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

Question Number	Answer	Acceptable answers	Mark
1(a)(ii)	**C** In DNA, the bases A - T are complementary		**(1)**

Question Number	Answer	Acceptable answers	Mark
1(b)	A definition including two of the following: • a sperm fuses with egg / penetrates the egg (1) • nuclei/genetic information fuses /combines (1) • reference to haploid gametes /gametes have 23 chromosomes (1) • reference to cell made being diploid / has 23 pairs of chromosomes / zygote formed (1)	Ignore sperm meets egg	**(2)**

Question Number	Answer	Acceptable answers	Mark
1(c)(i)	A description that includes the following: • (aerobic) respiration / using glucose / using oxygen (1) • energy released (for movement / swimming / metabolism)(1)		**(2)**

Question Number	Answer	Acceptable answers	Mark
1(c)(ii)	An explanation including **two** of the following: • a change in a base/base sequence/order of bases / a change in mRNA (1) • named change e.g. addition/deletion (1) • reference to change in an amino acid / order of amino acids (1)	Accept codon, triplet, genetic code for base. substitution/deletion/other named gene mutation.	**(2)**

(Total for question 1 = 8 marks)

Question Number	Answer	Acceptable answers	Mark
2a (i)	B – the glucose content of their blood		**(1)**

Question Number	Answer	Acceptable answers	Mark
2a (ii)	An explanation linking **three** of the following points: • (the hormone) insulin (1) • (insulin)is injected (into subcutaneous fat) (1) • use a low carbohydrate /healthy diet (1) • (increase) exercise (1) • to lower blood glucose levels / when blood glucose levels get too high / regulate glucose levels(1)	use of epipen	**(3)**

Question Number	Answer	Acceptable answers	Mark
2b	Body Mass Index calculation: $120/1.8^2$ (1) 37 (1)	ecf for correct manipulation with incorrect figures	**(2)**

Question Number		Indicative Content	Mark
QWC *2(c)		An explanation including the following points in a logical order: • a reflex response is an involuntary response • reflex responses do not involve the brain • reflex responses involve sensory neurones • reflex responses involve relay neurones • reflex responses involve motor neurones • relay neurones are in the spinal cord • impulses travel along neurones as electrical signals • the axon is insulated by the myelin sheath • which ensures the electrical signal does not lose energy • at the junction between two neurones there is a synapse • the message is carried across the synapse by neurotransmitters • the message travels from the stimulus along the axon and dendron of the sensory neurone to the spinal cord • the reflex arc is important to keep the body safe	**(6)**
Level		No rewardable content	
1	1-2	• A limited written explanation of some of the neurones involved in the reflex arc or a limited explanation of how messages /impulses are transmitted as electrical signals • 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 of the neurones involved in the reflex arc in the correct order, with the method of transmission along neurones, one neurone may be missing **or** a detailed description of all of the neurones in the reflex arc and the role of the CNS • the answer communicates ideas showing some evidence of clarity and organisation and mostly uses scientific terminology appropriately • spelling, punctuation and grammar are used with some accuracy	
3	5-6	• A detailed explanation of the neurones involved in the reflex arc in the correct order, with the method of transmission along neurones including the role of the synapse and/or myelin sheath. • the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors	

Question Number	Answer	Acceptable answers	Mark
3(a)(i)	A		**(1)**

Question Number	Answer	Acceptable answers	Mark
3(a)(ii)	A		**(1)**

Question Number	Answer	Acceptable answers	Mark
3(b)	an explanation linking the following • from receptor (cells) / sense organ (1) • to the {brain / spinal cord / CNS / synapse / other neurone}(1) • as an <u>electrical</u> impulse (1)	Accept named sense organ <u>electrical</u> message/signal Ignore references to current	**(2)**

Question Number	Answer	Acceptable answers	Mark
3(c)	a description including **two** of the following • insulates (electrical signal) (1) • the axon (1) • speeds up the impulse (1)	ignore protects / protection accept message / signal for impulse	**(2)**

Question Number	Answer	Acceptable answers	Mark
3(d)	a description including **three** of the following • receptor cells (pick up a stimulus) (1) • sensory neurone sends a message to the spinal cord / relay neurone / CNS (1) • the message travels from the relay neurone / CNS / spinal cord to the motor neurone (1) • (this initiates a response) in the effector / muscle / gland (1) • message travels across synapse (by neurotransmitters) (1)	accept the correct nerve pathway diagram for 3 marks accept nerve for neurone	**(3)**

Question Number	Answer	Acceptable answers	Mark
4(a)	**A** differentiate into any type of cell		**(1)**

Question Number	Answer	Acceptable answers	Mark
4(b)	Any **two** structures from the list with at least **one** matched adaptation: Structures (maximum of 2) • biconcave shape (1) • no nucleus (1) • thin membrane (1) • flexible / small (1) • contains haemoglobin (1) (matched) adaptation (maximum of 2) • large surface area / increase oxygen uptake (1) • to increase amount of haemoglobin / oxygen-carrying capacity (1) • so short distance for diffusion (1) • to get through capillaries (1) • to bind oxygen (1)		**(3)**

Question Number	Answer	Acceptable answers	Mark
4(c)	A description including **two** of the following points • clotting / to seal a wound / scab formed (1) • stop bleeding (1) • prevent infection / entry of microbes (1) • fibrin (1)		**(2)**

Question Number		Indicative Content	Mark
QWC	***4d**	A comparison between mitosis and meiosis including **Mitosis** • (genetically) identical cells produced • two daughter cells • one division • diploid daughter cells • identical set of chromosomes • occurs in the formation of body cells • for growth and repair (of body tissues) **Meiosis** • (genetically) non-identical cells • four daughter cells • 2 divisions • haploid daughter cells • half the number of chromosomes • occurs in the formation of gametes • for sexual reproduction • results in genetic variation	**(6)**
Level	**0**	No rewardable content	
1	**1 - 2**	• a limited description including two points on either meiosis or mitosis there maybe confusion between the two but this does not negate the level • 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 description including one comparison of meiosis and mitosis or a detailed description of either mitosis or meiosis • 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 comparison of both meiosis and mitosis – at least two correct comparisons made • the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors	