GradeMax

Pearson

Mark Scheme (Results)

January 2026

Pearson Edexcel International Advanced Subsidiary level In Biology
WBI11/01

GradeMax

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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	Additional guidance	Mark
1	An answer that makes reference to the following points : • phospholipids / phospholipid {bilayer / tail} / (hydrophobic / non-polar) fatty acid tails (1) • facilitated diffusion (1) • active transport (1) • ATP / carrier proteins / protein pumps (1) • endocytosis (1)	**DO NOT ACCEPT** diffusion / any other mechanism **DO NOT ACCEPT** any other mechanisms **ACCEPT** energy **IGNORE** pinocytosis / phagocytosis **DO NOT ACCEPT** any other mechanism	**(5)**

Question number	Answer	Mark
2(a)(i)	**The only correct answer is B** *A is incorrect because Benedict is the name of the solution that tests for reducing sugars* *C is incorrect because Meselson was involved with DNA* *D is incorrect because Stahl was involved with DNA*	**(1)**

Question number	Answer	Additional guidance	Mark
2(a)(ii)	An explanation that makes reference to three of the following points: • cystic fibrosis results in the production of {thick / sticky} mucus (1) • which {blocks / remains in / narrows} the {airways / alveoli / bronchi / bronchioles / trachea} (1) • reducing the concentration gradient of {carbon dioxide / oxygen} in the alveoli (1) • (this results in) {low / reducing the} {rate / speed} of {diffusion (of gases / of oxygen / of carbon dioxide) / gas exchange} (1)	**ACCEPT** increases thickness of alveoli walls / increases distance for diffusion across alveoli lowers surface area of alveoli **DO NOT ACCEPT** no diffusion	**(3)**

Question number	Answer	Additional guidance	Mark
2(b)	A description that makes reference to the following points: • amniocentesis (1) • {amniotic fluid / fluid from the amniotic sac} used (1) • analysed for presence of a {mutation / faulty allele} (that is responsible for cystic fibrosis) (1) **OR** • chorionic villus sampling / CVS (1) • {cells / tissue} from the placenta used (1) • analysed for presence of a {mutation / faulty allele} (that is responsible for cystic fibrosis) (1)	**ACCEPT** cells taken from amniotic fluid fluid around the fetus (not baby) **ACCEPT** defective **DO NOT ACCEPT** chronic **ACCEPT** chorion / chorionic villi **IGNORE** umbilical cord **ACCEPT** defective *ACCEPT* • *percutaneous umbilical blood sampling / PUBS / cordocentesis (1)* • *blood from umbilical cord used (1)* • *analysed for presence of a {mutation / faulty allele} (that is responsible for cystic fibrosis) (1)*	**(3)**

Question number	Answer	Additional guidance	Mark
3(a)	An answer that makes reference to one of the following points : • skin fold thickness (1) • waist-to-hip ratio (1) • waist (circumference) (1)	**ACCEPT** / WHR / hip to waist ratio / waist size / waist measurement / waist to hip index / percentage body fat / skin fold measurement / waist and hip **IGNORE** BMI / body mass index / pinch test / mass / weight / skin thickness **DO NOT ACCEPT** incorrect ideas such as blood pressure / cholesterol levels	**(1)**

Question number	Answer	Additional guidance	Mark
3(b)(i)	• overweight (1)	**ACCEPT** very overweight **IGNORE** values **DO NOT ACCEPT** any other weight category	**(1)**

Question number	Answer	Additional guidance	Mark
3(b)(ii)	An explanation that makes reference to three of the following points: • reduce their {cholesterol / saturated fat} intake as these increase the likelihood of atheroma formation (1) • reduce their salt intake as this increases {blood pressure / damage to endothelial cells} (1) • eat more antioxidants as these reduce free radicals (1) • eat more {fibre / roughage} as this reduces absorption of cholesterol (1) • as the person is only slightly overweight, they need to {adjust diet (slightly) / reduce {calories / sugar / fat} (slightly) (1)	**IGNORE** non-dietary comments **ACCEPT** plaque / atherosclerosis eat more foods that increase HDL to increase HDL : LDL to reduce ….. eat more foods that decrease your LDLs to reduce …. increase {omega oils / plant sterols} to reduce cholesterol to reduce …. **ACCEPT** increase omega oils to reduce blood pressure, if not already awarded **ACCEPT** reduce portion size …. e.g of an adjustment e.g. replace sugar with fruit	**(3)**

<table>
<tr><th>Question number</th><th>Answer</th><th>Additional guidance</th><th>Mark</th></tr>
<tr><td>4(a)(i)</td><td>An answer that makes reference to the following points:

<table>
<tr><td>Genotype</td><td>$w^+ w^+$</td><td>$w^+ w^-$</td><td>$w^- w^-$</td><td>w^+</td><td>w^-</td></tr>
<tr><td>Phenotype</td><td>Female with red eyes</td><td>Female with red eyes</td><td>Female with white eyes</td><td>Male with red eyes</td><td>Male with white eyes</td></tr>
</table>
</td><td>all colours correct = 1 mark
all sexes correct = 1 mark</td><td>(2)</td></tr>
</table>

<table>
<tr><th>Question number</th><th>Answer</th><th>Mark</th></tr>
<tr><td>4(a)(ii)</td><td>The only correct answer is D

A is incorrect because 2 000 ÷ 5 = 400 and 400 × 4 = 1 600
B is incorrect because 2 000 ÷ 5 = 400 and 400 × 4 = 1 600
C is incorrect because 2 000 ÷ 5 = 400 and 400 × 4 = 1 600</td><td>(1)</td></tr>
</table>

Question number	Answer	Additional guidance	Mark
4(b)	An answer that makes reference to the following points: Similarities: • both have sex chromosomes that are different (types) (1) • both have one sex that has two of the same chromosomes and one sex that does not have two of the same chromosomes (1) Differences: • in dragons, the male has identical chromosomes whereas in humans, the female has the identical chromosomes **OR** • in dragons, the male has identical chromosomes and in humans the male has different ones (1)	**ACCEPT** non-homologous / non-autosomal / different {lengths / genes} / two different types **ACCEPT** homozygous and heterozygous homogametic and heterogametic **ACCEPT** converse for the different chromosomes **ACCEPT** converse for females **ACCEPT** homozygous and heterozygous for either alternative	**(3)**

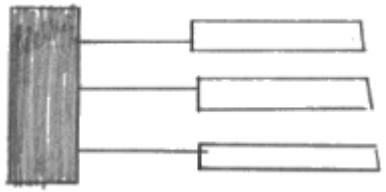
Question number	Answer	Additional guidance	Mark
5(a)	• a variable that <u>increases</u> the chance of an event happening (1)	variable: factor / characteristic chance: likelihood / probability / potential / possibility **IGNORE** risk / correlation event: disease / CHD / condition / something happening / hazard / outcome / result **IGNORE** risk	**(1)**

Question number	Answer	Mark
5(b)	**The only correct answer is B** ***A*** *is incorrect because diet is a lifestyle choice* ***C*** *is incorrect because both inactivity and diet are lifestyle choices* ***D*** *is incorrect because inactivity is a lifestyle choice*	**(1)**

Question number	Answer	Additional guidance	Mark
5(c)	A description that makes reference to two of the following points: • (overall) as the number of cigarettes smoked increases the risk of CHD increases (1) • the relationship is non-linear (1) • relative risk of CHD exists with no smoking (1)	**ACCEPT** positive correlation **ACCEPT** description **DO NOT ACCEPT** S shaped / sigmoidal / exponential **DO NOT ACCEPT** descriptions about rates	**(2)**

Question number	Answer	Additional guidance	Mark
5(d)(i)	• 1 826 / 1,826 (1)	**DO NOT ACCEPT** 1826.0	**(1)**

Question number	Answer	Additional guidance	Mark
5(d)(ii)	An explanation that makes reference to three of the following points: • because they are likely to {under-estimate / lie / not know} about the number of cigarettes they smoke (1) • because they are unlikely to smoke the same number of cigarettes each day (1) • because they may not know exactly how long they have been smoking for (1) • because they may not realise how much of a risk factor smoking can be (1)	**ACCEPT** don't smoke everyday **ACCEPT** not aware it is a risk factor lack of awareness / education considered 5 a day to be not many	**(3)**

Question number	Answer	Additional guidance	Mark
6(a)	An answer that makes reference to the following points: • one glycerol (shaded / labelled), three fatty acids (not shaded / labelled) and three bonds shown (1) • all components joined together correctly (1)	**IGNORE** relative sizes of glycerol and FAs  ecf if: {one / two} fatty acids drawn attached to glycerol {all shaded / nothing shaded} with no labels	**(2)**

Question number	Answer	Mark
6(b)	**The only correct answer is A** ***B*** *is incorrect because saturated fatty acids have lower carbon : hydrogen ratios* ***C*** *is incorrect because saturated fatty acids do not have carbon carbon double bonds* ***D*** *is incorrect because saturated fatty acids do not have carbon carbon double bonds and have a lower carbon : hydrogen ratio*	**(1)**

Question number	Answer	Additional guidance	Mark
6(c)(i)	• whole number between 15 and 50 (1)		**(1)**

Question number	Answer	Additional guidance	Mark
6(c)(ii)	An answer that makes reference to four of the following points: **Graph 1** • as chain length increases, the melting point of saturated fatty acids increases (1) • saturated fatty acids (shown) are all liquid above {45°C / any stated point above 15} (1) • there is no relationship between chain length of unsaturated fatty acids and their melting point (1) • melting point of saturated fatty acids is greater than unsaturated fatty acids (1) **Graph 2** • melting point decreases with an increase in the number of {(C-C) double bonds / C=C bonds} (1)	**ACCEPT** chain length / number of carbon atoms **ACCEPT** positive correlation if both variables given **ACCEPT** no correlation / (could be) a negative correlation / (could be) a decrease in melting point with increase in chain length **ACCEPT** presence of double bond decreases melting point	**(4)**

Question number	Answer	Mark
6(c)(iii)	**The only correct answer is C** ***A*** *is incorrect because the oil with the highest proportion of saturated fatty acids has the highest melting points* ***B*** *is incorrect because canola oil has the least saturated fatty acid therefore the lowest melting point* ***D*** *is incorrect because peanut oil has the most saturated fatty acid and therefore the highest melting point*	**(1)**

Question number	Answer	Mark
7(a)(i)	**The only correct answer is B** ***A*** *is incorrect because neither fructose nor sucrose are found in lactose* ***C*** *is incorrect because sucrose is a disaccharide not found in lactose* ***D*** *is incorrect because fructose is found in sucrose not lactose*	**(1)**

Question number	Answer	Additional guidance	Mark
7(a)(ii)	An explanation that makes reference to two of the following points: • because {lactase / enzymes} are catalysts (1) • because lactase lowers the activation energy (1) • needed to break the glycosidic bonds (between glucose and galactose) (1)	**ACCEPT** E_A	**(2)**

Question number	Answer	Mark
7(b)	**The only correct answer is C** ***A** is incorrect because 68% = (8.1 × 10^9 ÷ 100) × 68 = 5.508 × 10^9 = 5.5 × 10^9* ***B** is incorrect because 68% = (8.1 × 10^9 ÷ 100) × 68 = 5.508 × 10^9 = 5.5 × 10^9* ***D** is incorrect because 68% = (8.1 × 10^9 ÷ 100) × 68 = 5.508 × 10^9 = 5.5 × 10^9*	**(1)**

Question number	Answer
*7(c)	**pH** Descriptions: • trapped lactase works at a wider range of pHs (D) • both trapped and free lactase have the same optimum pH (D) • trapped lactase works slower around the optimum pH (D) Effect of pH on enzyme activity: • pH affects the shape of the active site (E) • because different pHs have different hydrogen ion concentrations (E) • which affects ionisation of the R groups (E) • which breaks bonds (E) Effect of alginate: • alginate holds the R groups in place / alginate holds enzyme shape even if bonds are broken (E) • alginate protects the R groups from the hydrogen ions (E) • activity of trapped enzymes is lower as fewer enzymes are in contact with the lactase (E) • at extremes of pH, the alginate cannot preserve the shape of the active site (E) • lactase in higher concentrations in the beads (E) **Temperature** Descriptions: • rate of reaction is the same up to 43°C (D) • trapped enzymes have a higher optimum temperature (D) • rate of reaction of trapped enzymes is higher at optimum temperature (D) Effect of temperature on enzyme activity: • increase in temperature causes increase in kinetic energy (E) • so the collisions are more frequent / energetic (E) • temperature affects the shape of the active site (E) • as the heat energy causes the R groups to vibrate (E) • once active site completely denatured there will be no activity (E) Effect of alginate: • alginate stabilises the active site (E) • reducing the vibration of the R groups (E) • at very high temperatures, the alginate cannot hold the R groups in place (E) • alginate absorbs the heat energy (E) • less spaces so movement is reduced (E) **(6)**

			Additional guidance
Level 0	0	No awardable content	
Level 1	1-2	An explanation may be attempted but with limited interpretation or analysis of the scientific information and with a focus on mainly just one piece of scientific information. The explanation will contain basic information, with some attempt made to link knowledge and understanding to the given context.	Simple descriptions of data with no real attempt of an explanation (D) 1 mark = a comparison of data in / comment on one graph 2 marks = a comparison of data in / comment on each graph
Level 2	3-4	An explanation will be given, with occasional evidence of analysis, interpretation and/or evaluation of both pieces of scientific information. The explanation shows some linkages and lines of scientific reasoning, with some structure.	Some explanation for factors affecting enzyme activity (2 points blue **and/or** red) (E) 3 marks = some explanation for pH graph **or** temperature graph 4 marks = some explanation for pH graph **and** temperature graph
Level 3	5-6	An explanation is made that is supported throughout by sustained application of relevant evidence of analysis, interpretation and/or evaluation of both pieces of scientific information. The explanation shows a well-developed and sustained line of scientific reasoning, which is clear and logically structured.	Good explanation for factors affecting enzyme activity (4 points blue **and** red) (E) 5 marks = some explanation for pH graph **and** temperature graph and good explanation for either pH **or** temperature graph 6 marks = good explanation for both pH graph **and** temperature graph

Question number	Answer	Additional guidance	Mark
8(a)(i)	A description that makes reference to two of the following points: • (overall) increase in concentration of Sch B decreases the number of (living) cancer cells (1) • concentration must be {greater than 3.125 / 6.25 or higher} to have an effect (1) • {the highest concentration used / Sch} does not destroy all cancer cells (1)	**IGNORE** reference to berries throughout **ACCEPT** negative correlation increases the number of killed cells **ACCEPT** minimum effective concentration is 6.25	**(2)**

Question number	Answer	Additional guidance	Mark
8(a)(ii)	• because {DNA synthesis precedes cell division / DNA has to be replicated for cells to divide} (1)	**ACCEPT** mitosis the more DNA synthesis the more cell division cancer is uncontrollable cell division so there will be more DNA synthesis	(1)

Question number	Answer	Additional guidance	Mark
8(b)(i)	• 2×10^6 / $2 . 10^6$ / 2 million / 2 000 000 / 2,000,000 (1)	**DO NOT ACCEPT** 2.0×10^6	(1)

Question number	Answer	Additional guidance	Mark
8(b)(ii)	• the liquid that was used to dissolve the drug (1)	**ACCEPT** water / salt solution / saline / the solvent / known (injectable) {treatments / drugs} **IGNORE** placebo / sugar	(1)

Question number	Answer	Additional guidance	Mark
8(b)(iii)	• volume calculated (mm^3 / cm^3) (1) • 600 / 628 / 630 / 650 / 680 / 681 (mm^3) (1)	**ACCEPT** answer in cm^3 if the units on the printed answer line have been changed : 0.6 / 0.628 / 0.63 / 0.65 / 0.68 / 0.681 **Bald answers:** 2 marks = 600 / 628 / 630 / 650 / 680 / 681 1 mark = correct answer but with correct dps e.g. 628.3 correct whole number correctly rounded but wrong order of magnitude e.g. 60, 6280 720 / 750 / 754 / 845 / 880 / 884 / 885	(2)

Question number	Answer	Additional guidance	Mark
8(b)(iv)	An explanation that makes reference to two of the following points: • because the tumours are not a {uniform / regular} shape (1) • so the value for {w / l / measurements} will depend on where the measurement is taken (1) • the {rule / equipment} only measures in mm (1) • formula may not be appropriate for the tumours (1)		**(2)**

Question number	Answer	Additional guidance	Mark
8(c)(i)	An explanation that makes reference to four of the following points: • mutation is a substitution mutation (in the DNA) (1) • this change will be copied onto the mRNA (1) • the {(triplet) code / codon} (on the DNA / mRNA) will be for aspartate (1) • a tRNA carrying an aspartate will bind to the altered codon (1) • and the aspartate will join by peptide bonds {into the polypeptide / to adjacent amino acid} (1)	**DO NOT ACCEPT** insertion / deletion / frameshift **ACCEPT** different mRNA produced / change in codons on transcription **ACCEPT** different amino acid, if aspartate already implied earlier in response **ACCEPT** different amino acid, if aspartate already implied earlier in response **ACCEPT** different amino acid, if aspartate already implied earlier in response primary structure / peptide / protein	**(4)**

Question number	Answer	Additional guidance	Mark
8(c)(ii)	An answer that makes reference to two of the following points: • because the target site of the drug is only one amino acid (1) • so the drug may not bind to the aspartate (1) • other proteins have aspartate (amino acid) (1) • drug will affect other proteins (that contain aspartate) (1)	**NB** drug could affect other proteins with aspartate = 2 marks	**(2)**

Question number	Answer
*9(a)	**Aspect 1: Formation of blood clot in leg** • blood flow is impaired by a person sitting still for a long time • because the skeletal muscles are not pushing blood back to the heart • red blood cells get lodged in the valve pockets • as they are pulled back by gravity • red blood cells build up / clot gets bigger • preventing the valves from closing properly **Aspect 2: Blood clotting process (either in formation of clot or increase in size of embolism)** • platelets get damaged • releasing thromboplastin • which catalyses formation of thrombin from prothrombin • which catalyses formation of fibrin from fibrinogen • trapping blood cells / platelets **Aspect 3: Movement of blood clot** • some of blood clot breaks away (in context of a response) • travels through veins / vena cava back to heart • enter right atrium • passes into right ventricle • through tricuspid / atrioventricular valve • pumped out of pulmonary artery **Aspect 4: Result of embolism** • arteries get smaller as they get closer to lungs • size of clot increases • blocking the pulmonary artery • so deoxygenated blood cannot reach lungs • to get reoxygenated • embolism may block other arteries eg to brain **Aspect 5: Cause of death** • lack of oxygenated blood reaches cells • so they cannot respire aerobically • insufficient energy produced to sustain cells • resulting in heart attack / stroke **(6)**

			Additional guidance
Level 0	0	No awardable content	
Level 1	1-2	An explanation may be attempted but with limited interpretation or analysis of the scientific information and with a focus on mainly just one piece of scientific information. The explanation will contain basic information, with some attempt made to link knowledge and understanding to the given context.	Simple points covering some aspects of question 1 mark = simple point about one aspect 2 marks = simple points about two different aspects
Level 2	3-4	An explanation will be given, with occasional evidence of analysis, interpretation and/or evaluation of both pieces of scientific information. The explanation shows some linkages and lines of scientific reasoning, with some structure.	Explanation covering some aspects of question 3 marks = simple points about three different aspects **OR** one explanation from two aspects 4 marks = simple points about three different aspects plus an explanation for one aspect **OR** two explanations from two aspects
Level 3	5-6	An explanation is made that is supported throughout by sustained application of relevant evidence of analysis, interpretation and/or evaluation of both pieces of scientific information. The explanation shows a well-developed and sustained line of scientific reasoning, which is clear and logically structured.	Detailed explanation covering most aspects of the question 5 marks = simple points about three different aspects plus an explanation for two aspects 6 marks = simple points about three different aspects plus an explanation for three aspects

Question number	Answer	Additional guidance	Mark
9(b)(i)	An explanation that makes reference to the following points: • because if the dose is too high the {clotting time too long / blood does not clot fast enough} (1) • so too much blood could be lost (1) **OR** • because if the dose is too low the {clotting time too short / blood clots too fast} (1) • risk of {heart attack / stroke / embolism / DVT} (1)	**ACCEPT** internal bleeding / excessive blood loss / uncontrolled bleeding / haemorrhaging / very heavy periods	**(2)**

Question number	Answer	Additional guidance	Mark
9(b)(ii)	An explanation that makes reference to the following points: • because (as the clot forms) the {blood / clot} becomes {thicker / jelly-like / sticky} (1) • causing too much resistance for the movement of the copper particles (1)	**ACCEPT** mesh of {fibres / fibrin} (formed in blood) **ACCEPT** get {stuck / become trapped} in the blood clot	**(2)**

Question number	Answer	Additional guidance	Mark
9(b)(iii)	• 19 / 19.0 (seconds) (1)		(1)

Question number	Answer	Additional guidance	Mark
9(b)(iv)	An answer that makes reference to two of the following points: • because the copper particles will not all stop moving at the same time (1) • idea of a large change in the movement of particles (before movement ceases) (1) • credit reason for choosing the halfway point (1)	**ACCEPT** the particles did not all stop moving no clear end point e.g. speed of movement of particles decreasing rapidly values drop below the normal range e.g. so the mid-point between starting to slow down (rapidly) and particles {stopping / nearly stopping} is used so {median / mean / average / middle value / middle time} **DO NOT ACCEPT** mode	**(2)**

Question number	Answer	Additional guidance	Mark
9(b)(v)	An answer that makes reference to two of the following points: • comparable / positive correlation between the times recorded (by both methods) (1) • they do not give the same blood clotting time (because the points do not sit on the line) (1) • at lower times the smartphone method records higher values (1) • at higher times the smartphone method records lower values (1)	**ACCEPT** both increase **ACCEPT** there is a difference between methods **ACCEPT** expressed in terms of clotting times **ACCEPT** expressed in terms of clotting times	**(2)**