



Pearson
Edexcel

Mark Scheme (Results)

Summer 2022

**Pearson Edexcel International GCSE
In Biology (4BI1) Paper 1B**

Question Number	Answer	Mark
1(a)(i)	<p>The only correct answer is</p> <p>A is the pancreas</p> <p>B is not the answer as B is not the pancreas</p> <p>C is not the answer as C is not the pancreas</p> <p>D is not the answer as D is not the pancreas</p>	1

Question Number	Answer	Mark
1(a)(ii)	<p>The only correct answer is</p> <p>D structure produces progesterone</p> <p>A is not correct as it does not produce progesterone</p> <p>B is not correct as it does not produce progesterone</p> <p>C is not correct as it does not produce progesterone</p>	1

Question Number	Answer	additional guidance	Mark
1(b)(i)	<p>Calculation method not marking points</p> <p>convert hormonal speed to m / min</p> <p>= 4.2 m per min</p> <p>convert hormonal speed to m / sec</p> <p>= $4.2 \div 60$ m per sec</p> <p>= 0.07 m per sec</p> <p>division</p> <p>$55 \div 0.07$</p> <p>= 786 :1 scores 3</p> <p>allow 2 sig figs so allow 790:1 scores 3</p>	<p>Calculation method</p> <p>conversion of nerve speed to cm per min</p> <p>= 5500 cm per sec</p> <p>= 5500×60 cm per min</p> <p>= 330 000 cm per min</p> <p>division</p> <p>$330\ 000 \div 420$</p> <p>= 786 : 1 scores 3</p> <p>Allow 785.7 to 1 for full marks and all versions of 785.7142857142857 score 3</p> <p>allow 1 mark for $\div 60$ or $\times 60$ or evidence of multiplying by or dividing by 60</p> <p>allow 1 mark for $\div 0.07$ or $:0.07$ or $\div 420$ or $:420$</p> <p>allow 2 marks for 1 to 786 or just number 786 etc</p> <p>any rounding errors such as 785:1 scores 2</p>	3

Question Number	Answer	Additional guidance	Mark
1 (b) (ii)	<p>A description that makes reference to three of the following:</p> <ul style="list-style-type: none"> • uses neurones / nerve <u>cells</u> (1) • <u>electrical</u> (1) • goes to target cells only / specific (locus) / eq (1) • (response) is usually short (term) (1) 	<p>allow converse for hormones uses plasma/ blood ignore impulse</p> <p>chemical</p> <p>all around body/ different organs</p> <p>(response) longer (lasting)</p> <p>ignore ref to speed</p>	3

total 8 marks

Question Number	Answer	Mark
2(a)	<ul style="list-style-type: none"> • hyphae (1) • chitin (1) • enzymes(1) • saprotrophic / saprophytic (1) 	4

Question Number	Answer	Mark
2(b)(i)	<ul style="list-style-type: none"> • carbon dioxide / CO₂ (1) 	1

Question Number	Answer	Mark
2(b)(ii)	<p>An explanation that makes reference to the following:</p> <ul style="list-style-type: none"> • increasing (kinetic) energy / molecules move more (1) • more collisions/ more enzyme substrate complexes formed / eq (1) • above 37 / 40°C /optimum / eventually / at higher temperature <u>enzyme</u> denatures / change in active site / substrate and enzyme can no longer bind /fit /eq (1) 	3

Question Number	Answer	additional guidance	Mark
2(b)(iii)	<p>A description that makes reference to two of the following</p> <ul style="list-style-type: none"> • use (collect gas in) measuring cylinder / (gas) syringe / eq (1) • measure <u>volume / cm³</u> in <u>time /</u> or <u>time</u> to produce <u>volume</u> / eq (1) 	<p>no credit for counting bubbles or time for limewater as stem states in this experiment.</p> <p>allow ref to capillary tube and scale</p> <p>ignore gas cylinder</p> <p>must refer to volume and time for mp 2</p>	2

total 10 marks

Question Number	Answer	Mark
3(a) (i)	<ul style="list-style-type: none"> • the middle value / eq (1) 	1

Question Number	Answer	additional guidance	Mark
3(a)(ii)	<ul style="list-style-type: none"> • median used as each age has wide / high range /not (influenced by) affected by / any reference to / reduces effect of extreme values / data is skewed / less affected by anomalies / eq 	allow converse for mean	1

Question Number	Answer	additional guidance	Mark
3(a)(iii)	<p>A description that makes reference to two of the following</p> <ul style="list-style-type: none"> • increases (steeply) up to 20-25 years (1) • levels off / peaks 20-25 years (1) • decreases (steadily at constant rate) from 20-25_years (1) 	<p>to score two marks must have one correct numerical ref</p> <p>allow one mark for increases then decreases</p>	2

Question Number	Answer	Mark
3(a)(iv)	<p>An explanation that makes reference to two of the following</p> <ul style="list-style-type: none"> • (increases) (up to 20 years) as body / size / mass / chest cavity / lungs / muscle increases / grows / develops / eq (1) • no / little change (from 20) no further growth / stop growing / eq (1) • (decreases) (from 25 years) as <u>diaphragm</u> / <u>intercostal</u> muscle weaker / lungs less elastic / less recoil / eq (1) 	2

Question Number	Answer	additional guidance	Mark
3(a)(v)	<p>An answer that makes reference to two of the following</p> <ul style="list-style-type: none"> • smoking (1) • lung disease / infection / condition / asthma / bronchitis / emphysema / eq (1) • fitness / how active you are / eq (1) • body size/ height / mass / genetics / eq (1) • sex /eq (1) • altitude at which you live / eq (1) • pregnancy (1) • pollution / eq(1) 	ignore illness / health	2

Question Number	Answer	additional guidance	Mark
3(b)	<p>A description that makes reference to three of the following</p> <ul style="list-style-type: none"> • count number of breaths per minute / number of breaths in stated time (at rest)/_ / eq (1) • breathing rate count per minute / number of breaths in stated time <u>after / during exercise</u> /eq (1) • repeat / using more participants /use group/ eq (1) • control age / sex / fitness of subjects / amount / period of exercise / eq (1) 	<p>allow use spirometer at rest for mp 1</p> <p>use spirometer after exercise for mp 2</p> <p>allow running increasing distances or durations of exercise for mp 1 and mp 2</p> <p>if measure heart rate can score mp 3 and 4 only</p>	3

total 11 marks

Question Number	Answer	additional guidance	Mark
4(a)(i)	<ul style="list-style-type: none"> • correct order of names (1) • correct shape (1) 	<p>(bottom) starting with producer / primary consumer/ secondary consumer / tertiary consumer ignoring shape</p> <p>pyramid shape ignoring order allow triangle pyramid</p>	2

Question Number	Answer	Additional guidance	Mark
4(a)(ii)	<p>an answer that makes reference to three of the following</p> <ul style="list-style-type: none"> • quadrat / use grid /eq (1) • random sample (1) • count (all) plants / producers / eq (1) • repeat / divide total sum of plants by area (1) 	<p>ignore organisms allow quadrats as ref to repeat mp 4</p>	3

Question Number	Answer	Additional guidance	Mark
4(b)(i)	<p>calculation</p> $2.40 \div 10.60 \times 100$ $= 22.6\% / 23\% (1)$	<p>allow 22.64 /22.642/22.6415 22.64151 etc</p>	1

Question Number	Answer	additional guidance	Mark
4 (b) (ii)	<p>An answer that makes reference to four of the following:</p> <ul style="list-style-type: none"> • fewer organisms at top of pyramid / eq (1) • less biomass/ dry mass at top of pyramid/ eq (1) • energy / biomass lost (at each transfer) / less energy / biomass transferred / not all energy/ biomass transferred/ eq (1) • most energy lost from producer to primary consumer / less energy/ less biomass transferred from producer to primary consumer /eq (1) • allow any two causes of energy loss (2) • movement / heat loss / respiration / metabolism • not all material digested / cellulose not digested / energy lost in faeces / energy present in faeces • not all organism eaten /eq • some energy excreted / in urine / eq • some organisms die / decomposed / eq 	<p>allow converse</p> <p>allow two from</p>	4

total 10 marks

Question Number	Answer	Mark
5 (a)(i)	<p>A description that makes reference to three of the following:</p> <ul style="list-style-type: none"> • W or stigma / feathery / large surface area / W stigma outside flower / exposed (to catch pollen)/eq (1) • X or anther outside flower/ exposed (to disperse pollen) / eq (1) • Y or filament long / hinged / not rigid / can move (to disperse pollen)/eq (1) 	3

Question Number	Answer	additional guidance	Mark
5 (a)(ii)	<p>An answer that refers to two of the following</p> <ul style="list-style-type: none"> • smaller / dull / green flowers /petals / no petals / eq (1) • no nectar/ nectary (1) • no scent / eq (1) • smaller / lighter / smooth pollen grains / more pollen produced (1) 	<p>allow converse for insect pollinated</p> <p>larger/ coloured /eq</p> <p>nectar/nectary</p> <p>scent</p> <p>larger / sticky / have hooks pollen grains/ less pollen produced</p>	2

Question Number	Answer	additional guidance	Mark
5 (b)	<p>An answer that makes reference to five the following:</p> <ul style="list-style-type: none"> • link between pollen number and symptoms /eq (1) • Person A allergic to tree pollen (only) / eq (1) • Person B allergic to (mainly) grass pollen / eq (1) • Person B <u>some / mild</u> allergy to tree <u>and</u> weed / eq (1) • Person C allergic to all pollen / tree <u>and</u> grass <u>and</u> weed/eq (1) • Person D no pollen allergy / eq (1) • Person E allergic to (mainly) grass <u>and</u> weed / eq (1) • Person E <u>some / mild</u> allergy to tree / eq (1) • no species level data / eq (1) • only one year / eq (1) 	allow hay fever/ allergic response/ for allergy	5

Question Number	Answer	additional guidance	Mark
5(c)	<p>An explanation that makes reference to two of the following</p> <ul style="list-style-type: none"> • response to antigens / pathogen / allergen / bacteria / virus /eq (1) • by white blood cells/ phagocytes / lymphocytes /eq (1) • antibodies produced / phagocytosis / engulf / eq (1) 	<p>if put phagocytes produce antibodies scores mp 2 only or lymphocytes engulf scores mp 2 only</p>	2

total 12 marks

Question Number	Answer	Mark
6(a)(i)	<p>The only correct answer is</p> <p>B M is the cell wall.</p> <p>A is not the answer as M is not the cell membrane</p> <p>C is not the answer as M is not the nucleus</p> <p>D is not the answer as M is not the vacuole</p>	1

Question Number	Answer	Mark
6(a)(ii)	<p>The only correct answer is</p> <p>C N is the cytoplasm.</p> <p>A is not the answer as N is not the cell membrane</p> <p>B is not the answer as N is not the cell wall</p> <p>D is not the answer as N is not the vacuole</p>	1

Question Number	Answer	Mark
6(b)(i)	<ul style="list-style-type: none"> sodium chloride (solution) / salt solution / bathing solution / eq (1) 	1

Question Number	Answer	additional guidance	Mark
6(b)(ii)	<p>An explanation that makes reference to four of the following</p> <p>in distilled water</p> <ul style="list-style-type: none"> • water enters cell / eq(1) • by osmosis (1) • from dilute solution to more concentrated solution / from high(er) water potential to low(er) water potential / water / outside has a higher water potential / eq (1) • cytoplasm pushed against cell membrane/ cell wall / eq (1) • cell is turgid / (1) 	<p>allow converse for cell in salt solution</p> <p>water exits</p> <p>allow as salt soln / outside has lower water potential</p> <p>allow high conc of water to low conc of water</p> <p>.cytoplasm /cell membrane shrinks away</p> <p>. cell plasmolysed / flaccid</p>	4

Question Number	Answer	additional guidance	Mark
6(c)	<p>A description that makes reference to four of the following</p> <ul style="list-style-type: none"> • (immerse) onion epidermis /rhubarb epidermis / named suitable plant tissues / leaf epidermis / eq (1) • same volume of solutions / stated volume of solutions /eq (1) • <u>at least two</u> different concentrations of salt solution / eq (1) • leave cells for stated time / same time / eq (1) • (observe / draw / photograph under) <u>microscope</u> / eq (1) 	<p>allow 'layer of onion' 'onion skin cells' 'rhubarb stem' <i>Cladophora</i> / / toadflax /eq</p> <p>not just leaf</p> <p>not just water and salt solution</p> <p>if describe potato discs expt can score mp 2 3 4 so 3 max</p>	4

total 11 marks

Question Number	Answer	Mark
7(a)(i)	<p>The only correct answer is</p> <p>A vessel U brings deoxygenated blood to heart</p> <p>B is not correct as V does not bring deoxygenated blood C is not correct as W does not bring deoxygenated blood D is not correct as X does not bring deoxygenated blood</p>	1

Question Number	Answer	Mark
7(a)(ii)	<p>The only correct answer is</p> <p>D chamber Z pumps oxygenated blood away from heart</p> <p>A chamber S does not pump oxygenated blood away B chamber T does not pump oxygenated blood away C chamber Y does not pump oxygenated blood away</p>	1

Question Number	Answer	additional guidance	Mark
7 (a)(iii)	<p>An explanation that makes reference to three the following:</p> <p>S</p> <ul style="list-style-type: none"> • thinner /eq (1) • less muscle /eq (1) <p>(muscle thinner scores MP 1 and MP 2)</p> <ul style="list-style-type: none"> • (generates) low / less pressure force /eq (1) • pumps blood to lungs / eq (1) 	<p>converse for Z</p> <p>chamber Z / left ventricle thicker /eq</p> <p>more muscle /eq</p> <p>(muscle thicker scores MP 1 and MP 2)</p> <p>(generates) high(er) pressure / force /eq</p> <p>ignore withstands high pressure</p> <p>pumps blood all around the body /eq</p>	3

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Question Number	Answer	additional guidance	Mark
7 (b)	<p>An explanation that includes 3 of</p> <ul style="list-style-type: none"> • carbohydrate for energy / energy store / respiration /eq (1) • protein for growth / repair / enzymes / eq (1) • fat / lipid for energy / energy store / insulation / respiration/ eq (1) • one named mineral and function (1) • one named vitamin and function (1) • fibre for peristalsis / move food through gut / eq (1) • water for solvent / medium for chemical reactions /constituent of cells / eq 	<p>eg Vitamin C develops connective tissue / prevents scurvy</p>	3

Question Number	Answer	additional guidance	Mark
7 (c)	<p>An explanation that includes 5 of</p> <ul style="list-style-type: none"> • large study / reliable / eq (1) • long term study / eq (1) • only in one place / country / population / eq (1) • (across all ages) increasing mass increases CHD/ eq (1) • heart attacks / CHD more common in older groups / eq (1) • if obese under 40 3 times as likely to have heart attack / CHD / greatest effect under 40 / eq (1) • up to 60 most likely to have heart attack if obese / eq (1) • in over 60 group more likely to have heart attack / CHD if normal or overweight / eq (1) • over 60 obese less likely to have heart attack / CHD/ eq (1) • other factors smoking / diet / exercise / stress / blood pressure / eq (1) • other factors genetics / sex / family / eq (1) 	allow converse	5

total 13 marks

Question Number	Answer	additional guidance	Mark
8 (a)(i)	<ul style="list-style-type: none"> • agouti (1) • all offspring are agouti / no offspring are black / as allele always expressed / shown / visible in all phenotype / expressed in heterozygous / black allele not expressed / /eq (1) 	<p>allow</p> <p>ignore passed on as black allele also passed on</p> <p>otherwise, all the black parents would need to be heterozygous and even then only 0.5 probability that each is black / eq (1)</p>	2

Question Number	Answer	additional guidance	Mark
8 (a)(ii)	<p>An answer that makes reference to two the following:</p> <ul style="list-style-type: none"> • parent genotypes Aa and Aa (1) • parent gametes (1) A or a A or a • offspring genotypes AA Aa aa (1) • offspring phenotypes labelled or ratio 3 : 1 (1) 	<p>allow from Punnett square</p> <p>allow other letters allow A and b</p> <p>eg</p> <p>Ab x Ab</p> <p>A or b A or b</p> <p>AA Ab bb</p> <p>ignore X and Y</p> <p>ECF max 2 for mp 2 gametes and mp 3 genotypes of offspring</p>	4

Question Number	Answer	additional guidance	Mark
8 (a)(iii)	<ul style="list-style-type: none"> probability of agouti / probability of male multiplied <p>$\frac{3}{8}$ or 0.375 or 37.5% (2)</p>	<p>allow full marks for correct answer no working</p> <p>1 mark for 0.5 or $\frac{1}{2}$ or 50%</p> <p>or 0.75 or $\frac{3}{4}$ or 75%</p>	2

Question Number	Answer	Mark
8 (b)(i)	polygenic (1)	1

Question Number	Answer	additional guidance	Mark
8 (b)(ii)	<p>An explanation that makes reference to three of the following:</p> <ul style="list-style-type: none"> more <u>adrenaline</u> produced / affects amount of <u>adrenaline</u> produced / eq (1) affects heart rate / fear response / fight or flight idea /eq (1) neurotransmitter levels affects <u>synapses</u> / eq (1) quicker reflex / reaction time / quicker response / more responsive / eq (1) 	allow converse for smaller adrenal and less neurotransmitter	3

Question Number	Answer	additional guidance	Mark
8 (c)	<p>An explanation that makes reference to three of the following:</p> <ul style="list-style-type: none"> iris does not block / blocks less light / eq (1) so pupil change / dilate / constrict has little / no effect / (iris) cannot regulate / control amount of light entering eye / eq (1) <u>too much</u> light / <u>more light</u> enters eye / falls on retina / eq (1) poor vision / damages retina / (goes) blind / eq (1) 	not just iris lets light through	3

total 15 marks

Question Number	Answer	additional guidance	Mark
9 (a)	<p>A description that makes reference to three of the following points</p> <ul style="list-style-type: none"> cross / breed / mate / allow to self- pollinate parent plant(s) with (grains) with highest mass / yield / desired characteristics / eq (1) select <u>offspring</u> plants with (grains) with highest mass / yield / desired characteristics / eq(1) repeat for more / many generations / eq (1) 		3

Question Number	Answer	additional guidance	Mark
9 (b)(i)	<ul style="list-style-type: none"> • Scale half grid and linear (1) • Lines straight and through all points (1) • Axes correct way round (1) • Points correctly plotted within half a small square (1) • Units (yield in) tonnes per hectare (1) 	<p>allow y axis starting at 1 or 2 etc</p> <p>yield on y</p> <p>No P if extrapolate yield to 0</p> <p>bar chart just loses L</p>	5

Question Number	Answer	additional guidance	Mark
9 (b)(ii)	$6.7 - 2.8 = 3.9$ $3.9 \div 2.8 \times 100 = 139.3\% \text{ in } 60 \text{ years}$ $139.3 \div 60 = 2.3\% \text{ per year (3)}$	<p>1 mark for 3.9 / 1.39 / 139 / 139.3 / 139.29 / etc</p> <p>1 mark for $\div 60$</p> <p>3 marks for correct answer no working</p> <p>allow 2.32 2.321 2.3214 2.32143 etc</p>	3

Question Number	Answer	Mark
9(b)(iii)	<p>An explanation reference to three of the following points:</p> <ul style="list-style-type: none"> • less energy used to grow tall / eq (1) • more energy available for grain/ eq (1) • higher yield / harvest / more grain(s) / grains heavier / eq (1) • less likely to fall over / less likely to be damaged by wind and rain / eq (1) • easier to harvest / eq (1) 	3

total 14 marks

Question Number	Answer	additional guidance	Mark
10	<p>C use plants with different coloured flowers / (1)</p> <p>O of same species / size / shape / (of flower) eq (1)</p> <p>R repeat each colour (1)</p> <p>M1 count / see how many insects land on / visit flower / eq (1)</p> <p>M2 in a stated time / eq (1)</p> <p>S1 same scent / nectar / use paper flowers / same location/ temperature /sunlight / same season /same time of day /eq (1)</p> <p>S2 same number of / same insects / bees / pollinators / same distance from hive / eq (1)</p>	<p>ignore colour of <u>plant</u> once</p>	6

total 6 marks