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

Question Number	Answer	Acceptable answers	Mark
1(a)(ii)	Hypothalamus	Accept alternative spellings e.g. hypothalamus / hyperthalamus	**(1)**

Question Number	Answer	Acceptable answers	Mark
1(b)	A description linking **two** of the following points: • erector muscles in the skin contract (1) • cause the hair to rise to trap air close to the skin to reduce heat loss / insulates skin (1) **OR** • sweat glands release water / sweat (1) • evaporates and cools the skin (1) **OR** • (brief description of) vasodilation or vasoconstriction (1) • method of control (1)	hairs on the surface of the skin stand on end	**(2)**

Question Number	Answer	Acceptable answers	Mark
1(c)	An explanation linking **two** of the following points • in order for the enzymes to be most effective / best /optimum temperature for enzymes to work (1) • for chemical reactions to happen (1) • at too high temperatures enzymes are denatured (1)	**Accept** named enzyme Accept named chemical reaction ORA at colder temperatures enzymes are less active	**(2)**

Question Number		Indicative Content	Mark
QWC	***1(d)**	An explanation linking some of the following points: • vasodilation and vasoconstriction help control body temperature • in vasodilation more warm blood flows near the surface of the skin • as the shunt valve stops blood flowing by another route • more heat can be radiated or convected from the skin • body temperature is reduced • in vasoconstriction less blood flows near the surface of the skin • as it flows through the shunt valve • body temperature returns to normal	**(6)**
Level	**0**	No rewardable content	
1	**1 - 2**	• a limited explanation of thermoregulation although the processes of vasodilation and vasoconstriction are not mentioned • 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 either vasodilation or vasoconstriction this may be a description but not include the words vasodilation and vasoconstriction • 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 of both vasodilation and vasoconstriction including references to either the method of heat loss or the role • there is coherent flow of content and accurate use of scientific terminology to explain thermoregulation • spelling, punctuation and grammar are used with few errors	

(Total for question 1 = 12 marks)

Question Number	Answer	Acceptable answers	Mark
2(a)(i)	A description including the following points: • as mean mass increases so does the percentage of population with type 2 diabetes (1) • correct readings from the graph to illustrate the comparative point (1)	**accept** positive correlation ORA	**(2)**

Question Number	Answer	Acceptable answers	Mark
2(a)(ii)	A suggestion linking **two** of the following: • increasing body mass leads to over weight / obesity • don't respond to insulin / reference to insulin resistance		**(2)**

Question Number	Answer	Acceptable answers	Mark
2(b)(i)	Calculation (1.7 x 1.7) = 2.89 (1) 78 / 2.89 = 27 (1)	Two marks for correct bald answer Ecf for incorrect numbers but correct calculation 26.98 / 26.9 Accept continued decimal places	**(2)**

Question Number	Answer	Acceptable answers	Mark
2(b)(ii)	**C** ☒ overweight		**(1)**

Question Number	Answer	Acceptable answers	Mark
2(c)	A description linking **three** of the following: • glucagon is released (1) • from the pancreas (1) • glycogen to glucose (1) • in the liver / muscle cells(1) • which acts to raise blood glucose levels (1)	correct spelling of glycogen and glucagon only No mark for glucagon is injected Ignore references to glucagon turning into glucose	**(3)**

Total for question 2 – 10 marks

Question number	Answer	Mark
3(a)(i)	• person 2 had a slightly higher blood glucose level than person 1 after fasting (by up to 0.2 mmols/l) (1)	(1)

Question number	Answer	Mark
3(a)(ii)	• person 3 had a much higher blood glucose level than person 1 two hours after taking glucose (up by up to 5.6 mmols/l) (1)	(1)

Question number	Answer	Mark
3(a)(iii)	Insulin	(1)

Question number	Answer	Mark
3(b)(i)	An answer that combines points of interpretation/evaluation to provide a logical description: • levels remain low up until day 14 then rise (1) • they continue to rise to day 23 and drop at day 24 (1)	(2)

Question number	Answer	Mark
3(b)(ii)	An explanation that combines identification – understanding (1 mark) and reasoning/justification – understanding (1 mark): • as ovulation occurs (1) • the levels of progesterone released from the corpus luteum increases to maintain the lining of the uterus (1)	(2)

Question number	Answer	Mark
3(b) (iii)	An explanation that combines identification via a judgment (1 mark) to reach a conclusion via justification/reasoning (1 mark): • progesterone levels fall after day 23 to 17.11 (1) • so uterus wall thickness is not maintained and therefore pregnancy has not occurred (1)	(2)

Question Number	Answer	Acceptable answers	Mark
4(a)	An explanation linking **four** of the following points: • (dehydration detected by) osmoreceptors/hypothalamus (1) • pituitary gland (1) • (releases more) ADH (1) • ADH acts on the nephron/collecting duct/tubules (1) • making the {collecting duct/tubules/nephron} more permeable (1) • so **more** water is reabsorbed (by the body/blood) (1)	ignore brain accept {small amount/concentrated} urine produced	**(4)**

Question Number	Answer	Acceptable answers	Mark
4(b)(i)	**A** corpus luteum		**(1)**

Question Number	Answer	Acceptable answers	Mark
4(b)(ii)	• uterus lining remains thick/uterus lining continues to grow (1)		**(1)**

Question Number		Indicative Content	Mark
QWC	**4(b)(iii)***	A explanation to include some of the following points Stages and hormones • menstrual cycle consists of menstruation, uterus lining thickening and ovulation • hormones involved in the menstrual cycle are oestrogen, progesterone, FSH and LH Role of the hormones • FSH stimulates the follicles to mature • FSH stimulates the production of oestrogen • follicles secrete oestrogen • oestrogen is responsible for the repair of the uterus wall • high levels of oestrogen stimulate the release of LH • LH triggers ovulation • corpus luteum produces progesterone • progesterone maintains the lining of the uterus Control mechanisms • oestrogen inhibits the production of FSH • progesterone inhibits the production of LH • progesterone inhibits the production of FSH • menstruation is triggered by low levels of oestrogen and progesterone • Low progesterone levels cause FSH to be released	**(6)**
Level	**0**	No rewardable content	
1	**1 - 2**	• A limited explanation of the menstrual cycle which might include at least one of the stages **or** some of the hormones involved **or** the role of one of the hormones involved • 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 menstrual cycle including some of the stages **and** the role of at least two of the hormones involved • 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 of the menstrual cycle including most of the hormones involved, their roles **and** at least one control mechanism • 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 4 = 12 marks)