



Mark Scheme (Results)

January 2023

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

Question Number	Answer	additional guidance	Mark
1(a)	<p>An explanation that makes reference to the following points:</p> <ul style="list-style-type: none"> • 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) 	<p>don't get water mp 2 from soil mp1</p>	2

Question Number	Answer	additional guidance	Mark
1(b)	<p>number of stomata in photo=3</p> <p>area of photo = 100 μm x 100 μm</p> <p>conversion of μm to mm</p> <p>= 0.1 x 0.1 mm</p> <p>= 0.01mm²</p> <p>3 stomata in 0.01 mm²</p> <p>answer in stomata per mm²</p> <p>= 3 x 1/0.01</p> <p>= 300 (3)</p>	<p>allow 1 mark for 3</p> <p>allow 1 mark for</p> <p>1 \div 0.01</p> <p>or 3 \div0.01</p> <p>or number of stomata \div0.01</p> <p>or number of stomata \times100</p> <p>allow full marks for 300 with no working</p>	3

Question Number	Answer	Mark
1(c)	<p>An explanation that makes reference to two of the following points:</p> <ul style="list-style-type: none"> • stomata closed / shut / less open / smaller / eq (1) • less carbon dioxide absorbed / eq (1) 	2

Question Number	Answer	Additional guidance	Mark
1(d)(i)	<p>An explanation that makes reference to two of the following points:</p> <ul style="list-style-type: none"> • 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)	<p>An explanation that makes reference to two of the following points:</p> <ul style="list-style-type: none"> • 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)	<p>A description that makes reference to two of the following points:</p> <ul style="list-style-type: none"> • named mineral ion (1) • correct matched function (1) 	<p>must be ions</p> <p>eg nitrate (1) ignore nitrogen</p> <p>for amino acids / protein (1) ignore growth</p> <p>magnesium for chlorophyll / chloroplasts (1)</p> <p>allow other correct mineral ions and correct function</p>	2

Question Number	Answer	additional guidance	Mark
1(f)	<p>A description that makes reference to four of the following points:</p> <ul style="list-style-type: none"> • <u>root hair cells</u> (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)	<p>The only correct answer is B nephron</p> <p>A is not correct as it is not the bladder</p> <p>C is not correct as it is not the ureter</p> <p>D is not correct as it is not the urethra</p>	1

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

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

Question Number	Answer	additional guidance	Mark
2(b)(i)	<p>An answer that makes reference to five of the following points:</p> <ol style="list-style-type: none"> 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)	<p>A description that makes reference to two of the following</p> <ul style="list-style-type: none"> • Benedict's added / eq (1) • heated / eq (1) 	<p>allow alternative test Fehlings or CuSO₄ and Na₂CO₃</p> <p>allow Benedict's</p>	2

	<ul style="list-style-type: none"> 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	
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Total = 10 marks

Question Number	Answer	Mark
3(a)(i)	<ul style="list-style-type: none"> 23 (1) 	1

Question Number	Answer	additional guidance	Mark
3(a)(ii)	<p>A description that that makes reference to the following points:</p> <ul style="list-style-type: none"> 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) 	<p>not just count plants</p> <p>no credit for repeat</p>	3

Question Number	Answer	additional guidance	Mark
3(b)	<p>An answer that that makes reference to four of the following points:</p> <ol style="list-style-type: none"> 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 'evenness' 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) 	<p>Y has 2 / fewer / no species A</p> <p>Y shows more variation in numbers/ uneven distribution of species C eq (1)</p> <p>Y shows little variation in numbers / even distribution of species B / eq (1)</p> <p>Y less even / dominated by species B</p> <p>Y less biodiversity</p>	4

Question Number	Answer	Mark
3(c)	<ul style="list-style-type: none"> • temperature / water / sunlight / wind speed / mineral ions/ eq 	1

Total = 9 marks

Question Number	Answer	Mark
4(a)	<ul style="list-style-type: none"> all of the genes / all of DNA in an organism / the <u>entire</u> DNA / entire genetic make up / eq (1) 	1

Question Number	Answer	additional guidance	Mark
4(b)	<p>A description that that makes reference to three of the following points:</p> <ul style="list-style-type: none"> DNA double (strand(ed)) (helix) / / eq (1) DNA contains deoxyribose / (1) DNA contains thymine / T / eq (1) DNA longer (molecule) / eq (1) 	<p>RNA single stand</p> <p>RNA ribose</p> <p>RNA contains uracil / U</p> <p>RNA shorter</p>	3

Question Number	Answer	Mark
4(c)	<p>A description that makes reference to four of the following points:</p> <ol style="list-style-type: none"> transcription produces mRNA / eq (1) mRNA copies code of DNA strand / DNA code copied / carried by mRNA / eq (1) mRNA moves out of nucleus / into cytoplasm / eq (1) binds with ribosome / eq (1) tRNA brings amino acids to ribosome /eq (1) anticodon binds with codons /eq (1) 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
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Question Number	Answer	additional guidance	Mark
5(b)	A description that makes reference to two of the following points: <ul style="list-style-type: none"> • 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: <ol style="list-style-type: none"> 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)	<p>A description that makes reference to the following points:</p> <ul style="list-style-type: none"> • FSH / eq (1) • FSH causes growth of follicle (in ovary) / egg to mature / release of oestrogen / eq (1) <p style="text-align: center;">OR</p> <ul style="list-style-type: none"> • LH /eq (1) • causes ovulation/ release of egg / formation of Corpus Luteum /eq (1) 	2

Total = 11 marks

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

Question Number	Answer	additional guidance	Mark
6(b)	<p>An explanation that makes reference to four of the following points:</p> <ol style="list-style-type: none"> 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) 	<p>herd immunity</p> <p>reject antibiotics</p> <p>mp 7 mp 8 allow range / leeway on cases and percentage</p>	4

Question Number	Answer	Mark
6(c)	<p>An explanation that makes reference to two of the following points:</p> <ul style="list-style-type: none"> • 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

Question Number	Answer	Mark
7	<ul style="list-style-type: none"> • 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