Pearson Edexcel

Mark Scheme (Provisional)

Summer 2021

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

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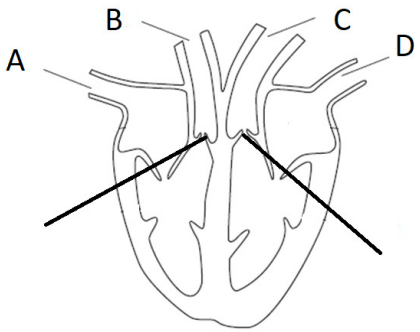
<table>
<tr><th>Question Number</th><th>Answer</th><th>Mark</th></tr>
<tr><td>1(a)</td><td>
<table>
<tr><th>Value</th><th>Apparatus</th></tr>
<tr><td>magnification of a red blood cell</td><td>microscope</td></tr>
<tr><td>heat produced by germinating seeds</td><td>thermometer / temperature probe / data logger/eq (1)</td></tr>
<tr><td>surface area to volume ratio of a potato chip</td><td>ruler /eq (1)</td></tr>
<tr><td>breathing rate of a human</td><td>clock / watch / timer / spirometer /eq (1)</td></tr>
<tr><td>volume of gas produced by yeast in anaerobic respiration</td><td>syringe / measuring cylinder / respirometer/ eq (1)</td></tr>
</table>
</td><td>4</td></tr>
</table>

Question Number	Answer	additional guidance	Mark
1(b)	• width of cell = 5.3 cm • width of cell = in 53 000 µm ÷ 8 = 6625 6250 to 6750	**5.0 – 5.4 cm** **allow full marks for answer alone** allow 1 mark for dividing by 8	**2**

Total 6 marks

Question Number	Answer	Mark
2(a) (i)	**The only correct answer is D** A is not correct as it does not bring oxygenated blood to heart B is not correct as it does not bring oxygenated blood to heart C is not correct as it does not bring oxygenated blood to heart	**1**

Question Number	Answer	Mark
2(a) (ii)	**The only correct answer is C** A is not correct as it does not contain blood with the highest pressure B is not correct as it does not contain blood with the highest pressure D is not correct as it does not contain blood with the highest pressure	**1**

Question Number	Answer	additional guidance	Mark
2(b) (i)		allow other forms of indication of location	**1**

Question Number	Answer	additional guidance	Mark
2(b)(ii)	A description that makes reference to the following points: • prevent backflow of blood /one way flow /eq (1) • (from arteries) into <u>ventricle/ ventricles</u> (1)	back into heart =mp1	**2**

Question Number	Answer	Mark
2(c)(i)	An explanation that makes reference to the following points: • so that oxygenated and deoxygenated blood do not mix / as left hand side now contains oxygenated blood from lungs / eq (1) • so that oxygenated blood can be pumped around body / so deoxygenated blood does not go round body / so oxygenated blood does not go to lungs / eq (1)	**2**

Question Number	Answer	Mark
2(c)(ii)	An explanation that makes reference to three of the following points: • may appear blue / lack colour / not survive / shortness of breath/ eq (1) • as less oxygen (transported from heart to body) / deoxygenated blood goes to body / eq (1) • less (aerobic) respiration (1) • less energy / less ATP/ eq (1)	**3**

Total = 10 marks

Question Number	Answer	Mark
3(a)	A description that makes reference to four of the following points: • boil leaf in water / eq (1) • boil in <u>ethanol</u> (to remove chlorophyll) (1) • hot water bath / kettle / turn off Bunsen / eq (1) • soak in water (to rehydrate / allow diffusion) (1) • add iodine solution (1) • <u>blue black</u> / eq (leaf uncovered) <u>starch present</u> / <u>yellow / eq</u> <u>no starch</u> (leaf covered) (1)	**4**

Question Number	Answer	additional guidance	Mark
3(b)(i)	An answer that makes reference to four of the following points: • increasing carbon dioxide increases rate /eq (1) • CO_2 required / substrate (for photosynthesis)/ eq (1) • greater higher (in rate) at high light intensity / eq (1) • light required / provides energy for photosynthesis/ eq (1) • increase is same from 0.00 to 0.02 / first two readings / eq (in both light intensities) (1) • levelling at (high light intensity) due to temperature / number of chloroplasts / amount of chlorophyll/ eq (1)	correct ref to CO_2 limiting factor allow converse light limiting/ eq factor ref to temperature limiting factor	**4**

Question Number	Answer	Mark
3(b)(ii)	An answer that makes reference to one of the following points: • use more bulbs / change bulb / wattage / use dimmer / filters / eq (1) • change distance (1)	**1**

Question Number	Answer	Mark
3(b)(iii)	• (number of) bubbles (per minute) / rate of photosynthesis / rate of oxygen production / eq	**1**

Question Number	Answer	Mark
3(b)(iv)	• same type / species / mass / number of leaves / length / size same piece of plant / eq	**1** **Grad**

Total = 11 marks

Question Number	Answer	Mark
4(a)(i)	**The only correct answer is C chitin glycogen** A is not correct as it is not cellulose and glycogen B is not correct as it is not cellulose and starch D is not correct as it is not chitin and starch	**1**

Question Number	Answer	Mark
4(a)(ii)	**The only correct answer is B fungus** A is not correct as it is not a bacterium C is not correct as it is not a plant D is not correct as it is not a protoctist	**1**

Question Number	Answer	Mark
4(b)(i)	**Only correct answer is B glucose → ethanol + carbon dioxide** A is not correct as it is not the correct equation C is not correct as it is not the correct equation D is not correct as it is not the correct equation	**1**

Question Number	Answer	additional guidance	Mark
4(b)(ii)	• restriction / endonuclease / ligase (1)	allow correctly named endonuclease	**1**

Question Number	Answer		Mark
4(b)(iii)	• contains new DNA / new gene / foreign DNA / foreign gene / altered genes / DNA from other organism/ DNA from other species / gene from other organism / gene form other species / contains gene for digesting cell walls / contains gene for digesting cellulose / gene for cellulase / eq /		**1**

Question Number	Answer		Mark
4(b)(iv)	An answer that makes reference to two of the following points: • less burning of fossil fuels / eq (1) • less carbon dioxide in air / carbon neutral / plants use CO_2 (in photosynthesis) / eq (1) • less trapping of heat / less greenhouse effect / eq (1) • uses renewable resource (1)	allow named fossil fuel	**2**

Question Number	Answer	Additional guidance	Mark
4(c)(i)	• 2.2 – 1.25 = • 0.95 ÷ 1.25 = 0.76 • × 100 = 76% (2)	award full marks for correct numerical answer without working allow 2.2 -1.3 =0.9 0.9÷1.3 = 0.69 ×100 = 69% allow 2.2 – 1.2 =1 1÷ 1.2= 0.8 0.8×100 = 80% allow 1 mark for dividing by mass of normal yeast / 1.2 to 1.3 percentage between 69 and 80 (2)	**2**

Question Number	Answer	additional guidance	Mark
4(c)(ii)	An answer that makes reference to two of the following points: • running out of glucose / food / eq (1) • (build-up of) ethanol (1) • yeast cells die (1)	allow one mark for oxygen becomes available ethanol kills the yeast = mp2 and mp3	**2**

Total 11 marks

Question Number	Answer	additional guidance	Mark
5(a)	An answer that makes reference to three of the following points: • quadrat (1) • repeat (1) • random / using coordinates / eq (1) • count / how many / amount / number /eq (1) • divide total /eq (count) by (area / number of) quadrats /eq (1)	use quadrat**s** scores mp1 and mp 2	**3**

Question Number	Answer	additional guidance	Mark
5(b)	An answer that makes reference to five of the following points: • BC numbers decline slower / CC numbers lower at start / February / eq (1) • CC numbers lower in some / April/ June / August / stated months /eq (1) • BC numbers are (overall) lower / eq (1) • BC stays low / less variable / CC go up and down / eq (1) • BC no need to reapply / insects reproduce / eq (1) • BC less risk of pollution / eq (1) • BC less risk of resistance /eq (1) • BC is specific / not affect (other) food chains /eq (1) • BC no bioaccumulation / eq (1) • BC could become pest /eq(1)	allow converse allow biomagnification	**5**

Total = 8 marks

Question Number	Answer	Mark
6(a)	The only correct answer is C the organisms of all species in a habitat A is not correct as is not a community B is not correct as is not a community D is not correct as is not a community	**1**

Question Number	Answer	Additional guidance	Mark
6(b)(i)	• $1.5 \times 10^4 = 15\,000$ • $2.5 \div 15\,000 =$ • 1.7×10^{-4} (3)	award full marks for correct numerical answer without working 1 mark for $2.5 \div 15000$ or $2.5 \div 1.5 \times 10^4$ 2 marks for 0.00017 2 marks for 17×10^{-5} allow $1.67 \times 10^{-4} = 3$ allow 1.66 recurring $\times 10^{-4} = 3$	**3**

Question Number	Answer	additional guidance	Mark
6(b)(ii)	• correct order / names (1) • correct pyramid / shape / eq (1)	ignore shape ignore names	**2**

Question Number	Answer	additional guidance	Mark
6(c)(i)	An explanation that makes reference to the following points: • undigested / not absorbed / waste / faeces / not assimilated / eq (1) • contains energy / cellulose (1)	cellulose not digested = 2 marks energy trapped in faeces = 2 marks	**2**

Question Number	Answer	Mark
6(c)(ii)	An answer that makes reference to two of the following points: • respiration / heat loss (1) • movement / eq (1) • uneaten / die / not consumed /eq (1) • excretion (1)	**2**

Total 10 marks

Question Number	Answer	Mark
7(a)	• <table><tr><th>Individual</th><th>Genotype</th></tr><tr><td>P</td><td>Dd (1)</td></tr><tr><td>Q</td><td>Dd (1)</td></tr><tr><td>R</td><td>Dd</td></tr><tr><td>S</td><td>dd (1)</td></tr></table>	**3**

Question Number	Answer	Mark
7(b)	1/8 / 0.125 / 12.5%	**1**

Question Number	Answer	Mark
7(c)	An answer that makes reference to four of the following points: • greater increase in testosterone in R / smaller increase in S /eq (1) • R male / S female / eq (1) • greater increase in oestrogen in S / less increase in R / eq (1) • more muscle / deeper voice / beard in R/ eq (1) • wider hips / breasts / in S (1) • body hair / growth spurt / eq (1) • gamete / sperm / egg production / start to menstruate (1) • <u>secondary sexual characteristics</u> (1)	**4**

Total 8 marks

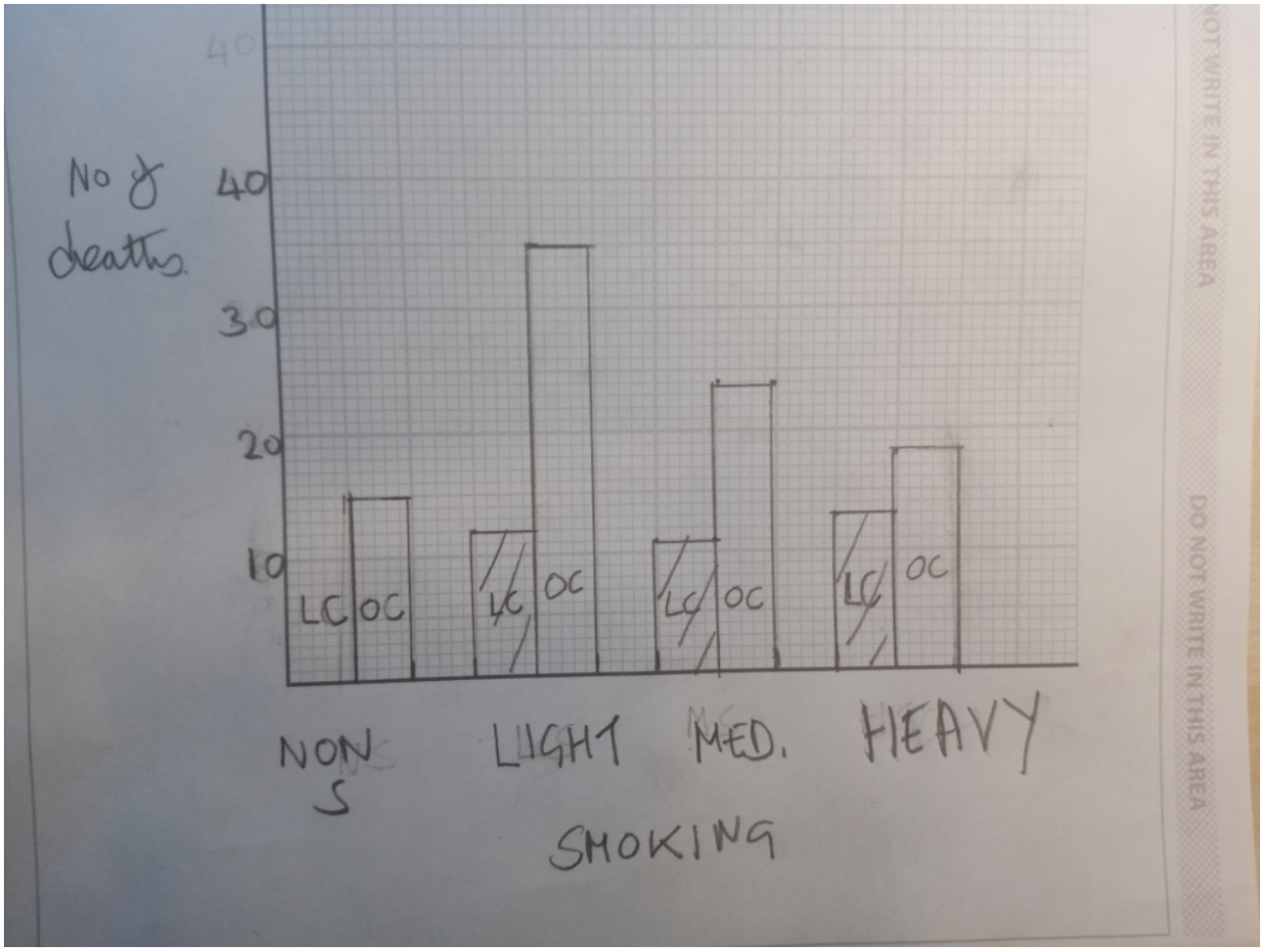
Question Number	Answer	additional guidance	Mark
8(a)	• Fat more in cow's / eq (1) • Fat could lead to obesity / too many kJ calories / eq (1) • Protein more in in cow's / eq (1) • Minerals more in cow's / eq (1) • Carbohydrate less in cow's / eq (1) • (too little carbohydrate in cow's) so not enough (quick) energy (1) • Vitamins similar / same (1) • Water the similar / same (1) • Antibodies no (human antibodies) in cow's (1) • Antibiotics in cow's (1)	allow converse for mp 1,3,4, 5, 9 and 10 allow 'too much' allow 'too much' allow 'too much' allow 'too little in cows '	**6**

Question Number	Answer	additional guidance	Mark
8(b)	An answer that makes reference to two of the following points: • (exposure to) sun(light) (1) • named source of vitamin D such as cod-liver oil / oily fish – such as salmon, sardines, herring and mackerel / red meat /liver /eggs / fortified foods – such as most fat spreads and some breakfast cereals (1) • add drops / use supplement / eq (1)	give cod-liver oil (tablets) = mp 2 and 3	**2**

Question Number	Answer	additional guidance	Mark
8(c)	An answer that makes reference to the following points: • Add biuret (1) • If protein present turns purple / lilac (1)	allow / uristix / clinistix /protein test sticks mp 1 and stated colour change mp 2	**2**

Total = 10

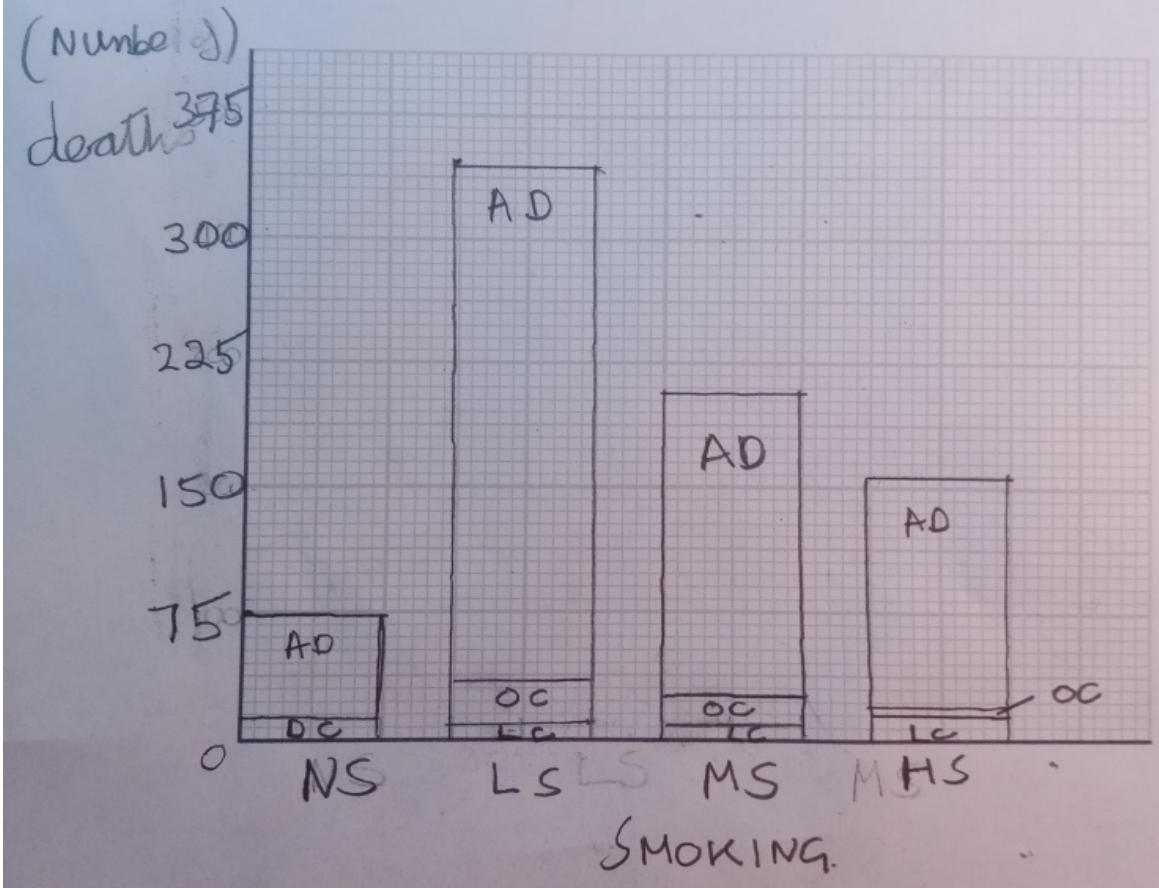
Question Number	Answer	Additional guidance	Mark
9(a)(i)	An answer that makes reference to 5 of the following points: • S y axis scale linear and half the grid (1) • A 2 y axis labelled (number of) deaths (1) • P bars plotted correctly within one (1) • K 1 non- smoker / light/ medium /heavy labelled key shown (1) • K2 labelled lung / other cancer (1)	allow stacked bar chart for LC and OC or LC OC and All line graph scores 4 max	**5**



lung cancer	0	12	11	13	36
other cancers	15	35	24	18	92
all deaths	82	345	206	157	790

(a) (i) Plot a bar chart to show the number of deaths from lung cancer and from other cancers for each of the four groups.

(5)



AD all
OC other C.
LC lung C.

Question Number	Answer	Additional guidance	Mark
9(a)(ii)	• percentage of deaths due to lung cancer in heavy = 13/157 x 100 = 8.3% • percentage of deaths caused by lung cancer in light smokers = 12/345 x 100 =3.5% • difference = 4.8% (3)	Allow 1 mark for 8.3 or 8.28/etc Allow 1 mark for 3.5 or 3.48/etc Allow full marks for 4.8%/ 4.802 etc	**3**

Question Number	Answer	additional guidance	Mark
9(b)	An explanation that makes reference to two of the following • as age increase higher incidence of cancers /eq (1) • as cells more likely to mutate /eq (1) • smoked for longer period / eq (1) • weak immune system / eq(1)	eg 'old people get more cancer'	**2**

Question Number	Answer	additional guidance	Mark
9(c)	An explanation that makes reference to one pair of the following • causing CHD / heart disease / heart attack / blood clots /eq (1) • due to narrowing / blocking of arteries / blood vessels / damage to artery lining /blood vessels lining/ eq (1) OR • bronchitis / pneumonia/ emphysema / lung infection / shortness of breath / eq(1) • due to damage to alveoli / reduces SA / damages cilia / build-up of mucus / prevents removal of mucus (1) OR • affects oxygen transport / shortness of breath / eq (1) • due to carbon monoxide binding to Hb /eq (1)	ignore veins second point must match first to score 2 ignore 'cough(ing)' can get second point without first eg smoking causes build-up of mucus	**2**

Total = 12 marks

Question Number	Answer	Mark
10(a)	• homeostasis (1)	**1**

Question Number	Answer	additional guidance	Mark
10(b)	An answer that makes reference to 4 of the following points. • receptors in skin surface detect stimulus / are stimulated /(1) • impulse (1) (once) • sensory neurone to relay neurone / CNS / eq (1) • via diffusion of neurotransmitters / eq (1) (once) • synapse (1) (once) • motor neurone to muscle / effector (1) • effector/ muscle contracts eq (1)	allow action potential ignore message / signal eq	**4**

Question Number	Answer	Mark
10(c)(i)	An explanation that makes reference to the following points. • less sweat released /eq (1) • less (sweat) evaporates / less cooling / less heat loss /eq (1)	**2**

Question Number	Answer	additional guidance	Mark
10(c)(ii)	An explanation that makes reference to 3 of the following points. • B / blood vessels (to surface) constrict / vasoconstriction / eq (1) • less blood flows (to skin surface) / eq (1) • less heat loss / heat conserved /eq (1) • less convection / radiation (1)	allow converse ignore capillaries constrict more blood away from surface / eq	**3**

Question Number	Answer	Mark
10(d)	An explanation that makes reference to 4 of the following points. • variation in amount of body hair / eq (1) • caused by mutation (1) • less hair increased heat loss / can lose heat in sun / warm / hot climate / chase animals / started to wear clothes / eq (1) • survive and reproduce (1) • pass on alleles / genes to offspring (1)	**4**

Total = 14 marks

Question Number	Answer	Mark
11(a)(i)	An explanation that makes reference to 3 of the following points. • (sulfur dioxide) released dissolves in water (vapour) (1) • forms sulfuric acid (1) • acid rain (1) • causes damage to plants / deforestation / eq (1) • breathing problems for humans / animals / eq (1) • death of fish /aquatic organisms / eq (1)	**3**

Question Number	Answer	additional guidance	Mark
11(a)(ii)	• less burning / use of fossils fuels / named fossil fuel / low sulfur fuel / named example of alternative to using fossil fuels / eq (1)	allow examples use public transport / use wind power / cycling / electric/hybrid vehicles / etc	**1**

Question Number	Answer	additional guidance	Mark
11(b)	An answer that makes reference to 6 of the following points. • C with and without HCO_3 / changes concentrations of HCO_3 (1) • O use same species / age / size / strain / type of seedling /eq (1) • R repeat (for each concentration of HCO_3) (1) • M1 measure / yield / height / mass / count number of leaves / number of plants that germinate / eq (1) • M2 after <u>stated time</u> 48 hours + (1) • S1 control light / CO_2 / temperature /eq (1) • S2 control compost / water / humidity / moisture /minerals / fertiliser/ volume of solution / eq (1)	not just same time for M2	**6 Exp**

Total = 10

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