Mark Scheme (Results)

November 2021

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

Edexcel and BTEC Qualifications

Edexcel and BTEC qualifications are awarded by Pearson, the UK's largest awarding body. We provide a wide range of qualifications including academic, vocational, occupational and specific programmes for employers. For further information visit our qualifications websites at www.edexcel.com or www.btec.co.uk. Alternatively, you can get in touch with us using the details on our contact us page at www.edexcel.com/contactus.

Pearson: helping people progress, everywhere

Pearson aspires to be the world's leading learning company. Our aim is to help everyone progress in their lives through education. We believe in every kind of learning, for all kinds of people, wherever they are in the world. We've been involved in education for over 150 years, and by working across 70 countries, in 100 languages, we have built an international reputation for our commitment to high standards and raising achievement through innovation in education. Find out more about how we can help you and your students at: www.pearson.com/uk

November 2021
Question Paper Log Number P66431RA
Publications Code 4BI1_2B_2111_MS

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	Additional guidance	Mark
1(a)	• Less able to contract / pump / beat / eq (1)	**Allow** heart has to work harder to push blood	**1**

Question Number	Answer	Additional guidance	Mark
1(b)	An answer that refers to three of the following points • pump / push blood into ventricles (1) • receive deoxygenated blood / blood from body / blood from vena cava (1) • receive oxygenated blood / blood from lungs / blood from pulmonary vein (1)	**Ignore** blood passes from atria ventricles without idea of actively being moved **Allow** one mark for receive blood if no MP2 or MP3	**3**

Question Number	Answer	Additional guidance	Mark
1(c)	An answer that refers to two of the following points • low(er) pressure (1) • low(er) oxygen / less oxygenated / deoxygenated (1) • high(er) carbon dioxide (1)	**Allow** converse for all mark points	**2**

Question Number	Answer	Additional guidance	Mark
1(d)	An explanation that refers to three of the following points **LUNG FUNCTION** • oxygenates blood (1) • removes carbon dioxide (1) **HEART FUNCTION** • transport / pump, blood around body (1) • (enable tissues / cells to) respire (1) • allows surgeon to operate on heart / connect new heart (1)	**Allow** aerates blood **Allow** transport glucose / nutrients, around body / to cells	**3**

Question Number	Answer	Additional guidance	Mark
1(e)	An explanation that refers to two of the following points • prevents rejection (1) • because antigens / eq, are recognised / are different (1) • stops action of immune system / reduces immune response / reduces lymphocyte action / stops antibody production /prevents white blood cells activity / eq (1)	**Ignore** attack stops immune system rejecting heart = 2 marks **Ignore** suppress **Allow** reduced phagocytosis	**2**

Question Number	Answer	Additional guidance	Mark
1(f)	An explanation that refers to two of the following points • less oxygen in blood / less efficient gas exchange (1) • narrows arteries / damages artery walls / increased risk of fat in artery walls / atheroma / increased risk of heart disease / eq (1) • carbon monoxide binds with haemoglobin / red blood cells (1) • (increased risk of) blood clotting / strokes (1) • (increases risk of) higher blood pressure (1)		**2**

Question Number	Answer	Additional guidance	Mark
1(g)	• contains **<u>all</u>** required nutrients /food groups in the correct proportion / amounts (1)	**Allow** all the food groups in correct amounts / eq **Allow** has carbohydrates, protein, fats, vitamins minerals, fibre and (water) in right amounts **Ignore** balance must contain **<u>all</u>** or complete list (except water) and correct proportion	**1**

Question Number	Answer	Additional guidance	Mark
1(h)	150 (2)	75 x 200 /100 75/100 x 200 0.75 x 200 **Allow** 2 marks for 150 **one mark** for use of 75 and 200	**2**

Question Number	Answer	Additional guidance	Mark
1(i)	• puts more pressure on heart / (increased risk of) heart attack / causes heart rate to increase / makes heart beat harder / increases blood pressure / eq (1)	**Allow to** not strain the heart / too stressful on heart	**1**

Question Number	Answer	Additional guidance	Mark
1(j)	• immune system is weaker / less able to produce antibodies / less immune response / eq	**Allow** because they are taking immunosuppressants	**1**

Total 18 marks

Question Number	Answer	Mark
2(a)(i)	The only correct answer is C A is not correct as pollen grains are not made in A B is not correct as pollen grains are not made in B D is not correct as pollen grains are not made in D	**1**

Question Number	Answer	Mark
2(a)(ii)	The only correct answer is B A is not correct as it is not the stigma C is not correct as it is not the stigma D is not correct as it is not the stigma	**1**

Question Number	Answer	Additional guidance	Mark
2(b)	An explanation that makes reference to three of the following points: • tube grows down style (1) • tube enters the ovary / ovule (1) • tube enters via micropyle (1) • transports <u>nucleus</u> / male gamete to ovary / ovule / down style (1) • idea of fertilisation (1)	**Allow** pollen nucleus / male gamete, <u>fuses</u> with egg nucleus / female gamete / egg cell **Allow** gametes fuse	**3**

Question Number	Answer	Additional guidance	Mark
2(c)(i)	80 (2)	600 ÷ 3 = 200 360 ÷ 3 = 120 200 – 120 = 80 600-360=240 240÷3=80 **one mark** for 240 **or** (200 **<u>and</u>** 120) award full marks for correct numerical answer without working	**2**

Question Number	Answer	Additional guidance	Mark
2(c)(ii)	An answer that makes reference to two of the following points: • with <u>both</u> (chemicals) there is less growth (1) • (because) fewer proteins made / less protein synthesis (1) • with actinomycin, no mRNA is made / <u>DNA</u> not transcribed (1) • with cycloheximide, amino acids cannot be joined together / eq (1) • growth with actinomycin is higher than cycloheximide, as some mRNA is present / is then translated (1)	**Allow** stopping transcription stops mRNA production **Allow** correct reference to any process associated with translation e.g. prevents ribosome binding to RNA/ mRNA and tRNA cannot pair up /codons cannot join with anticodons / such as tRNA does not bring amino acids	**4**

Question Number	Answer	Additional guidance	Mark
2(d)	An answer that makes reference to three of the following points: • microscope / lens / magnifying glass (1) • slide / tile / eq (1) • cover slip (1) • stain / dye (1)	**Allow** petri dish / watch glass	**3**

Total 14 marks

Question Number	Answer	Mark
3(a)	The only correct answer is A B is not correct as B is not the Bowman's capsule C is not correct as C is not the Bowman's capsule D is not correct as D is not the Bowman's capsule	**1**

Question Number	Answer	Additional guidance	Mark
3(b)(i)	An explanation that makes reference to three of the following points: • (selective) (re)absorption (1) • into blood / from / out of filtrate (1) • proximal convoluted tubule / B (1) • active transport (1)	**Allow** PCT / first coiled tubule	**3**

Question Number	Answer	Additional guidance	Mark
3(b)(ii)	• 99 / 99.2 / 99.17 / 99.16 (recurring) **(2)**	180 000 - 1500 = 178 500 178 500 ÷ 180 000 × 100 = 99.2 **One mark** for 178 500 / (180000-1500 ÷ 180000) / 0.99 / 99.1 / 99.16 award full marks for correct numerical answer without working	**2**

Question Number	Answer	Mark
3(b)(iii)	the only correct answer is C protein A is not correct as is fat not used to produce urea B is not correct as is glucose not used to produce urea D is not correct as is water not used to produce urea	**1**

Question Number	Answer	Mark
3(c)	An explanation that makes reference to four of the following points: • less urine / decreases urine production / urine more concentrated (1) • collecting duct (1) • more permeable (1) • water (absorbed) into blood / water reabsorbed (1) • by osmosis (1)	**4**

Total 11 marks

Question Number	Answer	Mark
4(a)(i)	• nucleus removed / without nucleus	**1**

Question Number	Answer	Additional guidance	Mark
4(a)(ii)	A description that makes reference to two of the following points: • divides (many times) / produces ball of cells /cell division occurs (1) • by mitosis (1) • cells differentiate / specialise (1)	divides by mitosis = 2 marks	**2**

Question Number	Answer	Additional guidance	Mark
4(b)	An answer that makes reference to four of the following points: Against fetal: • same number of offspring produced with each body cell (1) • fewer pregnancies with fetal cells / lower proportion of pregnancies with fetal cells (1) • fewer surrogates used for fetal cells (1) • 52% successful pregnancies / 29 % successful pregnancies (1) For fetal: • offspring from fetal cells are healthy / fetal cells produce more healthy offspring/ eq (1) Conclusion:	**Allow** both produce two offspring **Allow** converse for adult cells **Allow** converse for adult cells **Allow** other correct decimals **Allow** offspring from fetal cells survive longer / are not short lived / the two offspring from fetal cells survived	**4**

	• fetal cells are more successful (for cloning) / fetal should be used (1)		

Total 7 marks

Question Number	Answer	Additional guidance	Mark
5	A description that makes reference to six of the following points: • weigh each crisp / use same mass of crisp (1) • stated volume / mass of water in tube / beaker / calorimeter (1) • ignite / light crisp (1) • heat water using burning crisp / place burning crisp under tube / eq (1) • burn until it has completely burnt / no longer relights / eq (1) • measure temperature of water before and after burning / measure change in temperature (1) • energy content (per g) = 4.2 x mass of water × temp rise ÷ (mass of crisp) (1) • repeat (to obtain reliable data) (1) • insulate / move crisp under tube quickly (1)	**Allow** shc for 4.2 mass of crisps / mass of water / temperature rise, may be awarded here	**6**

Total 6 marks

Question Number	Answer	Additional guidance	Mark
6 (a)	A description that makes reference to two of the following points: • use random number tables / computer / eq (1) • to generate coordinates in field / place tape measures along edge of field / eq (1)	**Allow** grid area / split area into squares (1)	**2**

Question Number	Answer	Mark
6(b)(i)	3 (1)	**1**

Question Number	Answer	Additional guidance	Mark
6(b)(ii)	12 (1)	**ECF** from 6(b)(i)	**1**

Question Number	Answer	Additional guidance	Mark
6 (c)	A description that makes reference to two of the following points: • more plants / named plants in field A / more plants per quadrat / more of each species (1) • more species in field A (1) • higher (bio)diversity in field A / eq (1) • more species evenness in field A (1) / even distributions	**Allow** converse for all mark points **Allow** A has 39 plants, B has only 16 **Allow** A has 4 species, B has only 2 **Allow** only dandelions (and 1 violet) in B / all species present in A	**2**

Question Number	Answer	Additional guidance	Mark
6 (d)	A description that makes reference to three of the following points: **EITHER METHOD 1** • measure water content of soil / field / eq (1) • take repeated samples (1) • along a transect / at random locations (1) • count buttercups / compare number of buttercups to water content of soil (1) **OR METHOD 2** • plant buttercups in one field / pots with poor drainage and one with good drainage / eq (1)	Mark either of the two methods **Allow** calculate mean water content **Allow** plant in high soil water and low soil water	

	• repeat (1) • control temperature / minerals / light / rainfall / water added / eq (1) • count number of buttercups (1)		**3**

Total marks 9 marks

Question Number	Answer	Additional guidance	Mark
7(a)	An explanation that makes reference to two of the following points: • (unspecialised cells) develop into specialised cells / cells with specific functions (1) • to produce tissues / organs / example of tissue or organ (1)	**Allow** examples of specific cell types e.g. muscle cells / bone cells	**2**

Question Number	Answer	Mark
7(b) (i)	The only correct answer is D are found in some tissues and organs A is not correct as they can divide B is not correct as do not divide my meiosis C is not correct as cannot become all cell types	**1**

Question Number	Answer	Additional guidance	Mark
7(b)(ii)	An explanation that makes reference to two of the following points: • cells from embryos can make any cell type / many more cell types / adult stem cells can become fewer cell types (1) • ethical issues about the use of embryonic cells / eq (1)	**Allow** converse for adult cells for both MPs **Allow** only stem cells that come from embryos are totipotent / eq **Allow** people object to killing embryos / embryos are potential human lives / eq **Allow** embryo cells can become tumours	**2**

Total 5 marks