Question number	Answer	Additional guidance	Mark
1(a)(i)	An answer that combines knowledge (1 mark) and understanding (1 mark) to provide a logical description: • (scientists might look for) differences in the structural features of the fossil (1) • and *Ardipithecus ramidus* would be deeper in the rock layer than *Homo* {*habilis*/stone tools} (1)	e.g. *Ardipithecus ramidus* smaller cranial capacity	**(2)**

Question number	Answer	Additional guidance	Mark
1(a)(ii)	An explanation that combines identification – application of knowledge (1 mark) and reasoning/justification – application of understanding (1 mark): • likely to be out-competed by *Homo erectus* (1) • {for resources essential for survival/due to the presence of a new selection pressure} (1)	accept: named resources accept: named selection pressure, e.g. climate change, environmental change, disease	**(2)**

Question number	Answer	Additional guidance	Mark
1(a)(iii)	An explanation that combines identification via a judgement (1 mark) to reach a conclusion via justification/reasoning (1 mark): • stone tool B because it is more {sophisticated/worked} (1) • and *Homo erectus* lived more recently than *Homo habilis* (1)	accept: data quoted from the timeline	**(2)**

Question number	Answer	Mark
1(b)	An answer that combines the following points of application of knowledge and understanding to provide a logical description: • genetic variation means that some plants will be tolerant of drought conditions and these can be selected (1) • cross-pollinate these plants and grow the seeds under drought conditions (1) • select offspring and repeat over several generations (1)	**(3)**

Question Number	Answer	Acceptable answers	Mark
2(a)(i)	**D** a tissue		**(1)**

Question Number	Answer	Acceptable answers	Mark
2(a)(ii)	A suggestion including two from: more haemoglobin can be carried (1) {increase in surface area (to volume ratio) / biconcave shape} (1) can carry more / absorb more oxygen (1) idea that RBCs are only carriers / does not need to carry out processes like protein synthesis (1)	more only needs to be stated once eg more haemoglobin to carry oxygen = 2 marks	**(2)**

Question Number	Answer	Acceptable answers	Mark
2(b)	An explanation linking the following: soft body tissue decays / decompose (1) some parts / bones may have been eaten / moved away from rest of skeleton / (by animals before fossilisation) (1) (some parts) not found / eroded / corroded / damaged / crushed / changed by pressure / heat (when in ground / excavated)(1)		**(3)**

Question Number		Indicative Content	Mark
QWC	***2(c)**	A explanation to include some of the following points Basic structure All have: • similar bone structure • humerus / femur / has one upper limb bone • radius and ulna / tibia and fibula / two lower limb bones • carpels / wrist bones • pentadactyl limb • have 5 digits Specific examples • some (eg horse) have digits reduced / missing • different shapes reflect different uses • suitable example, eg bat has extended first digit to support wing • different features caused by mutations • different environments have selected different features / mutations • idea of different features being beneficial / survival of the fittest • idea of adaptive radiation / selection of features / genes • suggests similar ancestors for all mammals /birds / reptiles / and (many) amphibians • can show how one species is related to another	**(6)**
Level	**0**	No rewardable content	
1	**1 - 2**	• a limited explanation of at least one idea from the basic structure section or the specific examples • the answer communicates ideas using simple language and uses limited scientific terminology • spelling, punctuation and grammar are used with limited accuracy	
2	**3 - 4**	• a simple explanation from the basic structure linked to at least one specific example OR a detailed explanation of the basic structure • the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately • spelling, punctuation and grammar are used with some accuracy	
3	**5 - 6**	• a detailed explanation that includes linking some of the areas of basic structure to specific examples related to evolution • the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors	

Total for Question 2 = 12 marks

Question number	Answer	Mark
3(a)	An explanation that combines identification – application of knowledge (1 mark) and reasoning/justification – application of understanding (2 marks): • penicillin prevents the bacteria from dividing as they cannot make a new cell wall (1) • because humans cells do not have a cell wall (1) • they are unaffected by penicillin (1)	**(3)**

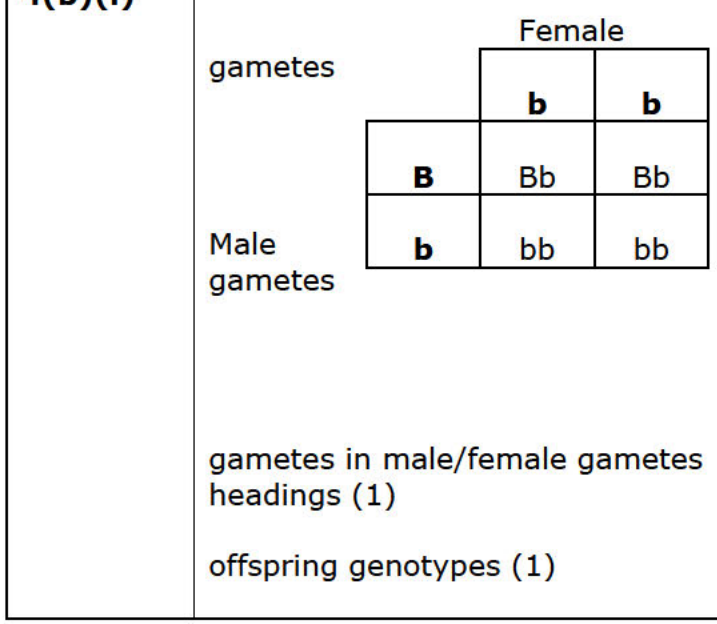
Question number	Answer	Mark
3(b)	An answer that combines knowledge (2 marks) and understanding (2 marks) to provide a logical description: • use restriction enzymes to remove the gene and cut the plasmid (1) • use of ligase to join DNA molecules together (1) • cut the gene from the genome of the fungus and extract a plasmid from the bacteria (1) • insert the recombinant plasmid back into the bacteria (1)	**(4)**

Question number	Indicative content	Mark
*3(c)	Answers will be credited according to 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 which is indicated as relevant. Additional content included in the response must be scientific and relevant. **AO1 (6 marks)** • bacteria reproduce rapidly generating a large population • there is variation among a bacterial population • some bacteria develop a resistance to antibiotics through mutation • antibiotic treatment exerts a selection pressure • bacteria resistant to antibiotics survive • antibiotic resistance inherited • non-resistant bacteria do not survive • levels of antibiotic resistance in a population of bacteria increase	**(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 fully developed. (AO1) • Presents an explanation that has a well-developed structure that is clear, coherent and logical. (AO1)

Question Number	Answer	Acceptable answers	Mark
4(a)(i)	D		**(1)**

Question Number	Answer	Acceptable answers	Mark
4(a)(ii)	substitution (1) 27 ÷ 40 evaluation (1) 0.675 x 100 67.5 (%)	e.c.f from 3(a)(i) accept 68(%) for 2 marks give full marks for correct answer, no working	**(2)**

Question Number	Answer	Acceptable answers	Mark
4(b)(i)	 gametes in male/female gametes headings (1) offspring genotypes (1)		**(2)**

Question Number	Answer	Acceptable answers	Mark
4(b)(ii)	0.5 / 50% / 50/50 / ½ / 2/4 / 2:2 /even chance	evens	**(1)**

Question Number	Answer	Acceptable answers	Mark
4(b)(iii)	homozygous recessive homozygous recessive	Accept any reasonable spelling of the term Reject heterozygous	**(1)**

Question Number	Answer	Acceptable answers	Mark
4 (c)	an explanation linking **three** of the following • speciation (1) • different geographical area may have different selection pressures / environmental conditions (1) • those individuals of a species suited /adapted / to this environment will survive and **breed** (1) • adaptations/genes passed down to the offspring • new species unable to breed with original (1)	named environmental conditions e.g. clima Accept survival of the fittest	**(3)**