Mark Scheme (Results)

November 2024

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)	An answer that makes reference to two of the following: • urea (1) • water (1) • salts / named salt / ions / minerals / named ions / eq (1)	 **Accept** uric acid / creatinine **Accept** ammonia / ammonium Mark first two e.g. glucose, urea, water would be one mark ; urea, uric acid, water is two (for urea /uric acid and water as urea / uric acid are both mp1)	**2**

Question Number	Answer	Additional guidance	Mark
1(b)	An answer that makes reference to two of the following points: • permanent / does not need replacing / long term treatment / eq (1) • can lead normal life / have normal diet / more independent / better quality of life / eq (1) • doesn't require (repeated) visits to a hospital / no need to repeat every week / eq (1) • kidney can perform other functions / eq (1)	**Accept** converse for dialysis machines for all mps **Ignore** dialysis takes a long time / inconvenient **Ignore** cost effective over long term **Accept** can live longer / longer lifespan / no need to monitor diet **Accept** kidney works all the time / continuous filtration / eq	**2**

Question Number	Answer		Mark
1(c)	A description that makes reference to three of the following points: • white blood cells / lymphocytes / phagocytes / eq (1) • (phagocytes / white blood cells) engulf / phagocytosis / eq (1) • (lymphocytes / white blood cells / memory cells) produce antibodies / eq (1) • (kill / remove) bacteria / viruses / microorganisms / pathogens / antigens / eq (1) • make memory cells (1)	**Allow** phagocytes engulf for 2 marks for mp1 and mp2 **Reject** lymphocytes engulf **Allow** lymphocytes produce antibodies for 2 marks for mp1 and mp2 **Reject** phagocytes produce antibodies	**3**

Question Number	Answer		Mark
1(d)	An explanation that makes reference to two of the following points: • genetically similar / eq (1) • same / similar proteins / antigens / eq (1) • no / less immune response / less response by white blood cells / fewer antibodies made / eq (1)	**Accept** same genes / identical genes / same DNA **Accept** same blood type / same tissue type **Accept** recognises kidney / cells as own body **Accept** recognises kidney as not foreign	**2**

Question Number	Answer	additional guidance	Mark
1(e)(i)	39.17 (3) If incorrect final answer, then: 58.75 **OR** 58.8 **OR** [(1040-429) / 1040] x 100 **for one mark** **and** 19.6 **OR** 19.58 **OR** 19.579(5….) **OR** [(2283-1836 / 2283)] x 100 **for one mark**	**Accept** answer between 39.15 to 39.2 for **3 marks** **Allow** full marks for correct answer no working	**3**

Question Number	Answer	Mark
1(e)(ii)	An answer that makes reference to one of the following points: • more deceased donor kidneys available / two kidneys per deceased donor / living can only donate one kidney / deceased do not need kidneys / living people may need both kidneys to live / both kidneys can be harvested when dead / eq (1) • living people reluctant to donate / people reluctant to have surgery / only (close) family will volunteer to be living donors / few living people agree to donate / surgery may cause harm / people might be harmed by removal / eq (1)	**1**

Question Number	Answer	Mark
1(f)	An answer that makes reference to the following point: • same tissue type / same tissue match / same blood type / similar genes / similar antigens / one that won't be rejected / a healthy kidney / a functioning kidney / not diseased / eq (1)	**1**

Question Number	Answer		Mark
1(g)	An explanation that makes reference to two of the following points: • more susceptible to kidney failure / get more kidney disease / eq (1) • few(er) donors / eq (1) • may not be able to receive from different group / may reject transplant from different group / less likely to reject from similar group / kidney will be a better match / eq (1)	**Accept** people in these countries have more kidney disease **Accept** there is more kidney disease in the countries **Accept** many donors are from different ethnic backgrounds **Ignore** more donors needed unqualified	**2**

Total 16 marks

Question Number	Answer	additional guidance	Mark
2(a)	An explanation that makes reference to the following: • final temp minus start temperature / calculate change in temperature / calculate difference in temperatures (1) • multiply by 4.2 / specific heat capacity (of water) (1) • multiply by mass (of water) / 20 (1) mc Δθ = 3 marks mc ΔT = 3 marks	**Ignore** division by mass **Accept** volume of water **Allow** all marks from equation	**3**

Question Number	Answer		Mark
2(b)	An answer that refers to: • repeat / calculate means / eq (1)	**Ignore** repeat with **different** types of grain **Accept** repeat with each grain	**1**

Question Number	Answer	Mark
2(c)(i)	An explanation that makes refence to the following: • large surface area / more contact of tube with water / eq (1) • more energy transferred / more heat transferred / better heat transfer / eq (1)	**2**

Question Number	Answer	Mark
2(c)(ii)	An answer that refers to : • completely burns grain / complete combustion / complete oxidation / eq (1)	**1**

Question Number	Answer	Additional guidance	Mark
2(d)(i)	5 (g) **OR** 4.6 (g) **OR** 4.55 (g) **OR** 4.5 (g) (2)	**Allow** 1 mark for 0.07 **OR** x 65 **Allow** full marks for correct answer no working	**2**

Question Number	Answer	additional guidance	Mark
2(d)(ii)	An answer that makes reference to four of the following points: **one from:** • **oats** have high fat / high carbohydrate **AND** for running / for respiration / for energy / eq (1) • **oats** have high protein **AND** for muscles / repair / eq (1) • **oats** have high fat **AND** could cause heart disease / CHD / eq (1) **one from:** • **rye** has low fat / energy **AND** so cannot run as well / eq (1) • **rye** has low protein **AND** so not good muscle growth / cannot repair cells / eq (1) • **rye** has low fat **AND** so less risk of heart disease / eq (1) • **rye** has high fibre **AND** so athlete will not have constipation / good peristalsis / eq (1) **one from:** • **rice** has high carbohydrate **AND** so run well / for respiration / provides high energy / eq (1) • **rice** has low protein **AND** so not good muscle / repair / eq (1) • **rice** has low fat **AND** so less risk of heart disease / may lack energy / eq (1) • **rice** has low fibre **AND** so risk of constipation / poor peristalsis / eq (1) **one from:** • **wheat** has low carbohydrate **AND** so will lack endurance / will lack energy / eq (1) • **wheat** has high protein **AND** so helps to build muscle / repair tissues / eq (1) • **wheat** has high fat **AND** so more risk of heart disease / has (long term) energy / eq (1) • **wheat** has high fibre **AND** so reduces risk of constipation / good peristalsis / eq (1)	**Accept oats** have high / most energy **AND** for running / eq **Accept rye** has low fat **AND** so less energy **Accept rice** has high energy **AND** so can run well / eq **Accept wheat** has low (overall) energy **AND** so cannot run well / eq	**4**

Total 13 marks

Question Number	Answer	additional guidance	Mark
3(a)	A description that makes reference to two of the following: • (stem cells) are unspecialised / are undifferentiated (1) • (stem cells) can divide / undergo mitosis (1) • (stem cells can differentiate) into other cell types / can form other cell types / can form specialised cells (1)	**Accept** converse for normal body cells	**2**

Question Number	Answer	Additional guidance	Mark
3(b)	A description that makes reference to the following: • help blood to clot / eq (1) • prevent (further) blood loss / stop bleeding / eq (1) • prevent entry of pathogens / bacteria / viruses / fungi / microorganisms / stop infection / eq (1)	**Accept** convert fibrinogen to fibrin / eq	**3**

Question Number	Answer	Mark
3(c)	An explanation that makes reference to four of the following: • dead bacteria / dead pathogen / weaker virus / weaker pathogen / attenuated virus / inactive pathogen / eq (1) • antigens (present in vaccine) (1) • lymphocytes respond (1) • memory cells produced / eq (1) • <u>secondary</u> (immune) <u>response</u> (1) • **more** <u>antibodies</u> / <u>antibodies</u> produced **faster** / <u>antibodies</u> produced **sooner** / eq (1)	**4**

Question Number	Answer		Mark
3(d)	An explanation that makes reference to three of the following: • (blood stem cells) can differentiate / specialise (1) • into different <u>blood</u> cells / various <u>blood</u> cells / any type of <u>blood</u> cell / eq (1) • can make red blood cells **AND** to transport oxygen / eq (1) • can make white blood cells / phagocytes / lymphocytes **AND** to destroy pathogens / release antibodies / produce immunity / eq (1) • can make platelets **AND** to help blood clotting / prevent blood loss / eq (1)	**Allow** any **two** named blood cells for one mark **Ignore** to treat anaemia **Ignore** to treat leukaemia	**3**

Total 12 marks

Question Number	Answer	Mark
4(a)(i)	The only correct answer is **A (P)** B is not the answer as Q is not the sweat gland C is not the answer as S is not the sweat gland D is not the answer as T is not the sweat gland	**1**

Question Number	Answer	Mark
4(a)(ii)	The only correct answer is **D (T)** A is not the answer as Q is not a capillary B is not the answer as R is not a capillary C is not the answer as S is not a capillary	**1**

Question Number	Answer	additional guidance	Mark
4(a)(iii)	A description that makes reference to three of the following points: • <u>vasodilation</u> / <u>vasodilate</u> (1) • as arterioles get wider /dilate / eq (1) • more blood flow near skin surface / more blood flow through the blood vessels / more blood flow through capillaries / eq (1) • so (more) heat lost / blood cools / eq (1)	**Accept** blood vessels get wider / dilate / **Reject** capillaries dilate **Reject** blood vessels move **Accept** (more) radiated heat	**3**

Question Number	Answer	Mark
4(b)(i)	• sweating rate / sweat loss (in litres per hour) / amount of sweat / volume of sweat / sweat release / eq (1)	**1**

Question Number	Answer	additional guidance	Mark
4(b)(ii)	0.43 **OR** 0.42 **OR** 0.425 (3) If final answer is not correct: **Accept** 1.7 for one mark **AND** **Accept** x0.25 or x¼ or ÷4 or x15/60 for one mark	**Accept** answers between 0.42 and 0.43 for three marks **Accept** reading between 1.7 and 1.72 **Accept** full marks for correct answer with no working	**3**

Question Number	Answer	additional guidance	Mark
4(b)(iii)	An answer that makes reference to four of the following: • increasing running speed increases sweating / eq (1) • sweating cools the body / sweating cools blood / sweating maintains body temperature / body heats up during running / eq (1) • increase in sweating is similar for both condition / effect of running speed has similar slope / eq (1) • more sweat produced in hot and humid condition / eq (1) • sweat / water <u>evaporates</u> more easily in dry / eq (1) • lower concentration gradient in humid conditions / lower diffusion gradient in humid conditions / eq (1) • no repeats / only one person / small sample size / no mention of water intake / no mention of diet / eq (1)	**Accept** same difference between the two conditions **Accept** same rate of increase **Accept** converse for dry **Accept** converse for humid **Accept** body heats up more in hot and humid so more sweat / eq (1) **Accept** converse for dry **Ignore** ref to different ages / body mass / sex etc	**4**

Total 13 marks

Question Number	Answer		Mark
5	An answer that makes includes the following: • nucleus (1) • egg / oocyte / ovum (1) • nucleus (1) • divide (1) • embryo (1) • uterus / womb (1) • surrogate (1)	**Reject** ovule **Accept** multiply	**7**

Question Number	Answer		Mark
6(a)(i)	An answer that makes reference to one of the following points: • excess not absorbed / some washed away / eq (1) • water lost by osmosis / causes plants to wilt / less water taken in / eq (1) • crop already receiving sufficient nutrients / minerals / fertiliser / eq (1) • not limited by minerals / there are other limiting factors / other minerals (not in the fertiliser) are limiting / eq (1)	**Accept** cannot take up any more nutrients / minerals / fertiliser / eq **Accept** is already taking up maximum nutrients / minerals / fertiliser / eq **Accept** light / carbon dioxide / temperature is limiting / eq	**1**

Question Number	Answer	Mark
6(a)(ii)	An explanation that makes reference to five of the following: • (waterlogged) soil lacks oxygen / water fills up air spaces in soil / eq (1) • plant root cells cannot perform active transport / cannot take up minerals / eq (1) • leaching occurs / run off (into rivers / lakes) / eq (1) • causes algal bloom / increased plant growth / eutrophication / eq (1) • blocks (sun)light / less light (passes into water) / covers water surface / eq (1) • less / no photosynthesis (by underwater plants / algae) / eq (1) • (aquatic) plants / algae die / eq (1) • decomposers / bacteria (1) • respiration / eq (1) • less oxygen (in water) / water becomes anoxic / eq (1) • fish / (aquatic) organism die / suffocate / eq (1)	**5**

Question Number	Answer		Mark
6(b)	An explanation that makes reference to two of the following: • combines with haemoglobin / forms carboxyhaemoglobin / eq (1) • prevents oxygen transport / less oxyhaemoglobin / oxygen cannot bind haemoglobin / eq (1) • less respiration / more anaerobic respiration / less energy released / more lactic acid formed / eq (1)	**Accept** forms carboxyhaemoglobin rather than oxyhaemoglobin for **2 marks** **Accept** binds to haemoglobin instead of oxygen for **2 marks**	**2**

Question Number	Answer	Mark
6(c)	The only correct answer is **C (nitrogen)** A is not the answer as it is a greenhouse gas B is not the answer as it is a greenhouse gas D is not the answer as it is a greenhouse gas	**1**

Total 9 marks

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