a)	An answer that makes reference to the following points: • carbohydrate / named carbohydrate (1) • oxygen (1) • higher / greater / more (1) • carbon dioxide (1) • equal / the same / balanced (1)	**allow** carbohydrate / named carbohydrate	**5 grad**

Question Number	Answer	additional guidance	Mark
7(b)	A description that makes reference to three of the following points: • (how light intensity is varied)foil / muslin / move lamp / eq (1) • leaf in test tube with bung / use flask with delivery tube/eq (1) • (look for colour change after) same/ stated time (1) • same size / species / type / surface area /eq (1) • same temperature / same <u>volume</u> of indicator (1) • correct colour change so goes yellow with increased CO_2 in dark / goes dark red/ red/ purple with reduced CO_2 in light /eq (1)	allow light and dark	**3 exp**

Total 8 marks

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