Pearson Edexcel

Mark Scheme (Results)

Summer 2023

Pearson Edexcel GCSE
In Biology (1BI0)
Paper 1F

Edexcel and BTEC Qualifications

Edexcel and BTEC qualifications are awarded by Pearson, the UK's largest awarding body. We provide a wide range of qualifications including academic, vocational, occupational and specific programmes for employers. For further information visit our qualifications websites at www.edexcel.com or www.btec.co.uk. Alternatively, you can get in touch with us using the details on our contact us page at www.edexcel.com/contactus.

Pearson: helping people progress, everywhere

Pearson aspires to be the world's leading learning company. Our aim is to help everyone progress in their lives through education. We believe in every kind of learning, for all kinds of people, wherever they are in the world. We've been involved in education for over 150 years, and by working across 70 countries, in 100 languages, we have built an international reputation for our commitment to high standards and raising achievement through innovation in education. Find out more about how we can help you and your students at: www.pearson.com/uk

Summer 2023
Publications Code 1BI0_1F_2306_MS
All the material in this publication is copyright
© Pearson Education Ltd 2023

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.

Mark schemes have been developed so that the rubrics of each mark scheme reflects the characteristics of the skills within the AO being targeted and the requirements of the command word. So for example the command word 'Explain' requires an identification of a point and then reasoning/justification of the point.
Explain questions can be asked across all AOs. The distinction comes whether the identification is via a judgment made to reach a conclusion, or, making a point through application of knowledge to reason/justify the point made through application of understanding. It is the combination and linkage of the marking points that is needed to gain full marks.
When marking questions with a 'describe' or 'explain' command word, the detailed marking guidance below should be consulted to ensure consistency of marking.

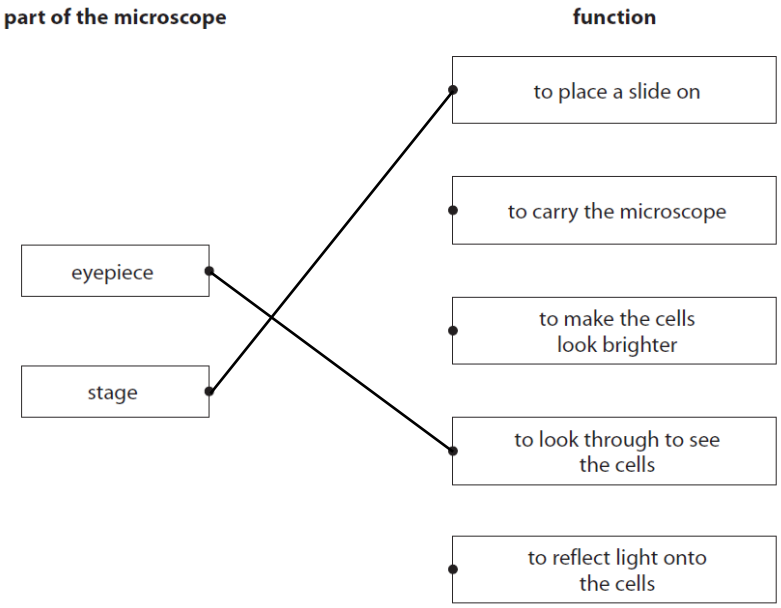
Assessment Objective		**Command Word**	
Strand	**Element**	**Describe**	**Explain**
AO1		An answer that combines the marking points to provide a logical description	An explanation that links identification of a point with reasoning/justification(s) as required
AO2		An answer that combines the marking points to provide a logical description, showing application of knowledge and understanding	An explanation that links identification of a point (by applying knowledge) with reasoning/justification (application of understanding)
AO3	1a and 1b	An answer that combines points of interpretation/evaluation to provide a logical description	
AO3	2a and 2b		An explanation that combines identification via a judgment to reach a conclusion via justification/reasoning
AO3	3a	An answer that combines the marking points to provide a logical description of the plan/method/experiment	
AO3	3b		An explanation that combines identifying an improvement of the experimental procedure with a linked justification/reasoning

Question number	Answer	Mark
1(a)(i)	B cell membrane **The only correct answer is B** *A is not correct because Y is not the cell wall* *C is not correct because Y is not the nucleus* *D is not correct because Y is not the cytoplasm*	**(1)** **AO1 1**

Question number	Answer	Mark
1(a)(ii)	A chromosomes **The only correct answer is A** *B is not correct because mitochondria are not found in Z* *C is not correct because ribosomes are not found in Z* *D is not correct because vacuoles are not found in Z*	**(1)** **AO1 1**

Question number	Answer	Additional guidance	Mark
1(a)(iii)	mitochondria	accept cytoplasm	**(1)** **AO1 1**

Question number	Answer	Mark
1(b)(i)	cells appear {larger / magnified} / can be seen in more detail /organelles can be seen	(1) AO1 2

Question Number	Answer	Mark
1(b)(ii)	 do not award mark if more than one line drawn from eyepiece box do not award mark if more than one line drawn from stage box	(2) AO1 2

Question number	Answer	Additional guidance	Mark
1(c)	picometre		**(1)** **AO1 1**

(Total for question 1 = 7 marks)

Question number	Answer	Mark
2(a)(i)	A layer A **The only correct answer is A** *B is not correct because layer B will not contain the most recent fossils* *C is not correct because layer C will not contain the most recent fossils* *D is not correct because layer D will not contain the most recent fossils*	**(1)** **AO2 1**

Question number	Answer	Additional guidance	Mark
2(a)(ii)	An explanation including • tool A is less refined (than B, C and D) (1) • (because) tool A was worked less (1) • (because) it is older / made by earlier humans / less evolved humans (1)	accept reverse arguments	**(2)** **AO3 1ab**

Question number	Answer	Additional guidance	Mark
2(b)(i)	characteristics (1) selective (1)	answers must be in the correct order	**(2)** **AO1 1**

Question Number	Answer	Mark
2(b)(ii)	C all the DNA of an organism **The only correct answer is C** *A is not correct because the genome is not all the cells of an organism* *B is not correct because the genome is not all the enzymes of an organism* *D is not correct because the genome is not all the structures of an organism*	**(1)** **AO1 1**

Question number	Answer	Mark
2(b)(iii)	food security / animals are less dangerous / make jobs easier / companionship / give humans protection	**(1)** **AO1 1**

(Total for question 2 = 7 marks)

Question number	Answer	Additional guidance	Mark
3(a)(i)	similar pattern of bones / 5 digits / pentadactyl (limb)		**(1)** **AO3 1a**

Question Number	Answer	Mark
3(a)(ii)	D Alfred Russel Wallace **The only correct answer is D** ***A*** *is not correct because Alexander Fleming did not work with Charles Darwin on the theory of evolution* ***B*** *is not correct because Gregor Mendel did not work with Charles Darwin on the theory of evolution* ***C*** *is not correct because Richard Leakey did not work with Charles Darwin on the theory of evolution*	**(1)** **AO1 1**

Question number	Answer	Additional guidance	Mark
3(b)(i)	(bones) contain (living) cells / nuclei / mitochondria	accept references to the role of DNA in bone cells	**(1)** **AO2 1**

Question number	Answer	Mark
3(b)(ii)	An answer including two from: • (stem cells) divide / produce more cells (1) • by mitosis (1) • stem cells are undifferentiated (1) • (stem cells) differentiate / develop into {different / specialised} types of cells (1)	**(2)** **AO1 1**

Question number	Answer	Additional guidance	Mark
3(b)(iii)	cone(s) / rod(s)		**(1)** **AO1 1**

Question number	Answer	Mark
3(b)(iv)	An answer including • (transplanted stem cells) can develop / replace (retinal) cells (1) • to correct blindness / damaged retina (1)	**(2)** **AO2 1**

(Total for question 3 = 8 marks)

Question Number	Answer	Mark
4(a)	C it is not spread from person to person **The only correct answer is C** ***A*** *is not correct because obesity is not spread from person to person* ***B*** *is not correct because obesity is not caused by a virus* ***D*** *is not correct because obesity does not last for a short time*	**(1)** **AO1 1**

Question Number	Answer	Mark
4(b)(i)	An explanation linking • the risk is high (1) • because the person is obese (1)	**(2)** **AO3 1ab**

Question Number	Answer	Additional guidance	Mark
4(b)(ii)	Any two from: • medication (1) • heart transplant (1) • stents (1) • bypass surgery (1)	accept named medicines	**(2)** **AO1 1**

Question Number	Answer	Mark
4(c)(i)	(the percentage of people who smoked cigarettes from 2011 to 2019) has decreased	**(1)** **AO3 2a**

Question Number	Answer	Mark
4(c)(ii)	Two from • more smokers die than non-smokers (and fewer people taking up smoking) (1) • people are more aware of the dangers of smoking / have followed health advice (1) • (there are) alternatives to smoking cigarettes / {nicotine gum / nicotine patches / vapes} available (1) • smoking cigarettes is expensive / unaffordable (1)	**(2)** **AO3 2a**

Question Number	Answer	Mark
4(c)(iii)	a line showing a continued downward trend to 2041	**(1)** **AO3 2a**

Question Number	Answer	Mark
4(c)(iv)	B uncontrolled cell division **The only correct answer is B** ***A*** *is not correct because cancer is not uncontrolled organ division* ***C*** *is not correct because cancer is not controlled cell division* ***D*** *is not correct because cancer is not controlled organ division*	**(1)** **AO1 1**

(Total for question 4 = 10 marks)

Question Number	Answer	Mark
5(a)(i)	bacteria are killed (by the garlic extract / antibiotic)	**(1)** **AO2 2**

Question Number	Answer	Mark
5(a)(ii)	An explanation linking • C (is the 100 mg/cm^3 concentration) (1) • (because C) has the largest area with no bacterial growth / A and B have smaller areas (with no bacterial growth) (1)	**(2)** **AO3 2ab**

Question Number	Answer	Mark
5(a)(iii)	one from: • use a control (1) • use the same source of garlic extract (1) • incubate the agar plates at the same temperature (1) • ensure paper discs are the same size (1) • measure the diameter of the clear zone (1) • repeat (each concentration) (1)	**(1)** **AO3 3a**

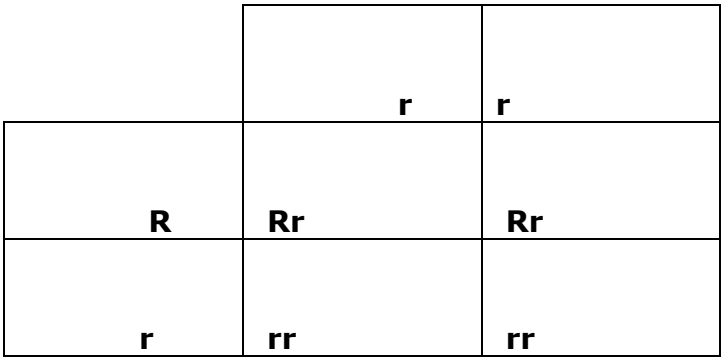
Question Number	Answer	Additional guidance	Mark
5(a)(iv)	3.14 x 5^2 / 3.14 x 25 (1) 78.5 (mm^2)	award full marks for correct answer without working	**(2)** **AO2 1**

Question Number	Answer	Mark
5(b)(i)	to sterilise it / to kill {bacteria / microorganisms} (on the spreader)	**(1)** **AO1 2**

Question Number	Answer	Mark
5(b)(ii)	two from: • disinfect the **work surface** / **area** (1) • work close to a Bunsen burner (flame) (1) • wear protective gloves / mask (1) • taking the lid off for the minimum amount of time possible (1) • aseptic techniques (1)	**(2)** **AO1 2**

(Total for question 5 = 9 marks)

Question Number	Answer	Mark
6(a)	D recessive **The only correct answer is D** ***A*** *is not correct because the term that describes the allele for white flowers is not heterozygous* ***B*** *is not correct because the term that describes the allele for white flowers is not homozygous* ***C*** *is not correct because the term that describes the allele for white flowers is not gamete*	**(1)** **AO1 1**

Question Number	**Answer**	**Mark**
6(b)(i)	 • gametes (r r) (1) • genotypes of offspring (1)	**(2)** **AO2 2ab**

Question Number	Answer	Additional guidance	Mark
6(b)(ii)	50 (%)	ecf from Punnett square	**(1)** **AO3 2a**

Question Number	Answer	Additional guidance	Mark
6(c)(i)	(133 ÷ 46) = 2.89 / 2.9 (1) Rounded to the whole number 3 (:1)	award full marks for correct answer without working	**(2)** **AO3 2a**

Question Number	Answer	Mark
6(c)(ii)	An explanation linking • both parents are heterozygous / Pp / each parent has an allele for white flowers (1) • (so) some offspring have {two recessive alleles / pp} / are homozygous recessive (1)	**(2)** **AO2 2**

Question Number	Answer	Additional guidance	Mark
6(d)(i)	An answer including two from • gametes are produced by meiosis (1) • (meiosis) {halves the number of chromosomes / produces haploid gametes} / gametes have one of each pair of chromosomes (1)	accept when gametes fuse diploid cells / cells with 14 chromosomes are produced (1)	**(2)** **AO1 1**

Question Number	Answer	Mark
6(d)(ii)	Any two from: • (male and female) gametes fuse (1) • (forming a) zygote (1) • (forming a) diploid cell (1)	**(2)** **AO1 1**

(Total for question 6 = 12 marks)

Question Number	Answer	Additional guidance	Mark
7(a)	(using fertiliser) produces a larger one thousand grain mass / {bigger / heavier} grains		**(1)** **AO3 1a**

Question Number	Answer	Additional guidance	Mark
7(b)	An answer including: • (single) grains are {very small / have a small mass / have different masses} (1) • so the mass of single grains would not allow a reliable comparison (of fertiliser treatments) to be made (1)	accept reverse argument accept to **calculate** an average (grain mass) (1)	**(2)** **AO2 2**

7(c)(i)	C using predators to control pests **The only correct answer is C** ***A*** *is not correct because biological control is not using antiseptics to control pests* ***B*** *is not correct because biological control is not using fertilisers to control pests* ***D*** *is not correct because biological control is not using pesticides to control pests*		**(1)** **AO1 1**

Question Number	Answer	Additional guidance	Mark
7(c)(ii)	An explanation linking two from: • (biological control agent) is enclosed / cannot escape if crop is under cover (1) • so (biological control agent) more likely to {find / eat / destroy} pests (1) • (therefore) less crop damage / more yield (if under cover) (1)	accept predator / parasite / named predator e.g ladybirds	**(2)** **AO2 2**

Question number	Indicative content	Mark
7(d)*	• GM plants have their genome modified • genes introduced into their genome, e.g. *Bt* corn **Advantages** • resistance to insects means less crop damage • so there is a larger yield • GM corn plants produce a toxin that kills insects • the toxin is not released into the environment • so {safer for farmers / beneficial insects not killed} • less / no {insecticide / pesticide} needed • so cheaper to manage pests (long term) • corn can be sprayed with weedkiller (to kill weeds) without affecting the crop • crop grows better / larger yield because no weeds **Disadvantages** • GM seeds are more expensive • genes for {insect / weedkiller} resistance could become incorporated into {wild plants / weeds} • decreasing weeds / insect populations could impact biodiversity / food chains • over time insects could become resistant to the toxin produced by the GM corn • so concerns that weeds / pest could be more difficult to control in the future	**(6)** **AO2 1**

Level	Mark	Descriptor
	0	• No rewardable material.
Level 1	1-2	• The explanation attempts to link and apply knowledge and understanding of scientific ideas, flawed or simplistic connections made between elements in the context of the question. • Lines of reasoning are unsupported or unclear.
Level 2	3-4	• The explanation is mostly supported through linkage and application of knowledge and understanding of scientific ideas, some logical connections made between elements in the context of the question. • Lines of reasoning mostly supported through the application of relevant evidence.
Level 3	5-6	• The explanation is supported throughout by linkage and application of knowledge and understanding of scientific ideas, logical connections made between elements in the context of the question. • Lines of reasoning are supported by sustained application of relevant evidence.

Level	Mark	Additional Guidance	General additional guidance The level is determined by the areas of indicative content covered within the response. The mark within the level is determined by the detail and/or use of biological terms within each explanation.
	0	No rewardable material	
Level 1	1–2	Makes simple statements about an advantage **or** a disadvantage of growing GM corn plants.	Possible candidate responses • Seeds for GM corn plants are expensive. • Seeds for GM corn plants are expensive so may not be affordable to some farmers.
Level 2	3–4	Makes simple statements to explain an advantage **and** a disadvantage of GM corn plants and makes some logical connections between points.	Possible candidate responses • Less pesticide are needed for GM corn plants. A disadvantage is that the seeds are expensive. • Less pesticide is needed for GM corn plants. A disadvantage is that the seeds are expensive, but farmers spend less money on pesticides.
Level 3	5–6	Explains advantages and disadvantages of GM corn plants and makes logical connections between points.	Possible candidate responses • Less pesticide is needed for GM corn plants. The corn can be sprayed with weedkiller without affecting the crop. A disadvantage is that this can reduce the biodiversity. Seeds are also expensive to buy. • Less pesticide is needed for GM corn plants. The corn can be sprayed with weedkiller without affecting the crop so a large yield will be produced. A disadvantage is that weedkillers can reduce biodiversity. Seeds are also expensive to buy, so farmers will not buy them and will continue to use pesticides.

(Total for Question 7 = 13 marks)

Question number	Answer	Additional guidance	Mark
8(a)(i)	mutation / sexual reproduction / different combinations of alleles can occur	accept genetic modification	**(1)** **AO2 1**

Question number	Answer	Mark
8(a)(ii)	D phenotype **The only correct answer is D** ***A*** *is not correct because gene is not the correct term for an observable characteristic* ***B*** *is not correct because genotype is not the correct term for an observable characteristic* ***C*** *is not correct because heterozygous is not the correct term for an observable characteristic*	**(1)** **AO1 1**

Question number	Answer	Additional guidance	Mark
8(b)	asexual (reproduction)	ignore mitosis reject meiosis accept cloning / binary fission	**(1)** **AO1 1**

Question number	Answer	Additional guidance	Mark
8(c)	One from advantages: • (fruit) will have desired qualities (1) • can be produced faster (1) **AND** One from disadvantages: • susceptible to a disease (1) • can't survive an environmental change (1) • reduced gene pool (1)	ignore genetically identical / no variation for advantages and disadvantages accept examples of characteristics e.g. all tasty / same taste ignore higher yield accept inherited/genetic diseases accept can't survive a selection pressure	**(2)** **AO2 1**

Question number	Answer	Additional guidance	Mark
8(d)	A method including four from: • mix starch, enzyme and pH (solution) (1) • use iodine (to test for starch) (1) • (with iodine solution) blue-black means starch is present / {orange / brown} means no starch present (1) • control of one variable e.g. concentration, volume, temperature (1) • **repeat** using different pH solutions (1)	all three solutions are required accept add iodine to a spotting tile ignore blue ignore amount unless a measurement is given	**(4)** **AO3 3a**

Question Number	Answer	Additional guidance	Mark
8(e)	An explanation linking two from: • enzyme denatures (1) • which changes the shape of the **active site** (1) • so {the enzyme cannot bind to its substrate / active site no longer complementary / no **enzyme-substrate** complexes form} (1)	accept enzyme changes shape accept substrate {no longer fits /is no longer complementary} accept starch for substrate	**(2)** **AO2 1**

(Total for question 8 = 11 marks)

Question number	Answer	Additional guidance	Mark
9(a)	Calculation 300 ÷ 30 / 2^{10} / indication that there are 10 divisions (1) Evaluation 1024	award full marks for the correct answer with no working accept 512 for one mark	**(2)** **AO2 1**

Question number	Answer	Additional guidance	Mark
9(b)(i)	(pathogens are organisms) that **cause** disease	ignore examples of pathogens unless linked to causing disease accept **cause** disease / illness / infections	**(1)** **AO1 1**

Question number	Answer	Additional guidance	Mark
9(b)(ii)	An explanation including two from: • they inhibit processes (in bacteria) (1) • so **bacteria** {are destroyed / are killed / growth stops / reproduction stops} (1) • but antibiotics {do not affect/damage} the host cell (1)	accept named processes e.g. disrupt cell walls accept slows down for stopped	**(2)** **AO1 1**

Question number	Answer	Additional guidance	Mark
9(b)(iii)	substitution 80 ÷ 0.005 (1) 16 000	award full marks for the correct answer with no working	**(2)** **AO2 1**

Question number	Indicative content	Mark
9(c)*	**<u>similarities</u>** • cell membrane • cell wall • ribosomes • cytoplasm • both have DNA **<u>differences</u>** • chromosomal DNA (bacteria) • plasmid DNA (bacteria) • flagella (bacteria) • smaller size (bacteria) • prokaryotic (bacteria) • nucleus containing DNA (plants) • chloroplasts (plants) • mitochondria (plants) • vacuole (plants) • eukaryotic (plants)	**(6)** **AO1 1**

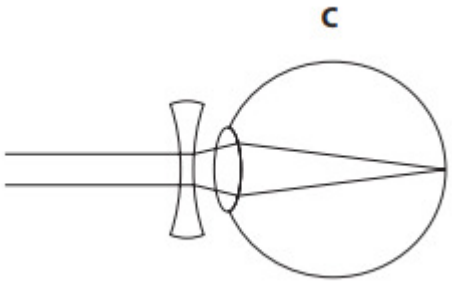
Level	Mark	Descriptor
	0	• No rewardable material.
Level 1	1-2	• Demonstrates elements of biological understanding, some of which is inaccurate. Understanding of scientific ideas lacks detail. • Presents a description with some structure and coherence.
Level 2	3-4	• Demonstrates biological understanding, which is mostly relevant but may include some inaccuracies. Understanding of scientific ideas is not fully detailed and/or developed. • Presents a description that has a structure which is mostly clear, coherent and logical.
Level 3	5-6	• Demonstrates accurate and relevant biological understanding throughout. Understanding of the scientific ideas is detailed and fully developed. • Presents a description that has a well-developed structure which is clear, coherent and logical.

Level	Mark	Additional Guidance	General additional guidance The level is determined by the number points of indicative content and the inclusion of similarities and differences in the response. The mark within the level is determined by the depth of detail, coherence and accuracy of the response.
	0	No rewardable material	
Level 1	1–2	Makes simple statements identifying either similarities **or** differences between bacterial cells and plant cells.	<u>Possible candidate responses</u> • Bacterial cells and plant cells have a cell wall. • Bacterial cells and plant cells have a cell wall for structural support.
Level 2	3–4	Makes simple statements to describe a similarity **and** a difference between bacterial cells and plant cells including some detail.	<u>Possible candidate responses</u> • Both cells have a cell membrane and a cell wall. Bacteria have flagella, but plant cells do not. • Both cells have a cell membrane and a cell wall for structural support. Bacteria have flagella, but plant cells do not.
Level 3	5–6	Gives an accurate, detailed description of similarities **and** differences between bacterial cells and plant cells.	<u>Possible candidate responses</u> • Both cells have a cell membrane and a cell wall. Bacteria have flagella and plasmids but plant cells do not. • Both cells have a cell membrane and a cell wall for structural support. Bacteria have flagella for movement, and a plasmid, but plant cells do not.

(Total for question 9 = 13 marks)

Question number	Answer	Additional guidance	Mark
10(a)(i)	**240** x 0.35 / 84 (1) **240** – 84 (1) 156 (people) OR 100 – 35 / 65 / 0.65 (1) 0.65 x **240** / 65 ÷ 100 x **240** (1) 156 (people) OR **240** ÷ 100 / 2.4 (1) 2.4 **x 65** (1) 156 (people)	Award full marks for the correct answer with no workings ecf for an incorrect value subtracted from 240 shown in workings ecf for an incorrect value multiplied by 240 shown in workings ecf for an incorrect value multiplied by 65 shown in workings	**(3)** **AO2 1**

Question number	Answer	Additional guidance	Mark
10(a)(ii)	Any one from: • the eye(ball) is too long (1) • the cornea is too curved (1) • lens is too thick/too curved (1) • the {cornea/lens} refracts the light too much (1) • {light rays focus/focal point is} in front of the **retina (1)**	ignore the eye(ball) is too big ignore image forms in front of the retina accept it is inherited / caused by genetics (1)	**(1)** **AO1 1**

Question number	Answer	Mark
10(a)(iii)	C  **The only correct answer is C** ***A*** *is not correct because a convex lens is not used* ***B*** *is not correct because a convex lens is not used* ***D*** *is not correct because a concave lens doesn't refract light in this way*	**(1)** **AO1 1**

Question number	Answer	Additional guidance	Mark
10(b)(i)	an answer including two from: • **protein** (has built up) (1) • (in the) <u>lens</u> (1) • light is dispersed (1)	 accept cloudy lens accept not all the light rays pass through ignore blurry vision	**(2)** **AO1 1**

Question number	Answer	Additional guidance	Mark
10(b)(ii)	(surgery to) replace the lens / use an {artificial / plastic lens}	ignore surgery /laser surgery	**(1)** **AO1 1**

Question number	Answer	Mark
10c(i)	A cerebellum **The only correct answer is A** ***B*** *is not correct because structure X is not the cerebral hemisphere* ***C*** *is not correct because structure X is not the medulla oblongata* ***D*** *is not correct because structure X is not the spinal cord*	**(1)** **AO2 1**

Question number	Answer	Additional guidance	Mark
10c(ii)	An answer including: • by **electrical** impulses (1) • along a motor neurone (to the effector) (1)	 accept **electrical** message / signal accept motor neurone in the correct place in a description of a reflex arc	**(2)** **AO2 1**

(Total for question 10 = 11 marks)

Pearson Education Limited. Registered company number 872828
with its registered office at 80 Strand, London, WC2R 0RL, United Kingdom