Pearson Edexcel

Mark Scheme (Results)

November 2021

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

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 both (chemicals) there is less growth (1) • (because) fewer proteins made / less protein synthesis (1) • with actinomycin, no mRNA is made / DNA 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