Mark Scheme (Results)

Pearson Edexcel

Additional Sample Assessment Materials

GCSE 9-1

Paper 1: Biology 1BI0/1H

First examination 2017

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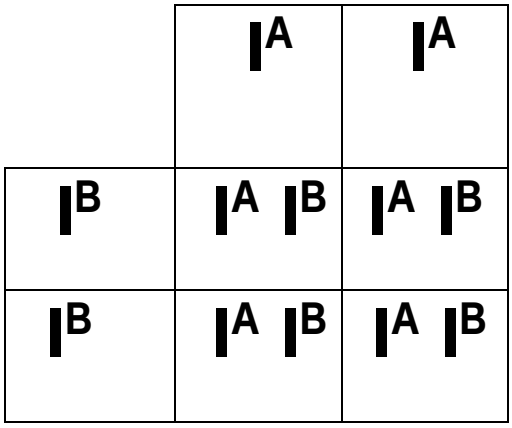
Summer 2017

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.

Paper 1H Additional SAM Biology

Question number	Answer	Mark
1(ai)	D	(1)

Question number	Additional guidance	Mark
1(aii)	 1 mark for correct parental gametes (1) 1 mark for correct offspring (1)	(2)

Question number	Answer	Mark
1(b)	An explanation that combines identification - application of knowledge (1 mark) and reasoning/justification - application of understanding (1 mark): • each parent carries a recessive/O allele (1) • offspring inherit two recessive/O alleles (1)	(2)

Question number	Answer	Mark
1(c)	An explanation that combines identification - application of knowledge (1 mark) and reasoning/justification - application of understanding (2 marks): • faulty allele is carried on X chromosomes (1) • males only have one X chromosome (1) • allele always expressed (in the phenotype) (1)	**(3)**

Total for Question 1 = 8 marks

Question number	Answer	Mark
2(a)	cannot be transferred from one person to another	(1)

Question number	Answer	Additional guidance	Mark
2(b)	Any one from: • mammals may be harmed • drugs may affect other mammals in a different way(1)	other mammals systems work in a different way from humans	(1)

Question number	Answer	Additional guidance	Mark
2(ci)	C		(1)

Question number	Indicative content	Mark
2(cii)	An explanation that combines identification via a judgement (1 mark) to reach a conclusion via reasoning (2 marks): • male Q (1) • higher BMI / less exercise / higher fat intake (1) • so more risk of fatty deposits / plaques in arteries / atherosclerosis / restricted blood flow to heart (1)	(3)

Question number	Answer	Mark
2(d)	An explanation that combines identification - application of knowledge (1 mark) and reasoning/justification - application of understanding (2 marks): • stent inserted into blood vessel and is expanded (1) • stent opens /widens blood vessel (1) • greater blood flow (through blood vessel) (1) • more oxygen delivered to body organ (1)	(3)

Total for Question 2 = 9 marks

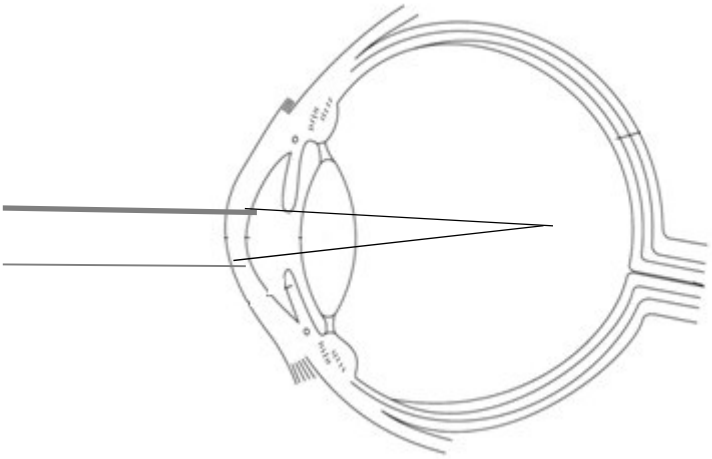
Question number	Answer	Additional guidance	Mark
3(a)	• to produce more food (1) • to improve quality of food (1)	bigger plants , produce more kernels, more sweet/juicy, pest resistant,	(2)

Question number	Answer	Additional guidance	Mark
3(b)	An answer that combines the following points of application of knowledge and understanding to provide a logical description: • best characteristics/named characteristic chosen (1) • parents bred together (1) • offspring produced showing some of the best characteristics are selected(1) • selection and breeding process repeated (1)	accept reference to pollination / fertilisation	(3)

Question number	Answer	Mark
3(c)	An answer that provides a description by making reference to: • an extra/new gene (1) • present in the DNA/chromosome (1)	(2)

Question number	Answer	Mark
3 (d)	An explanation that combines identification - knowledge (1 mark) and reasoning/justification - understanding (1mark): • cut DNA at recognition sites (1) • to create areas called sticky ends (1)	(2)

Total for Question 3 = 9 marks

Question number	Answer	Mark
4(ai)	 the rays converging (1) rays meeting at a point before the retina (1)	**(2)**

Question number	Answer	Mark
4(aii)	An explanation that combines application of knowledge (1 marks) and reasoning/justification – application of understanding (1 mark): • laser used to reshape the cornea/lens (1) • so that light rays are refracted on to the retina (1)	**(2)**

Question number	Answer	Mark
4(aiii)	B	**(1)**

Question number	Answer	Mark
4(bi)	A description that combines analysis via a judgement (1 mark) to reach a conclusion (1 mark): • as the caffeine dosage increases from 100mg to 300mg mean reaction time decreases (1) • little / no further effect on reaction time above 300mg dosage (1)	**(2)**

Question number	Answer	Mark
4(bii)	Any two from: • volunteers to be standardised e.g. gender, mass, age • include a control e.g. volunteer with no caffeine, reaction time before drinking • include interim concentrations of caffeine e.g. 200mg, 400mg	**(2)**

Total for Question 4 = 9 marks

Question number	Answer	Mark
5(a) (i)	Substitution 6mm ÷ 750 (1) Evaluation = 0.008 mm (1) Conversion = 8.0×10^{-3} mm	(3)

Question number	Answer	Mark
5(a) (ii)	**B**	(1)

Question number	Answer	Mark
5(b)	interphase	(1)

Question number	Answer	Mark
5(c)	D	(1)

Question number	Answer	Mark
5(d)	An answer that combines points of interpretation and evaluation to provide a logical description: • the chromosomes are split (1) • then the chromatids are pulled to either side of the cell (1) • by spindle fibres (1)	(3)

Total for Question 5 = 9 marks

Question number	Answer	Mark
6(a)(i)	Substitution 1.84 – 2.15 = -0.31 (1) change in mass Evaluation -0.31 ÷ 2.15 = -0.144 (1) Correct decimal places -0.144 x 100 = -14.41 (%) (correct to 2 dec place)	(3)

Question number	Answer	Additional guidance	Mark
6(a)(ii)	An explanation that combines application of knowledge (1 marks) and reasoning/justification – application of understanding: (2 mark) • chip 2 has gained mass but chip 5 has lost mass (1) • because chip 2 was immersed in a solution where the sucrose concentration outside the chip was lower than the sucrose concentration inside the chip (1) • so water osmosed into the chip causing it to become turgid / so chip water osmosed out of chip 5 and it became plasmolysed (1)	Accept reverse argument for chip 5	(3)

Question number	Indicative content	Mark
***6(b)**	Answers will be credited according to the candidate's deployment of knowledge and understanding of the material in relation to the qualities and skills outlined in the generic mark scheme. The indicative content below is not prescriptive and candidates are not required to include all the material that is indicated as relevant. Additional content included in the response must be scientific and relevant o tube 1 will be larger o as water will move into the tube by osmosis o from a high water potential outside tube 1 o into the low water potential inside tube 1 o across the partially permeable membrane of the visking tubing o tube 2 will shrink o as water will move out of the tube by osmosis o moving from a high water potential inside tube 2 o to a lower water potential outside of tube 2 o across the partially permeable membrane of the visking tubing	**(6)**

Level	Mark	Descriptor
	0	No rewardable material.
Level 1	1–2	• The explanation attempts to link and apply knowledge and understanding of scientific enquiry, techniques and procedures, flawed or simplistic connections made between elements in the context of the question. • Lines of reasoning are unsupported or unclear. (AO2)
Level 2	3–4	• The explanation is mostly supported through by linkage and application of knowledge and understanding of scientific enquiry, techniques and procedures, some logical connections made between elements in the context of the question. • Lines of reasoning mostly supported through the application of relevant evidence. (AO2)
Level 3	5–6	• The explanation is supported throughout by linkage and application of knowledge and understanding of scientific enquiry, techniques and procedures, logical connections made between elements in the context of the question. • Lines of reasoning are supported by sustained application of relevant evidence. (AO2)

Total for Question 6 = 12 marks

Question number	Answer	Mark
7(a)(i)	An answer that combines points of interpretation and evaluation to provide a logical description: • proteinase K breaks down protein molecules (1) • in cell and nuclear membranes to release the DNA (1)	(2)

Question number	Answer	Mark
7(a)(ii)	An answer that combines points of interpretation and evaluation to provide a logical description: • Aseptic techniques should be used to minimise transfer of genetic material / pathogens (1) • By sterilising equipment / autoclaving equipment (1) • Using protective clothing including gloves / facemask / goggles to prevent contamination (1)	(3)

Question number	Answer	Mark
7(a)(iii)	An explanation that combines application of knowledge (1 mark) and reasoning/justification – application of understanding: (1 mark): • activity decreases during storage at 37 ^{0}C (1) • because the active site of the enzyme has been affected / because the substrate can no longer bind to the enzyme (1)	(2)

Question number	Indicative content	Mark
7(b)	An answer that combines points of interpretation and evaluation to provide a logical description: • RNA polymerase attaches to non-coding portion of DNA located in front of the gene for proteinase K (1) • RNA polymerase produces a complementary messenger RNA strand from the coding DNA of the gene for proteinase K (1) • messenger RNA leaves the nucleus via the nuclear pore and enters cytoplasm of cell (1)	**(3)**

Total for Question 7 = 10 marks

Question number	Answer	Mark
8(a)(i)	A description that combines analysis via a judgement (1 mark) to reach a conclusion (1 mark) • as the pH of the hydrogen peroxide increases to pH 7 the catalase activity increases / above pH7 the activity of catalase decreases / less oxygen is produced (1) • catalase activity is optimal at pH7 (1)	**(2)**

Question number	Answer	Mark
8(a)(ii)	An explanation that combines application of knowledge (1 mark) and reasoning/justification – application of understanding (2 marks) • decrease in volume of oxygen produced (1) • as catalase denatures and there is less breakdown of hydrogen peroxide (1) • because less enzyme substrate complexes form (1)	**(3)**

Question number	Answer	Mark
8(a)(iii)	Any two variables from: • catalase concentration • catalase volume • hydrogen peroxide concentration • hydrogen peroxide volume • temperature	**(2)**

Question number	Indicative content	Additional Guidance	Mark
8(b)(i)	61 to be left out of the calculation (1) Substitution $\frac{53.0 + 51.2 + 52.8}{3}$ Evaluation = 52.3	Accept correct calculation using all 4 numbers for 1 mark (54.5)	**(2)**

Question number	Answer	Mark
8(b)(ii)	An analysis to develop an experimental procedure (2 marks) • only test the range between 6 and 8 (1) • with more intervals within this range (1)	**(2)**

Total for Question 8 = 11 marks

Question number	Answer	Mark
9(a)(i)	A description that combines the following points to form a plan: • use a sterilised inoculating loop (1) • dip into the bacteria culture and spread evenly over the agar jelly (1) • cover the Petri dish to prevent cross contamination (1)	**(3)**

Question number	Answer	Mark
9(a)(ii)	A description that combines identification of knowledge (1 mark) and reasoning/justification – understanding (1 mark): • both tetracycline and penicillin killed bacteria(1) • penicillin was more effective than tetracycline (1)	**(2)**

Question number	Answer	Additional guidance	Mark
9(a)(iii)	Calculate the radius =9mm Substitution $3.142 \times 9^2 = (1)$ Evaluation 254.5 (mm^2)	**Accept** other acceptable numbers for π	**(2)**

Question number	Indicative content	Mark
***9(b)**	Answers will be credited according to the candidate's deployment of knowledge and understanding of the material in relation to the qualities and skills outlined in the generic mark scheme. The indicative content below is not prescriptive and candidates are not required to include all the material that is indicated as relevant. Additional content included in the response must be scientific and relevant • attachment of viral particle to host cell receptor • nucleic acid of virus moves across the cell membrane • into the host cell • replication and synthesis of new viral components • using host DNA • assembly of new viral components into new viruses • lysis of infected host cell • release of fully assembled virus particles	**(6)**

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. (AO1) • Presents an explanation with some structure and coherence. (AO1)
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. (AO1) • Presents an explanation that has a structure which is mostly clear, coherent and logical. (AO1)
Level 3	5–6	• Demonstrates accurate and relevant biological understanding throughout. Understanding of the scientific ideas is detailed and developed. (AO1) • Presents an explanation that has a well-developed structure which is clear, coherent and logical (AO1)

Total for Question 9 = 13 marks

Question number	Answer	Mark
10(a)	**C**	**(1)**

Question number	Answer	Mark
10(b)(i)	Total percentage for AT bases = 56.8 % (1) Remainder shared between 2 bases 43.2 ÷ 2 = 21.6 %	**(2)**

Question number	Answer	Mark
10(b)(ii)	An explanation that combines identification of knowledge (1 mark) and reasoning/justification – understanding (2 marks): • the percentage of each of the bases are different (1) • so bases cannot be complementary to one another (1) • so will not form a double helix / will form a single strand (1)	**(3)**

Question number	Answer	Additional guidance	Mark
10(c)	An explanation that combines application of knowledge (2 marks) and reasoning/justification – application of understanding (2 marks) • The phosphorescent gene needs to be isolated from the DNA of the phosphorescent organism using enzymes to expose sticky ends(1) • The plasmid is removed from the bacterial cell and cut open using the same enzymes to expose complementary sticky ends (1) • The phosphorescent gene is inserted into the bacterial cell matching the sticky ends using the enzyme ligase (1) • The plasmid is inserted back into the bacterial cell and is grown on a petri dish each bacterial cell will express the phosphorescent gene and glow in the dark (1)		**(4)**

Total for Question 10 = 10 marks