

Mark Scheme

Combined Science GCSE

Natural Selection and Genetic Modification Test
(Levels 4-9)

	Answer	Marks
1. (a)	Charles Darwin.	(1)
1. (b)	• species • variation • adapted Answers must be given in that order.	(3)
1. (c)	• variation within the bacteria population owing to mutation • some variants are resistant to antibiotics/better adapted to survive against antibiotics • resistant bacteria reproduce • genes for resistance are inherited/passed onto offspring	(4)

(Total for Question 1 = 8 marks)

	Answer	Marks
2. (a)	the imprint or remains of organisms which were alive millions of years ago.	(1)
2. (b)	• (4.4) Ardi • (3.2) Lucy • (1.6) Leakey	(3)
2. (c)	• (Leg) bones suggest upright walking position (like humans) • Skull is small/ape-like	(2)
2. (d)	• They have been shaped. • They have been attached to a stick. • They have become more weapon-like.	(3)

(Total for Question 2 = 9 marks)

	Answer	Marks
3. (a)	An artificial process in which organisms with more desirable characteristics are genetically crossed to produce offspring.	(1)
3. (b)	Any two from: • Cows producing more milk/meat • Chickens producing larger eggs • Crops which produce more grain/higher yield	(2)
3. (c)	• Decide important characteristics for selection • Choose parent organisms showing these characteristics • Choose offspring from these parents showing these characteristics • Interbreed these offspring and continue to repeat process	(4)

(Total for Question 3 = 7 marks)

	Answer	Marks
4. (a)	3. Insertion of the desired gene into another organism 2. Isolating the gene which codes for the desired characteristic 1. Decide the important characteristic 4. Replication of the transgenic organism 2 correct for 1 mark 3 correct for 2 marks All correct for 3 marks	(3)
4. (b)	• Bacteria reproduce rapidly • Can express/produce the proteins coded for quickly	(2)
4. (c)	• vector • restriction • ligase Answers must be given in that order.	(3)
4. (d)	• DNA containing desirable gene is removed from a cell nucleus • Enzyme used to cut the gene from the DNA molecule • Plasmid is removed from a bacteria (cut using enzyme) • Desired gene inserted into plasmid • Plasmid inserted back into bacterium cell • Bacteria reproduces rapidly, producing clones	(6)

(Total for Question 4 = 14 marks)

	Answer	Marks
5. (a)	Advantages; any two from: • Higher yield • Better quality produce • More food • Increased profit Disadvantages; any two from: • Reduced biodiversity • Reduced gene pool • Increased spread of disease • Possibility of genetic mutations	(4)
5. (b)	Any two from: • Possible risk to human health • Allergens or toxins • Morally wrong to create new life forms • Morally wrong to move genes between species	(2)
5. (c)	Max two marks for each statement (i) Can prevent blindness Can prevent malnutrition/vitamin deficiencies (ii) Could contain allergens Could contain toxins Levels (of beta carotene) may not be sufficient for impact (iii) Gene can enter/contaminate wild species Mutations cannot be predicted/controlled Crops can crossbreed with non-GM species	(6)

(Total for Question 5 = 12 marks)

TOTAL FOR PAPER = 50 MARKS