

Mark Scheme (Results)

November 2020

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

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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 *A is incorrect because digestion is not a process in the kidneys* *B is incorrect because mutation is not a process in the kidneys* *D is incorrect because vaccination is not a process in the kidneys*	**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 *A is incorrect because it is the wrong value* *B is incorrect because it is the wrong value* *C is incorrect because it is the wrong value*	**1 comp**

Question Number	Answer	Additional guidance	Mark
1(e)	• $8 \times 10^{-4} = 0.0008$ • x 240 million = 192 000 ÷ 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 *B is incorrect because it is not RNA* *C is incorrect because it is not a protein* *D is incorrect because it is not RNA*	**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 ^{o}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 *A is incorrect because 0.5 is the answer* *B is incorrect because 0.5 is the answer* *D is incorrect because 0.5 is the answer*	**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: $6CO_2 + 6H_20 \longrightarrow C_6H_{12}O_6 + 6O_2$ (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 ÷ 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) • O_2 may dissolve in water (1) • bubbles may be CO_2 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 indicator (1) • change colour (of hydrogen carbonate indicator) (1)		**2 exp**

Total 14 marks

<table>
<tr><th>Question Number</th><th>Answer</th><th>Mark</th></tr>
<tr><td>5(a)</td><td>
<table>
<tr><th>Hormone</th><th>Name of structure that secretes hormone</th><th>Functions of hormone</th></tr>
<tr><td>FSH</td><td>pituitary (1)</td><td>1. stimulate follicle growth / mature eggs / develop eggs / eq (1)

2. stimulates oestrogen secretion</td></tr>
<tr><td>LH / Lutenising hormone (1)</td><td>pituitary</td><td>1. cause ovulation / egg / ovum release / eq / stimulate progesterone release (1)

2. stimulates development of corpus luteum</td></tr>
<tr><td>oestrogen / estrogen (1)</td><td>ovaries</td><td>1. repairs lining of uterus

2. stimulates LH secretion</td></tr>
<tr><td>progesterone</td><td>ovaries / corpus luteum / placenta (1)</td><td>1. maintains the lining of uterus
2. inhibits LH</td></tr>
</table>
</td><td>6 exp</td></tr>
</table>

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 x 52 x 7 = 14 196 days 39 x 365 = 14 235 39 x 365.25 = 14 24.75 • 14 196 ÷ 28 = 507 • = **510** to 2 sig figs (3) **OR** • 51 – 12 = 39 • 365 / 28 = 13(.04) • 13.04 x 39 = 508 • = **510** to 2 sig figs (3)	Award full marks for correct numerical answer without working **Allow** one mark for x 39 **OR** for ÷ 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

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