Question Number	Answer	Acceptable answers	Mark
1(a)(i)	met, val, lys met – val – lys MET VAL LYS	Accept mix of upper and lower case Accept: metvallys / metvalys Not necessary to separate the words out.	**(1)**

Question Number	Answer	Acceptable answers	Mark
1(a)(ii)	translation	Accept spellings such as transation, transalation reject: transcription	**(1)**

Question Number	Answer	Acceptable answers	Mark
1(a)(iii)	**D** ribosome		**(1)**

Question Number	Answer	Acceptable answers	Mark
1(b)	An explanation including **two** of the following points: • ref to specific shape (1) • to bind to substrate / form enzyme substrate complex (1) • for reaction to take place / catalysed(1) • joining together {substrates / molecules} / break down {substrates / molecules} (1) • ref to lock and key mechanism / hypothesis (1)		**(2)**

Question Number	Answer	Acceptable answers	Mark
1(c)	A description including **three** of the following points: • a mutation is a change in a gene (sequence) / base pairs (1) • (change in DNA) causes a change in amino acid(s) /order of amino acids (1) • change in shape of {active site / protein / enzyme} (1) • prevent / reduce binding to substrate (1) • enzyme can no longer function / reduced function (1) • enzyme could be more effective (1)	accept change enzyme function / stops the function of the enzyme ignore: refs to denaturation	**(3)**

Question number	Answer	Mark
2(a)(i)	B	(1)

Question number	Answer	Mark
2(a)(ii)	TACGTACATGGC	(1)

Question number	Answer	Additional guidance	Mark
2(a)(iii)	• 3.33×10^{-10} equals 0.33 nm (1) • $0.33 \times 250 = 82.5$ (nm) (1)	maximum one mark if no conversion to nm award full marks for correct numerical answer without working	(2)

Question number	Answer	Additional guidance	Mark
2(b)(i)	• heterozygous	accept alleles showing heterozygous genotype	(1)

Question number	Answer	Mark
2(b)(ii)	• correct Punnett square (1) • 75% normal fur pigmentation (1)	(2)

	A	a
A	AA	Aa
a	Aa	aa

Question number	Answer	Mark
2(c)	An explanation that combines identification – understanding (1 mark) and reasoning/justification – understanding (1 mark): • both parents must be heterozygous for the recessive allele (1) • so the offspring must inherit the recessive allele from each parent (1)	(2)

Question number	Answer	Mark
3(a)	An explanation that combines identification – application of knowledge (1 mark) and reasoning/justification – application of understanding (1 mark): • the CD4+ count is significantly below the normal range because the HIV has destroyed the {white blood cells/CD4+ cells} (1) • so the person is more susceptible to opportunistic infections and classified as having AIDS (1)	**(2)**

Question number	Indicative content	Mark
*3(b)	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. **AO2 (6 marks)** • isolate an antigen from the pathogen which causes the STI • inject the antigen into a mouse/rodent • collect lymphocytes producing an antibody to the STI antigen • fuse the B-lymphocyte with a myeloma cell • production of a hybridoma • hybridoma produces a monoclonal antibody against the antigen of the STI • attach the monoclonal antibody to coloured bead/indicator • incorporate into a test strip.	**(6)**

Level	Mark	Descriptor
	0	No awardable content
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. (AO2) • Lines of reasoning are unsupported or unclear. (AO2)
Level 2	3-4	• The explanation is mostly supported through 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. (AO2) • 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. (AO2) • Lines of reasoning are supported by sustained application of relevant evidence. (AO2)

Question number	Answer	Additional guidance	Mark
3(c)	An explanation that combines identification – understanding (1 mark) and reasoning/justification – understanding (3 marks): • a single strand of messenger RNA is transcribed from the gene in the nucleus (1) • messenger RNA molecule binds to the ribosome (1) • the triplet code from the mRNA is matched by a complementary tRNA anticodon at the ribosome (1) • tRNA transfers amino acids to the polypeptide chain in a specific order (1)	to gain maximum marks the process must be in a logical sequence	**(4)**