Pearson Edexcel

Mark Scheme (Results)

January 2021

Pearson Edexcel International GCSE
In Biology (4BI1) Paper 1B and Science (Double Award) (4SD0) Paper 1B

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Question Number	Answer	Mark
1(a)	The only correct answer is B 1 A is not correct as 0 is not the correct number of chromosomes C is not correct as 2 is not the correct number of chromosomes D is not correct as 23 is not the correct number of chromosomes	**1**

Question Number	Answer	Mark
1(b)	An explanation that makes reference to the following points: • energy / ATP / respiration /eq (1) • movement / swimming / tail movement/ eq (1)	**2**

Question Number	Answer	additional guidance	Mark
1(c)	An explanation that makes reference to two of the following points: • digest / break down egg membrane / eq (1) • allow (nucleus) to enter / penetrate egg (1) • fertilisation / fusion (1)	ignore wall / shell etc	**2**

Question Number	Answer	Additional guidance	Mark
1(d)	An answer that makes reference to 2 of the following points: • vagina • uterus / womb /cervix • oviduct / fallopian tube	two marks for all 3 in correct order one mark for 3 structures wrong order one mark for 2 structures in correct order vagina oviduct =1 uterus vagina oviduct = 1 oviduct vagina = 0 uterus oviduct = 1 vagina uterus = 1 ign route after fertilisation	**2**

Total = 7 marks

Question Number	Answer	Mark
2(a)	small fish	**1**

Question Number	Answer	additional guidance	Mark
2(b)(i)	A description that makes reference to three of the following points: • photosynthesis (1) • chloroplasts / chlorophyll (1) • absorbs / traps light /eq (energy) (1) • starch / glucose / carbohydrate (1)	allow formula or from equation	**3**

Question Number	Answer	additional guidance	Mark
2(b)(ii)	An answer that makes reference to two of the following points: • respiration / heat loss (by plant) (1) • cannot digest / egested / not absorbed /eq (1) • uneaten / die / decomposition (1) • excretion (1)		**2**

Question Number	Answer	Mark
2(c)	An answer that makes reference to the following points: • increase surface area (1) • enzymes (1)	**2**

Total 8 marks

Question Number	Answer	Mark
3(a)(i)		**5**

statement	**letter**
contains the least carbon dioxide	A
contains the most glucose after a meal	G
contains the least oxygen	J
contains the least urea	F
contains blood at the highest pressure	B

Question Number	Answer	additional guidance	Mark
3(a)(ii)	An answer that makes reference to two of the following points: A / pV has • thin(ner) wall (1) • less muscle (1) • less elastic tissue (1) • wide(r) / big(er) / lumen (1)	allow converse for J allow thin allow wide ignore ref to valves	**2**

Question Number	Answer	Mark
3(b)	An answer that makes reference to five of the following points: • more (capillaries to transport) oxygen / glucose (1) • more (aerobic) respiration / less anaerobic respiration (1) • more ATP/ more energy (1) • (more) muscle contraction (1) • less lactic acid (1) • effective for long distance events / ineffective for power events / type of performance not specified /only leg muscle sampled / eq(1) • other factor(s) / age / lung (capacity) / heart (rate) named other factors affect performance (1) • need to test more than one person / not repeated / eq (1)	**5**

Total 12 marks

Question Number	Answer	Mark
4(a)		**3**

Example of process	Name of process
plants with a short growing season survive drought	**natural selection**
growth of algae in rivers polluted by fertiliser	eutrophication (1)
pollen transferred from one plant to another by an insect	<u>insect</u> pollination (1)
absorption of nitrate ions from soil using ATP	active transport (1)

Question Number	Answer	additional guidance	Mark
4(b)(i)	An explanation that makes reference to four of the following points: • (more) grass flourishes / grows well / survives / not killed by zinc / eq (near mine) (1) • less competition (1) • mutation (1) • reproduce (1) • pass allele / gene / DNA on to offspring (1)	other species killed by zinc near mine	**4**

Question Number	Answer	additional guidance	Mark
4(b)(ii)	A description that makes reference to four of the following points: • use tape measure (1) • quadrat (1) • repeat / several (1) • count plants / estimate percentage cover described (1)	allow belt transect for mp1 allow for quadrats how many	**4**

Total 11 marks

Question Number	Answer	Additional guidance	Mark
5(a)	Temperature (1)	allow heat loss / temperature loss	**1**

Question Number	Answer	Mark
5(b)	An answer that makes reference to **one** of the following points: • (to prevent) volume / surface area affecting heat loss / eq • valid comparison / fair test / eq	**1**

Question Number	Answer	Additional guidance	Mark
5(c)	• covered 40 ÷ 80 x 100 = 50 % (1) • uncovered 36 ÷ 80 x 100 = 45 % • difference = 5 (2)	allow 1 mark for 45 or 50 full marks for correct answer	**2**

Question Number	Answer	additional guidance	Mark
5(d)	An answer that makes reference to four of the following points: • less heat loss if indoors / eq (1) • depends upon outside temperature different in hot country (1) • but only small / 5% difference / eq (1) • animals move around less (1) • more energy for growth / making meat / eggs / milk / less energy used to keep warm /eq (1) • diseases easier to spread (1) • protected from predators (1) • ethical objection / cruel / quality of life idea / eq (1) • eat variety of food outdoors / taste/ eq (1)	allow converse ignore natural	**4**

Question Number	Answer	additional guidance	Mark
5(e)	An answer that makes reference to the following points: • use beakers / containers of different sizes / different volumes (1) • keep beakers out of box / keep beakers under box (1)	allow different volumes of water ignore animals	**2**

Total 10 marks

Question Number	Answer	Mark
6(a)(i)	Circle around axon terminals	**1**

Question Number	Answer	Mark
6(a)(ii)	The only correct answer is B motor A is not correct as it is not an association neurone C is not correct as it is not a relay neurone D is not correct as it is not a sensory neurone	**1**

Question Number	Answer	Mark
6(a)(iii)	An explanation that makes reference to two of the following points: • fast (1) • no brain involvement / no thought / automatic /involuntary / eq (1) • less damage / harm / eq (1)	**2**

Question Number	Answer	Mark
6(b)(i)	The only correct answer is D wider neurones have faster impulses A is not correct as it is not supported by the graph B is not correct as it is not supported by the graph C is not correct as it is not supported by the graph	**1**

Question	Answer	Mark

Number		
6(b)(ii)	4.4 (m per s)	**1**

Question Number	Answer	Additional guidance	Mark
6(b)(iii)	• 90cm = 0.9m • 90 ÷ (speed) 440 = 0.20s 0.9 ÷ (speed) 4.4 = 0.20 s = seconds • 2.0×10^{-1} (3)	award full marks for correct numerical answer without working regardless of speed used allow 1 mark for 0.9 (m) **or** speed expressed as x 100 cm/s (440 idea) allow 1 mark for 90 ÷ speed **or** 0.9 ÷ speed (if not 0.20455 etc) allow 2 marks for marks for correct numerical answer without working but not in standard form	**3**

Total 9 marks

Question Number	Answer	Mark
7(a)(i)	Radicle/ root / plumule / shoot has grown / seed split/ sprouts /eq (1)	**1**

Question	Answer	additional	Mark

Number		guidance	
7(a)(ii)	An answer that includes two of the following • Temperature (1) • Volume of solution (1) • Humidity (1) • Oxygen (1) • Light (1) • pH (1) • Carbon dioxide (1)	ignore amount of water ignore wind allow soil / compost /growth medium	**2**

Question Number	Answer	additional guidance	Mark
7(b)(i)	An answer that includes two of the following S linear and half of each axis (1) L straight and passing through all points (1) A x axis correct way round (Na Cl or salt conc / eq) (1) U axes labelled with Na Cl / salt concentration **in mmol** and **percentage** / **% germination** (1) P points correctly plotted within one square (1)	if non linear scale can still get P bar chart loses L	**5**

Question	Answer	additional	Mark

Number		guidance	
7(b)(ii)	An explanation that makes reference to four of the following points • (increasing (salt)concentration) decreases germination (1) • (as concentration of solution increases) (lower) water potential / concentration / osmotic gradient /eq (1) • less water absorbed / water exits /eq (1) • by osmosis (1) • to activate enzymes / digest starch / eq (1)	allow water potential / concentration gradient described /reversed eg more water molecules inside / eq	**4**

Question Number	Answer	Additional guidance	Mark
7(c)(i)	An answer that makes reference to the following points • roots grow towards gravity (1) • positively gravitropic / geotropic (1)	Allow converse for stems allow gravitrophic	**2**

Question Number	Answer	Additional guidance	**Mark**
7(c)(ii)	An answer that makes reference to the following points • roots grow away from light (1) • negatively phototropic (1)	Allow converse for stems	**2**

16 marks

Question Number	Answer	Mark
8(a)	chemical / solution / eq that kills / destroys / eq pests / animals / plants / insects / eq (1)	**1**

Question Number	Answer	additional guidance	Mark
8(b)	1319.5 /1320 /1300 km^2 (1) Barley (1)	Multiply total area by % sprayed 91 % of 1450	**2**

Question Number	Answer	additional guidance	Mark
8(c)	An answer that makes reference to two of • in winter cold / low temperature / less food eq (1) • fewer insects / pests (1) • less insecticide / pesticide needed (1)	allow converse for spring spring warmer / more food more insects more insecticide /pesticide	**2**

Question Number	Answer		Mark
8(d)	An answer that makes reference to four of • around 70% / even pattern of herbicide / fungicide and insecticide in fruit crops (1) • high(er)use of herbicide in cereals / low(er) use of herbicide in fruit(1) • as smaller plants / growing plants need to compete with weeds (1) • high(er) use of insecticide in fruit crops / low(er) use of insecticide in cereals (1) • more variation in fungicide use in cereals (1) • high use of fungicide on (rotting) fruit (1) • as fruit more prone to saprophytic decay/ high sugar content / eq	Allow converse mp 3 allow converse mp 7	**4**

8(e)	An answer that makes reference to • use biological control (1) • using a predator (species) (such as Encarsia) to target / eat / consume (specific) pest / insect / eq (eg whitefly) (1)	use nets (1) exclude insects from plants / eq (1) allow introduce consumer of insect / Allow example ladybird for aphids for mp 2	**2**

Total 11 marks

Question Number	Answer	Mark
9(a)(i)	Sickle shaped red blood cells stick to each other / caught / trapped /eq walls of blood vessels / eq (1)	**1**

Question Number	Answer	Mark
9(a)(ii)	An explanation that makes reference to three of the following points • cold temperatures reduce blood flow / cause more sickling (1) • less oxygen (at high altitude) (1) • less respiration / (more) <u>anaerobic</u> respiration (1) • more lactic acid (1) • (less) energy / ATP (1)	**3**

Question Number	Answer	Mark
9(b)(i)	only expressed when homozygous / two copies / no dominant allele present / not expressed in heterozygote /eq (1)	**1**

Question Number	Answer	Additional guidance	Mark
9(b)(ii)	0.75 x 0.5 ¾ X ½ 0.375 or 3/8 or 37.5% (2)	Allow 1 mark for ¾ or 0.75 or 75% or one mark for ½ or 0.5 or 50%	**2**

Question Number	Answer	Mark
9(c)	The only correct answer is D A is not correct as bacterium does not cause malaria B is not correct as fungus does not cause malaria C is not correct as plant does not cause malaria	**1**

Question Number	Answer	Mark
9(d)	The only correct answer is B A is not correct as chlorophyll not found in red blood cells C is not correct as iron is not a pigment D C is not correct as magnesium not found in red blood cells	**1**

Question Number	Answer	Additional guidance	Mark
9(e)	An answer that includes two of the following points • red cells smaller (1) • red cells have no nucleus (1) • red cells are biconcave /eq (1)	Allow converse for wbc allow (mature) RBC's lack mitochondria ign haemoglobin	**2**

Total 11 marks

Question Number	Answer	Additional guidance	Mark
10(a)	An explanation answer that makes reference to five of the following points • temperature increases (kinetic) energy / particle movement / more collisions / eq (1) • difference in concentration / concentration gradient increases rate of movement (1) • short(er) distance increases diffusion /eq (1) • surface area to (volume ratio) increases diffusion (1) • mass / size of particle smaller particles move faster (1) • larger particles / charged particles cannot pass through cell membrane (1) • (increased) oxygen / ATP / respiration / energy for active transport (1)	allow converse thin walls villi / microvilli / eq	**5**

Question Number	Answer	Additional guidance	Mark
10(b)	An answer that makes reference to the four of the following points • diffusion <u>passive</u> (1) • diffusion from high concentration to low / requires concentration gradient (1) • active transport requires ATP / energy/ oxygen / respiration (1) • active transport requires membrane / carrier proteins (1) • diffusion can take place in non-living systems (1)	appropriate converse mp2-5	**4**

Total 9 marks

Question Number	Answer	additional guidance	Mark
11	An answer that makes reference to four of the following points • C change amount of starch (1) • O use same species / strain / genotype / mass / volume / measure of yeast (1) • R repeat each flour type more than once / eq (1) • M1 measure height / volume of dough / bread / use ruler (1) • M2 after stated time / same time (1) • S1 use same measure of flour / volume / mass of flour / volume/ mass of water / eq (1) • S2 same temperature / knead for stated / same time / eq (1)	ign amount ign amount allow cook at same temp	**6**

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