



Mark Scheme (Results)

November 2020

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

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Autumn 2020

Publications Code 4BI1_2B_2011_MS

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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)	C ultrafiltration <i>A is incorrect because digestion is not a process in the kidneys</i> <i>B is incorrect because mutation is not a process in the kidneys</i> <i>D is incorrect because vaccination is not a process in the kidneys</i>	1 comp

Question Number	Answer	Additional guidance	Mark
1(b)	An answer that makes reference to three of the following points: • stay out of water / wear waterproof clothes / eq (1) • treat drinking water / boil water (before drinking) / do not drink water / drink bottled water / eq (1) • sanitation / no faeces in water / no urine in water / eq (1) • remove snails / eq (1) • vaccination (1)	Allow do not go in infected rivers or lakes / cover skin when in water / avoid contact with affected water / only wash in clean water Allow filter water / do not drink river water / lake water Allow use sewage treatment system / use toilet with septic tank Allow don't touch snails	3 exp

Question Number	Answer	Mark
1(c)	An answer that makes reference to two of the following points: • red blood cells / rbc (1) • white blood cells / wbc (1) • lymphocytes (1) • phagocytes / macrophages (1)	2 grad

Question Number	Answer	Mark
1(d)	D 4 800 <i>A is incorrect because it is the wrong value</i> <i>B is incorrect because it is the wrong value</i> <i>C is incorrect because it is the wrong value</i>	1 comp

Question Number	Answer	Additional guidance	Mark
1(e)	• $8 \times 10^{-4} = 0.0008$ • $\times 240 \text{ million} = 192$ $000 \div 100 = 1920$ (2)	Allow 1 mark for: 19200000 / 1920000 / 192000 / 19200 / 192 / 19.2 / 1.92 / 0.192 / 0.0192 Award full marks for correct numerical answer without working	2 grad

Question Number	Answer	Mark
1(f)	A a circle of DNA <i>B is incorrect because it is not RNA</i> <i>C is incorrect because it is not a protein</i> <i>D is incorrect because it is not RNA</i>	1 comp

Question Number	Answer	Mark
1(g)	An explanation that makes reference to three of the following points: • antigen (1) • memory cells / lymphocytes (1) • (secondary) immune response (1) • more antibodies / antibodies made sooner / faster / faster immune response / eq (1)	3 exp

Question Number	Answer		Mark
1(h)(i)	• (a treatment with) no plasmid / no protein / only water / saline / eq (1)	Allow placebo vaccine / a placebo / plasmid with no gene / plasmid with no DNA / different DNA	1 exp

Question Number	Answer	Additional Guidance	Mark
1(h)(ii)	An answer that makes reference to three of the following points: • reduced numbers / eq (1) • by 19 or by 47% / about 50% • schistosomes / worms, still present in body (1) • no idea of group size / needs to be repeated (1) • no idea of age / sex / health (1)	Allow reduces numbers of worms / worms decrease / lower number of worms after vaccine Allow more worms in control group Allow does not completely get rid of them Allow more testing / more people tested	3 exp

Total = 17 marks

Question Number	Answer	Mark
2(a)(i)	An answer that makes reference to the following points: • prevent loss of blood / stops bleeding (1) • prevent entry of pathogens / microbes / bacteria / viruses / fungi / eq / prevent infections (1)	2 grad

Question Number	Answer	Mark
2(a)(ii)	An answer that makes reference to the following point: • graph showing drop at 37 °C then increase	1 grad

Question Number	Answer	Mark
2(b)(i)	An explanation that makes reference to the following points: • (have been given) genetic material / gene / allele / DNA / genetically alter (1) • from human / different species (1)	2 grad

Question Number	Answer	Additional guidance	Mark
2(b)(ii)	An answer that makes reference to six of the following points: • use enucleated egg / empty egg / remove nucleus from egg / eq (1) • nucleus from body cell / diploid nucleus (placed into empty egg) / fuse adult cell with empty egg (1) • use of electricity / shock (1) • cell division / mitosis (1) • embryo (1) • uterus / womb (1) • surrogate mother (1)	Ignore DNA	6 exp

Total 11 marks

Question Number	Answer	Mark
3(a)	spinal cord / chord	1 cler

Question Number	Answer	Mark
3(b)(i)	C 0.5 <i>A is incorrect because 0.5 is the answer</i> <i>B is incorrect because 0.5 is the answer</i> <i>D is incorrect because 0.5 is the answer</i>	1 comp

Question Number	Answer	Mark
3(b)(ii)	A diagram that makes reference to the following points: • one circle and one square shown (1) • two shapes unshaded (1)	2 grad

Question Number	Answer	Additional guidance	Mark
3(c)	An explanation that makes reference to three of the following points: • prevents translation / no translation (1) • prevents ribosomes attaching (to mRNA) (1) • prevents / no, codon binding to anticodon (1) • prevents amino acids joining / amino acid chain not made (1) • huntingtin / protein / polypeptide not made (1)	Allow tRNA does not bind to mRNA Allow less huntingtin / protein made	3 exp

Total 7 marks

Question Number	Answer	Additional guidance	Mark
4(a)	An answer that makes reference to the following points: $6\text{CO}_2 + 6\text{H}_2\text{O} \longrightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2 \text{ (2)}$	Allow 1 mark for unbalanced but correct formula No marks for word equation	2 grad

Question Number	Answer	Additional guidance	Mark
4(b)(i)	• $84 + 80 \div 2$ • 82 (2)	Allow 1 mark for 70 or 70.3 or 70.33 etc Allow one mark for 164 or $80 + 84$ Award full marks for correct answer	2 grad

Question Number	Answer	Additional guidance	Mark
4(b)(ii)	An explanation that makes reference to four of the following points: • no filter has highest rate of photosynthesis / bubbling / oxygen (1) • (because) all light colours / wavelengths are present / has more light energy / most amount of light that can be absorbed / eq (1) • green has low(est) rate of photosynthesis, because green light is not absorbed / eq (1) • blue / red has a medium rate of photosynthesis because light is, absorbed / not reflected / eq (1) • chlorophyll / chloroplast absorbs red / blue light / does not absorb green light / eq (1)	Allow no bubbling / 8 bubbles / no oxygen production because green light is reflected / passes through Allow causes photosynthesis / produces bubbles because light is, absorbed / not reflected / eq	4 exp

Question Number	Answer	Additional guidance	Mark
4(b)(iii)	An answer that makes reference to two of the following points: • temperature (1) • carbon dioxide (1) • light <u>intensity</u> (1)	Allow volume / amount / concentration of hydrogen carbonate Allow brightness of lamp/ thickness of filter / eq	2 grad

Question Number	Answer	Additional guidance	Mark
4(c)(i)	An explanation that makes reference to two the following points: • bubbles are different volumes / sizes (1) • O₂ may dissolve in water (1) • bubbles may be CO₂ not oxygen / may not be due to photosynthesis / other gases may be present (1) • easy to miscount / miss bubbles (1) • bubbles get trapped / stuck (1)	Allow bubbles may be due to respiration Ignore 'make error' unqualified	2 exp

Question Number	Answer	Additional guidance	Mark
4(c)(ii)	An answer that makes reference to two the following points: • use measuring cylinder / (gas) syringe / burette / graduated test tube (1) • (to measure) volume (1) OR • use hydrogen carbonate <u>indicator</u> (1) • change colour (of hydrogen carbonate indicator) (1)		2 exp

Total 14 marks

Question Number	Answer			Mark
5(a)				6 exp
	Hormone	Name of structure that secretes hormone	Functions of hormone	
	FSH	pituitary (1)	1. stimulate follicle growth / mature eggs / develop eggs / eq (1) 2. stimulates oestrogen secretion	
	LH / Lutenising hormone (1)	pituitary	1. cause ovulation / egg / ovum release / eq / stimulate progesterone release (1) 2. stimulates development of corpus luteum	
	oestrogen / estrogen (1)	ovaries	1. repairs lining of uterus 2. stimulates LH secretion	
	progesterone	ovaries / corpus luteum / placenta (1)	1. maintains the lining of uterus 2. inhibits LH	

Question Number	Answer	Additional guidance	Mark
5(b)	An answer that makes reference to one of the following points: • blood loss once a month / monthly period / eq (1) • breakdown of uterus lining / breakdown of endometrium / eq	Allow passing out / shedding / loss of uterus lining / endometrium	1 grad

Question Number	Answer	Additional guidance	Mark
5(c)	• $51 - 12 = 39$ • $39 \times 52 \times 7 = 14\,196$ days • $39 \times 365 = 14\,235$ • $39 \times 365.25 = 14\,247.75$ • $14\,196 \div 28 = 507$ • = 510 to 2 sig figs (3) OR • $51 - 12 = 39$ • $365 / 28 = 13(.04)$ • $13.04 \times 39 = 508$ • = 510 to 2 sig figs (3)	Award full marks for correct numerical answer without working Allow one mark for $\times 39$ OR for $\div 28$ Allow answer between 507 and 510 for 2 marks e.g. 507 / 508 / 509	3 exp

Question Number	Answer	Additional guidance	Mark
5(d)	An answer that makes reference to one of the following points: • not all eggs fertilised / eq (1) • no sexual intercourse / eq (1) • contraception / eq (1) • no implantation / eq (1) • miscarriages / eq (1) • some eggs not fertile / eq (1)	Allow eggs fertilised by abnormal sperm	1 exp

Total 11 marks

Question Number	Answer	Additional guidance	Mark
6(a)(i)	A description that makes reference to two of the following points: • elongated / pointed / projections / extensions /eq (1) • increase surface area (1) • thin wall for short diffusion path / eq (1) • concentrated cell sap for osmosis / eq (1)	Allow low water potential to increase gradient for osmosis / increase water potential gradient /eq	2 grad

Question Number	Answer	Additional guidance	Mark
6(a)(ii)	An explanation that makes reference to four of the following points: • water enters (root) by osmosis (1) • from dilute solution to more concentrated solution / eq (1) • (water) enters / moves up xylem (1) • water pulled up to leaf due to transpiration / pulled along transpiration stream / eq (1) • (water vapour) exits through stomata (1)	Allow from higher water potential to lower water potential Allow from high concentration of water to low concentration of water Allow water pulled due to evaporation from leaf / eq	4 exp

Question Number	Answer	Additional guidance	Mark
6(b)	A description that makes reference to four of the following points: • use (bubble) / (weight) <u>potometer</u> (1) • cut shoot underwater / dry leaves / place mineral oil on surface of water / eq (1) • measure distance moved by bubble (in cm) / mass lost / change in volume of water (1) • (in set) time (1) • repeat / calculate mean rate (1)	Allow polythene bag around soil (if shoot placed in soil) Allow stated time Allow time mark ref and mass mark for two marks if given as units e.g. cm per min g per min	4 exp

Total 10 marks

