Pearson Edexcel

Mark Scheme (Results)

January 2025

Pearson Edexcel International Advanced Subsidiary Level In Biology (WBI11)
Paper 01 Molecules, Diet, Transport, and Health

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January 2025
Question paper log number P78442A
Publications Code WBI11_01_2501_MS
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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	Mark
1(a)	The only correct answer is **C** *A is incorrect as statement 1 is wrong as hydrogen bonds do not join the O and H* *B is incorrect as statement 1 is wrong as hydrogen bonds do not join the O and H* *D is incorrect as statement 1 is wrong as hydrogen bonds do not join the O and H*	(1)

Question number	Answer	Mark
1(b)		(3)

Structure	Structure found in			
	amylose only	amylopectin only	both amylose and amylopectin	neither amylose nor amylopectin
glycosidic bonds	[x]	[x]	[x]	[x]
1-4 α bonds	[x]	[x]	[x]	[x]
branched side chains	[x]	[x]	[x]	[x]

Question number	Answer	Additional guidance	Mark
1(c)	• peptide bond drawn correctly	 **ACCEPT** O on the C and H on the N facing up or down	**(1)**

Question number	Answer	Additional guidance	Mark
2(a)	An answer that includes two of the following points: • cells that are {dividing / multiplying} out of control (1) • caused by a {mutation / change in (DNA) base sequence} (1) • cells can break off (from some cancers) / and spread {through the body / to other tissues} (1)	**ACCEPT** rapid cell division / mitosis no Hayflick's limit **IGNORE** growth **ACCEPT** tumour suppressor gene / proto-oncogene **ACCEPT** not functioning properly apoptosis inhibited metastasis secondary tumour forming	**(2)**

Question number	Answer	Additional guidance	Mark
2(b)(i)	An answer that includes three of the following points with at least one similarity and one difference: Similarities: • highest cause of death is lung and bronchus in both (1) • lowest cause of death is pancreas in both (1) • lung and bronchus cause the same number of deaths in both (1) Differences: • deaths from all cancers, except lung and bronchus, are higher in ethnic group 2 (1) • more people died of cancer in group 2 (than group 1) (1)	**DO NOT PIECE TOGETHER** **NB** responses must refer to {deaths / data} not height of bars **ACCEPT** similar **ACCEPT** {prostate / colon and rectum / breast / pancreas} are higher in group 2 converse for group 1 **ACCEPT** converse for group 1	**(3)**

Question number	Answer	Mark
2(b)(ii)	The only correct answer is D *A is incorrect as statement 1 is wrong as (47-18) ÷ ((47+18)÷2) x 100 = 89.23* *B is incorrect as statement 1 is wrong as (47-18) ÷ ((47+18)÷2) x 100 = 89.23* *C is incorrect as statement 1 is wrong as (47-18) ÷ ((47+18)÷2) x 100 = 89.23*	(1)

Question number	Answer	Additional guidance	Mark
2(b)(iii)	• 20 per hundred thousand / 2 x / 2.1 x / twice as many (1)	**IGNORE** 2 / 2.1	(1)

Question number	Answer	Additional guidance	Mark
2(b)(iv)	An answer that includes the following points: • (not very useful) as cancers cause different numbers of deaths in different (ethnic) groups (1) • (useful) if you are not in one of these (ethnic) groups as you get an idea of the effects of the different cancers (overall) (1)	**ACCEPT** other factors / named factors involved **ACCEPT** useful (to professionals) to focus on {highest causes of cancer / screening programmes / health initiatives}	**(2)**

Question number	Answer	Mark
3(a)(i)	The only correct answer is **D** ***A** is incorrect because fibrinogen is in the plasma* ***B** is incorrect because prothrombin is in the plasma* ***C** is incorrect because thrombin is formed from prothrombin which is in the plasma*	**(1)**

Question number	Answer	Mark
3(a)(ii)	The only correct answer is **C** ***A** is incorrect because fibrinogen is not an enzyme, and prothrombin is a precursor enzyme* ***B** is incorrect because prothrombin is a precursor enzyme* ***D** is incorrect because prothrombin is a precursor enzyme*	**(1)**

Question number	Answer	Mark
3(a)(iii)	The only correct answer is **A** ***B** is incorrect because fibrinogen is soluble* ***C** is incorrect because prothrombin is soluble* ***D** is incorrect because thromboplastin is soluble*	**(1)**

Question number	Answer	Additional guidance	Mark
3(b)	An answer that includes three of the following points: • blood clot (in pulmonary artery) {prevents / reduces} (deoxygenated) blood reaching lungs (1) • so blood will {not become oxygenated / contain less oxygen} (1) • therefore there will {not be enough / less} oxygen supplied to the {cells / tissues} (1) • difficulty in breathing due to body trying to increase gas exchange (1) • rapid heart rate to pump more {(oxygenated) blood / oxygen} {around the body / to the cells} (1)	**ACCEPT** less gas exchange **ACCEPT** named cell / tissue e.g. heart tissue **IGNORE** body **ACCEPT** increase {oxygen uptake / removal of carbon dioxide} **ACCEPT** named cell / tissue e.g. lungs	**(3)**

Question number	Answer	Additional guidance	Mark
3(c)	An answer that includes three of the following points: • (would be useful) if we could find a way to {block / breakdown} HSP47 (1) • (reduced HSP47) would {prevent / reduce risk of} {DVT / thrombus / blood clotting} (1) • and therefore reduce risk of {pulmonary embolism / CVD / CHD} (1) • may not have the {side effects / named side effect} of current {anticoagulants / platelet inhibitors} (1) • HSP47 {may not be present in humans / may be species specific} (1)	**ACCEPT** {find a way to reduce HSP47 / reduce synthesis of HSP47 / modify HSP47 gene} using HSP47 to increase blood clotting process in e.g. surgery, haemophilia **ACCEPT** description of blood clotting process being reduced **ACCEPT** may cause side effects e.g. prevent blood from clotting, excessive bleeding	**(3)**

Question number	Answer	Additional guidance	Mark
4(a)	A description that includes the following points: • CVD includes all diseases affecting heart and blood vessels (1) • CHD is when the coronary artery is {blocked / affected (only)} (1)	 **ACCEPT** (whole) circulatory system **IGNORE** cardiovascular system **ACCEPT** atheroma in the CA **DO NOT ACCEPT** heart / blood vessels	**(2)**

Question number	Answer	Additional guidance	Mark
4(b)(i)	• 25 / 25.0 / 24.98	**DO NOT ACCEPT** 24.97 any other values	**(1)**

Question number	Answer	Additional guidance	Mark
4(b)(ii)	• 0.8 / 0.84 / 0.842 (:1)	**DO NOT ACCEPT** any other values	**(1)**

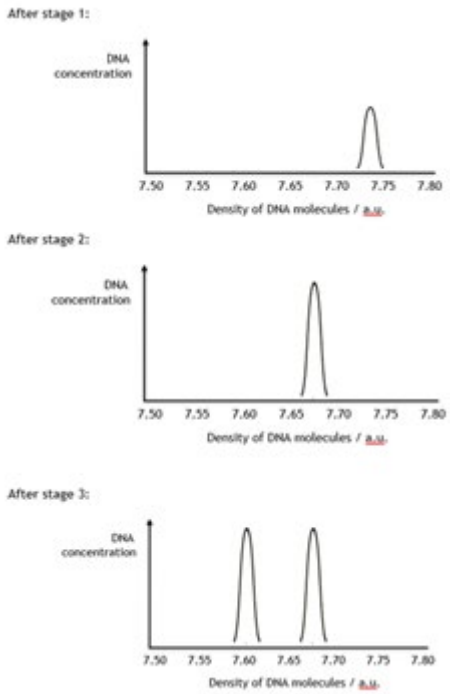
Question number	Answer	Additional guidance	Mark
4(c)(i)	An explanation that includes two of the following points: • (high blood pressure could) damage the {endothelial lining / endothelial cells / lining of the blood vessels} (1) • which would cause {an inflammatory response / inflammation} (1) • therefore {cholesterol may accumulate (in the blood vessel) / formation of blood clots} (1)	**IGNORE** walls of blood vessels **ACCEPT** white blood cells accumulate in the damaged area **ACCEPT** {plaque / atheroma} may form **IGNORE** atherosclerosis	**(2)**

Question number	Answer	Additional guidance	Mark
4(c)(ii)	An answer that includes **two** of the following: diet / {salt / fibre / fats / cholesterol} (intake) exercise family history / genetic predisposition / genetics (of CVD / CHD) other diseases smoking alcohol (intake) ethnicity sex / gender age	e.g. diabetes	**(1)**

Question number	Answer	Additional guidance	Mark
4(c)(iii)	An answer that includes three of the following points: • suitable comment about BMI and CVD (1) • suitable comment about WHR and CVD (1) • suitable comment about BMI and CHD (1) • suitable comment about WHR and CHD (1) • (overall graphs show) WHR more useful (than BMI) (1) • not useful as no {error bars / indication of sample size / other factors affect risk} (1)	e.g. only useful in men (above 24.9 / 29.9) only useful in women above 39.9 limited in women as no correlation e.g. correlation in (men / women) (more) useful in {men / women} above 0.79 e.g. limited use in women as no correlation useful in men above 24.9 not useful in men with higher BMI as no data e.g. correlation (overall) in {men / women} (more) useful in women above 0.79 (more) useful in men above 0.79	**(3)**

Question number	Answer	Additional guidance	Mark
5(a)	An answer that includes the following points: • (semi-conservative) one {original / parent} strand retained (in each molecule) (1) • (replication) more DNA (molecules) is produced / two new molecules made (1)	**ACCEPT** (in each new molecule) there is one old strand and one new strand **NB** both new molecules have one old strand and one new strand = 2 marks	**(2)**

Question number	Answer	Additional guidance	Mark
5(b)	A description that includes two of the following points: • adds nucleotides to each (new) DNA strand / {assembles / lines up} nucleotides (against the old strand / in new strand) (1) • forms phosphodiester bonds between (DNA) nucleotides (1) • repairs {damage / mistakes} in DNA (1)	**ACCEPT** description e.g. corrects wrong bases proofreading	**(2)**

Question number	Answer	Additional guidance	Mark
5(c)	An answer that includes the following points: after stage 1: • one peak at 7.74 (1) after stage 2 • one peak at 7.67 (1) • peak approx. twice height as after stage 1 peak (1) **NB** award if both peaks twice the height if two peaks shown after stage 3: • two peaks (1) • one at 7.60 and the other at 7.67 (1) **NB** award one of correct values plotted if only one peak has been shown correctly • both peaks approx. twice height as stage 1 (1) **NB** award if only one peak has been shown	**IGNORE** widths of curves 	**(6)**

Question number	Answer	Additional guidance	Mark
6(a)	A description that includes the following points: • increase death rate (with increase in cholesterol) in all countries (except Japan) (1) • increase is greater in United States (and Northern Europe) (1) • death rate higher in Northern Europe (and United States) (1)	**ACCEPT** positive correlation **ACCEPT** converse for Mediterranean (and Japan) **ACCEPT** death rate lowest in Japan (and Mediterranean)	**(2)**

Question number	Answer	Additional guidance	Mark
6(b)(i)	**Two** from: headache pins and needles hair loss acne allergic reaction / rash / hives dizziness / low blood pressure memory loss / confusion feeling sick / nausea / vomiting feeling unusually tired / fatigue / physically weak stomach pain digestive system problems, such as constipation, diarrhoea, indigestion or farting loss of appetite (type II) diabetes impotence muscle {pain / tiredness / weakness / damage} joint {pain / swelling} tendon problems sleep problems low blood platelet count / risk of (excessive) bleeding liver damage / hepatitis / yellowing of {eyes / skin} / dark-coloured urine / problems kidney failure / damage / problems		(1)

Question number	Answer	Additional guidance	Mark
6(b)(ii)	An explanation that includes two of the following points: • more {LDL / LDL-cholesterol} will attach to {liver cells / (liver cell) membrane} (1) • therefore more will be {enclosed inside the (membrane) vesicle / (taken) inside the (liver) cell} (in endocytosis) (1)		**(2)**

Question number	Answer	Additional guidance	Mark
6(c)(i)	• total number of people calculated as 67 500 000 (1) • 6.8×10^7 / 6.75×10^7 / 6.750×10^7 (1)	ECF if magnitude wrong in the product using the correct values Bald answer of 6.8×10^7 / 6.75×10^7 = 2 marks Bald answer of 67 500 000 / correct value but incorrect standard form = 1 mark	**(2)**

Question number	Answer	Additional guidance	Mark
6(c)(ii)	An answer that includes two of the following points: • because statins work by increasing the synthesis of (LDL-)receptors (1) • a homozygous individual will have mutations in <u>both</u> their alleles coding for (LDL-) receptors (1) • therefore no {mRNA / genetic code / instructions} for making the (correct) {receptor / (receptor) protein} (1) • LDL will not be able to bind {to liver cells if no receptor / receptors if wrong shape} (1)	**ACCEPT** genes (on each chromosome) homozygous individual will have both alleles that are {the same / recessive / dominant} (in LDL-receptor genes) **ACCEPT** fewer receptors for no receptors	**(2)**

Question number	Answer	Additional guidance	Mark
6(c)(iii)	An answer that includes the following points: • the {antisense strand of DNA / the drug} will bind to the (apo B) mRNA (1) • preventing translation (so no apo B protein synthesised) (1) **OR** • transcription of this {DNA / drug} (then translation) will result in a {shortened / different} apo B (protein) (1) • which will {not function properly / less effective / dilute the normal apo B (proteins)} (1)	**ACCEPT** description of translation **ACCEPT** description of transcription (shorter) mRNA produced so shorter protein	**(2)**

Question number	Answer	Additional guidance	Mark
7(a)	An explanation that includes the following points: • non-polar solute can cross the membranes because lipid is non-polar (1) • polar molecules cannot cross the membrane because they {cannot interact with the non-polar lipid / cannot dissolve in the non-polar lipid / are repelled by the non-polar lipid} (1)	**ACCEPT** hydrophobic phospholipid / fatty acid tails soluble in the lipid **ACCEPT** hydrophilic / hydrophobic phospholipid / fatty acid tails insoluble in the lipid **NB** one is polar (cannot cross) and one is non-polar (can cross) = 1 mark if no correct explanation given	(2)

Question number	Answer	Additional guidance	Mark
7(b)	An explanation that includes two of the following points: • because phospholipids have non-polar {tails / fatty acids} (and polar heads) (1) • the tails will orientate themselves away from the aqueous environment on {each side / both sides} of the membrane (1) • a bilayer is (the only) {stable / appropriate} arrangement (1)	**ACCEPT** hydrophilic and hydrophobic **ACCEPT** water repelled by water	(2)

Question number	Answer	Additional guidance	Mark
7(c)	An answer that includes two of the following points: • saturated or unsaturated (phospholipids / fatty acids) (1) • number of {saturated / unsaturated} fatty acids (1) • number of {carbon carbon / CC} double bonds (1) • length of (fatty acids / hydrocarbon chains / tails) (1) • some are attached to {carbohydrates / proteins} (1)	**ACCEPT** some contain CC double bonds some do not / some are kinked and some are straight / have different ratios of C : H **ACCEPT** number of carbons (in tail) **IGNORE** different size / bigger side chain	**(2)**

Question number	Answer	Additional guidance	Mark
7(d)	An explanation that includes the following points: • channel proteins and protein {pumps / carriers} present (1) • proteins need to span the membrane to transport substances across it (1) • because channel proteins needed for (facilitated) diffusion (1) • protein {pumps / carriers} to actively transport molecules (across the membrane) (1)	**ACCEPT** carrier proteins	**(2)**

Question number	Answer	Additional guidance	Mark
7(e)	• actual thickness and measured thickness given in same units for thickness measurements of {5 / 5.5 / 6} mm • magnification given to two significant figures 220 000 / 2.2×10^5 240 000 / 2.4×10^5 260 000 / 2.6×10^5	22.8 nm and 5 000 000 / 5 500 000 / 6 000 000 nm 0.0000228 mm and 5 / 5.5 / 6 mm Bald answer of 220 000 / 2.2×10^5 / 240 000 / 2.4×10^5 / 260 000 / 2.6×10^5 = 2 marks of these three values given in wrong standard form to 2 sig figs = 1 mark of these three values to wrong order of magnitude but correctly presented = 1 mark	**(2)**

Question number	Answer	Additional guidance	Mark
7(f)	An explanation that includes the following points: • (fluid) because the phospholipids (and proteins) can move (within the {membrane / bilayer}) (1) • (mosaic) because the proteins are {scattered / embedded / randomly distributed} (throughout the {membrane / phospholipids}) (1)	**IGNORE** monolayer **ACCEPT** named proteins e.g. channel proteins **IGNORE** cholesterol	**(2)**

Question number	Answer	Additional guidance	Mark
8(a)	An explanation that includes four of the following points: • substitution mutation results in {base / nucleotide} being {replaced / swapped / changed with another} (1) • (substitution mutation) could affect one amino acid (1) • change {in one amino acid / in glycine} could affect {triple helix / collagen secondary structure / collagen tertiary structure} (1) • H bonds would not form / fewer H bonds would form (1) • {H bonds / triple helix} involved in strength (1) • a larger R group would loosen the triple helix (1)	**ACCEPT** stop codon could be inserted **ACCEPT** shorter collagen if linked to stop codon **IGNORE** 3D structure	**(4)**

Question number	Answer	Additional guidance	Mark
8(b)	An answer that includes the following points: • parent with OI : Oo and parent without OI : oo (1) • possible genotypes of offspring shown as Oo and oo (1) • corresponding phenotypes of offspring shown as Oo has OI and oo does not have OI (1) • 1 : 1 / 50 : 50 (probability) (1)	**NB** ecf for {wrong parental genotypes / different letters used} for max 3 marks ecf mp 3 and 4 if X and Y given for max 2 marks **ACCEPT** any sets of upper- and lower-case letters **IGNORE** refs to carriers **ACCEPT** 1 in 2 / 50% / half / ½ / 0.5 / 2 in 4	**(4)**

Question number	Answer	Mark
*8(c)	**Non-spec methods shown in diagram:** **Ultrasound** • would not harm mother or fetus – as there are no needles penetrating the tissues (A) • would only be useful if the {damage to bones / fractures} showed up (D) • can only be used relatively late into pregnancy – may be too late to have an abortion (D) **NIPT** • would not harm mother or fetus – as there are no needles penetrating the tissues (A) • can be used early on in pregnancy – abortion would still be an option / more ethical to abort a less-developed embryo (A) • of no use if female does not know she is pregnant that early – too late for abortion (D) **Cordocentesis** • can only be used relatively late into pregnancy – may be too late to have an abortion (D) • risk of miscarriage – parents may not want to lose embryo / unethical if nothing wrong with embryo (D) **On-spec methods:** **Chorionic villus sampling** • can be used fairly early on in pregnancy – abortion would still be an option / more ethical to abort a less-developed fetus (A) • has a fast turnaround time – reduces stress of waiting • risk of miscarriage – parents may not want to lose embryo / unethical if nothing wrong with embryo (D) **Amniocentesis** • safer in later pregnancies than CVS – less likely to have a miscarriage (A) • risk of miscarriage – parents may not want to lose embryo / unethical if nothing wrong with embryo (D) **PGD** • allows an unaffected embryo to be implanted - avoids the risks associated with CVS and amniocentesis of miscarriage / avoids the possibility of a pregnancy being terminated (A) • ethical issues surrounding the unused embryos – because they are living humans (D) • successful pregnancy is not guaranteed – causing stress / financial implications (D) **Applicable to all DNA testing methods** (except ultrasound for some points) provides a DNA sample of the fetus - that can be tested for the mutations (A) • the specific mutation could be identified – allowing more informed decisions about keeping the child (A) • other disorders may be identified – which family members may not want to know about (D)	(6)

	• other disorders may be identified – which allows more informed decisions about keeping the child (A) • possibility of false positive / false negative results – unnecessary terminations / birth of child that had the condition (D)	

Level 1
1 mark = a relevant comment
2 marks = simple discussion of **both** an advantage **and** disadvantage of screening methods {in general / limited to one group of methods}

Level 2
3 marks = simple discussion of **either** advantages for both groups of methods **or** disadvantages for both groups
4 marks = simple discussion of **both** advantages for both groups of methods **and** disadvantages that cover both groups

Level 3
5 marks = as for 4 marks **plus** one extended discussion of **either** advantages or disadvantages
6 marks = as for 4 marks **plus** extended discussion of **both** advantages **and** disadvantages

Level	Mark	Descriptor
	0	No awardable content
Level 1	1-2	Demonstrates isolated elements of biological knowledge and understanding to the given context with generalised comments made. Vague statements related to consequences are made with limited linkage to a range of scientific ideas, processes, techniques and procedures. The discussion will contain basic information with some attempt made to link knowledge and understanding to the given context.
Level 2	3-4	Demonstrates adequate knowledge and understanding by selecting and applying some relevant biological facts/concepts. Consequences are discussed, which are occasionally supported through linkage to a range of scientific ideas, processes, techniques and procedures. The discussion shows some linkages and lines of scientific reasoning with some structure.
Level 3	5-6	Demonstrates comprehensive knowledge and understanding by selecting and applying relevant knowledge of biological facts/concepts. Consequences are discussed, which are supported throughout by sustained linkage to a range of scientific ideas, processes, techniques or procedures. The discussion shows a well-developed and sustained line of scientific reasoning which is clear and logically structured.

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