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Mark Scheme (Results)

January 2023

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)	An explanation that makes reference to the following points: • roots (hair cells) damaged / roots not in soil / roots exposed / eq (1) • water not absorbed / taken up /eq (1) • water lost by transpiration / evaporation / eq (1)	don't get water mp 2 from soil mp1	**2**

Question Number	Answer	additional guidance	Mark
1(b)	number of stomata in photo=3 area of photo = 100 µm x 100 µm conversion of µm to mm = 0.1 x 0.1 mm = 0.01mm^2 3 stomata in 0.01 mm^2 answer in stomata per mm^2 = 3 × 1/0.01 = **300** (3)	allow 1 mark for 3 allow 1 mark for 1 ÷ 0.01 or 3 ÷0.01 or number of stomata ÷0.01 or number of stomata×100 allow full marks for 300 with no working	**3**

Question Number	Answer	Mark
1(c)	An explanation that makes reference to two of the following points: • stomata closed / shut / less open / smaller / eq (1) • less carbon dioxide absorbed / eq (1)	**2**

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Question Number	Answer	Additional guidance	Mark
1(d)(i)	An explanation that makes reference to two of the following points: • stomata mainly / only on lower surface / upper surface has no/ fewer stomata / eq (1) • so stomata not blocked / stomata not covered by reflective compound / eq (1) • carbon dioxide can still be absorbed / gas exchange can still take place / eq (1) • more /most light falls on upper surface / eq (1)	allow converse for if covered	**2**

Question Number	Answer	Mark
1(d)(ii)	An explanation that makes reference to two of the following points: • lower temperature reduces (kinetic) energy (1) • water molecules move less / eq (1) • less diffusion / evaporation / eq (1)	**2**

Question Number	Answer	additional guidance	Mark
1(e)	A description that makes reference to two of the following points: • named mineral ion (1) • correct matched function (1)	must be ions eg nitrate (1) ignore nitrogen for amino acids / protein (1) ignore growth magnesium for chlorophyll / chloroplasts (1) allow other correct mineral ions and correct function	**2**

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Question Number	Answer	additional guidance	Mark
1(f)	A description that makes reference to four of the following points: • root hair cells (1) • (absorb water by) osmosis / eq (1) • from dilute solution to more concentrated / eq (1) • water moves up xylem / xylem carries water to leaves /eq (1) • transpiration pull /stream /eq (1) • due to water loss from stomata / transpiration from stomata / evaporation from stomata /eq (1)		**4**

Total = 17 marks

Question Number	Answer	Mark
2(a) (i)	**The only correct answer is B nephron** A is not correct as it is not the bladder C is not correct as it is not the ureter D is not correct as it is not the urethra	**1**

Question Number	Answer	Mark
2(a) (ii)	**The only correct answer is B blood** A is not correct as it not bile C is not correct as it not filtrate D is not correct as it not urine	**1**

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Question Number	Answer	Mark
2(a) (iii)	**The only correct answer is C ureter** A is not correct as it not the renal artery C is not correct as it not the renal vein D is not correct as it not the urethra	**1**

Question Number	Answer	additional guidance	Mark
2(b)(i)	An answer that makes reference to five of the following points: 1. **Process** W (ultra) filtration (1) 2. **Location** from glomerulus / into Bowman's capsule (1) 3. **Effect** protein passes (through basement membrane) out of blood / into nephron / eq (1) 4. **Process** X (selective) reabsorption (1) 5. **Location** in convoluted tubule (1) 6. **Effect** glucose not taken back into blood / stays in tubule / eq (1) 7. **Process** Y reabsorption of water / ADH release / osmoregulation/ eq (1) 8. **Location** in collecting duct (1) 9. **Effect** stays impermeable / less permeable / doesn't allow water (back) into blood / eq (1)	glomerular filtration = mp 1 and mp 2	**5**

Question Number	Answer	additional guidance	Mark
2(b)(ii)	A description that makes reference to two of the following • Benedict's added / eq (1) • heated / eq (1)	allow alternative test Fehlings or $CuSO_4$ and Na_2CO_3 allow Benedict's	**2**

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	• red / green / yellow / orange / eq (1)	test for mp 1 allow clinistix / ursitix / glucose testing strip for mp 1 and correct colour change for mp 3 / brown	

Total = 10 marks

Question Number	Answer	Mark
3(a)(i)	• 23 (1)	**1**

Question Number	Answer	additional guidance	Mark
3(a)(ii)	A description that that makes reference to the following points: • use quadrat (1) • random (number generator) / use random coordinates / eq (1) • count number of <u>each species</u> in quadrat(1) • divide number by area of quadrat/s (1)	not just count plants no credit for repeat	**3**

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Question Number	Answer	additional guidance	Mark
3(b)	An answer that that makes reference to four of the following points: 1. Field X has 3 species / more species / all 3 species / greater richness / eq (1) 2. Field X shows little variation in numbers/ even distribution of species A eq (1) 3. Field X shows little variation in numbers/ even distribution of species C / eq (1) 4. Field X shows more variation in numbers/ uneven distribution of species B eq (1) 5. Field X has more 'eveness' of species number 6. Field X has greater biodiversity / eq (1) 7. Only 3 counts of each / limited data set / more repeats needed /eq (1)	Y has 2 / fewer / no species A Y shows more variation in numbers/ uneven distribution of species C eq (1) Y shows little variation in numbers / even distribution of species B / eq (1) Y less even / dominated by species B Y less biodiversity	**4**

Question Number	Answer	Mark
3(c)	• temperature / water / sunlight / wind speed / mineral ions/ eq	**1**

Total = 9 marks

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Question Number	Answer	Mark
4(a)	• all of the genes / all of DNA in an organism / the entire DNA / entire genetic make up / eq (1)	**1**

Question Number	Answer	additional guidance	Mark
4(b)	A description that that makes reference to three of the following points: • DNA double (strand(ed)) (helix) / / eq (1) • DNA contains deoxyribose / (1) • DNA contains thymine / T / eq (1) • DNA longer (molecule) / eq (1)	RNA single stand RNA ribose RNA contains uracil / U RNA shorter	**3**

Question Number	Answer	Mark
4(c)	A description that makes reference to four of the following points: 1. transcription produces mRNA / eq (1) 2. mRNA copies code of DNA strand / DNA code copied / carried by mRNA / eq (1) 3. mRNA moves out of nucleus / into cytoplasm / eq (1) 4. binds with ribosome / eq (1) 5. tRNA brings amino acids to ribosome /eq (1) 6. anticodon binds with codons /eq (1) 7. translation produces polypeptide / protein / amino acid chain (1)	**4**

Total = 8 marks

Question Number	Answer	Mark

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5(a)	A oviduct / Fallopian tube (1) B ovary (1) C cervix (1)	**3**

Question Number	Answer	additional guidance	Mark
5(b)	A description that makes reference to two of the following points: • site of implantation of embryo / eq (1) • placenta grows (in uterus) / eq (1) • provides nutrition / removes waste from embryo/ / allow named substances/ eq (1)	allow zygote fertilised egg implants	**2**

Question Number	Answer	additional guidance	Mark
5(c)(i)	An explanation that makes reference to four of the following points: 1. M is oestrogen / N is progesterone (1) 2. M / oestrogen increases and peaks before ovulation / eq (1) 3. M / oestrogen repairs uterine lining (following menstruation) / inhibits FSH / stimulates release of LH / eq (1) 4. (ready) for implantation (of fertilised egg) / eq (1) 5. N / progesterone increases after ovulation /eq (1) 6. N maintains uterine lining / prevents menstruation / inhibits / prevents release of FSH and LH / eq (1) 7. drop in N / progesterone causes menstruation / uterine lining/ endometrium to break down/ eq (1)	allow from graph	**4**

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Question Number	Answer	Mark
5(c)(ii)	A description that makes reference to the following points: • FSH / eq (1) • FSH causes growth of follicle (in ovary) / egg to mature / release of oestrogen / eq (1) **OR** • LH /eq (1) • causes ovulation/ release of egg / formation of Corpus Luteum /eq (1)	**2**

Total = 11 marks

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Question Number	Answer	additional guidance	Mark
6(a)	1950 =400 - 420 1965 = 510 - 520 percentage change ((520-400)÷400) ×100 = + 30% 520-420 ÷420 x 100 = + 24% **range for 1950 to 1965 = 21 to 30** 1968 = 480-490 1983=120-130 percentage change ((120-490)÷490) ×100 = -75.5% ((130-480))÷480) X 100 = -72.9% **range for 1968 to 1983 = -73 to - 76** subtraction -75.5% – 30% = 105.5 max 30 + 76 min 21 + 73 **allow range 94 to 106 (3)**	**allow 1 for 21 to 30** and **1 for 73 to 76** if one of these figs is wrong allow one for subtraction of (-74 to + 30) being correct eq even if using incorrect values **so if incorrect final answer can get up to 2 for working** allow full marks for **94 to 106** with no working	**3**

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Question Number	Answer	additional guidance	Mark
6(b)	An explanation that makes reference to four of the following points: 1. cases higher before vaccine introduced / lower after vaccination introduced/ eq (1) 2. cases more variable before vaccine introduced/ less variable after vaccine introduced / eq (1) 3. as no immunity / antibodies to measles / takes time to produce antibodies / eq (1) 4. as percentage / more of population vaccinated cases decrease/ eq (1) 5. as virus no longer reproducing in children / virus destroyed in children / no longer spreading / can no longer find a suitable host / eq (1) 6. as vaccinated children have antibodies / memory cells /eq (1) 7. quoting early data (eg up to 1974) (**cases and percent vaccinated**) 125 cases 52% vaccinated /eq (1) 8. quoting later data: (**cases and percent vaccinated**) (eg 1990 onwards) later data eg 80% vaccinated 20 cases / no cases (by 1998) when 90% vaccinated / eq (1)	herd immunity reject antibiotics mp 7 mp 8 allow range / leeway on cases and percentage	**4**

Question Number	Answer	Mark
6(c)	An explanation that makes reference to two of the following points: • cannot produce antibodies /fewer antibodies produced / eq (1) • no / fewer memory cells produced / no / less secondary immune response / eq (1) • could develop disease / give child disease / give child illness / give child measles / eq (1)	**2**

Total = 9 marks

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Question Number	Answer	Mark
7	• explants • microorganisms / microbes / fungi / bacteria /pathogens / eq • sugar / named sugar / glucose / sucrose / starch / eq • clones • sexual • all / throughout/ during / through / anytime	**6** ignore carbohydrate

Total = 6 marks

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