

Question Number	Answer	Mark
1(a)(i)	The only correct answer is A – a glycosidic bond B is not correct because they do not form hydrogen bonds C is not correct because fats form ester bonds D is not correct because they do not contain ionic bonds	(1)

Question Number	Answer	Mark
1(a)(ii)	The only correct answer is C - hydrolysis A is not correct because this occurs when glycogen is formed B is not correct because this occurs when fats are formed D is not correct because this refers to DNA	(1)

Question Number	Answer	Additional Guidance	Mark
1(b)(i)	1. correctly formed peptide bond ; 2. rest of dipeptide drawn correctly ; 3. molecule of water shown ;	MP1 I-CONH/CO-NH/COHN I-orientation MP2 A-COOH/NH₂ MP3 A-chemical or structural formula	(3)

Question Number	Answer	Additional Guidance	Mark
1(b)(ii)	polypeptide / protein ;	ACCEPT dipeptide/peptide DNA-peptide bond	(1)

Question Number	Answer	Additional guidance	Mark
1(c)	1. water is a solvent ; 2. water is {slightly charged / dipole / polar / eq} ; 3. idea that {polar molecules / charged molecules / ions} dissolve/eq in water ; 4. correctly named example of a solute transported ;	"water is a polar solvent"=mp1/2 2. A- correct reference to hydrogen bonds A-ref to H slightly +ve and O slightly -ve I-amphoteric / charged / ion 3. A-ref to being soluble A-substances as eq A-ionic compounds 4. Eg O2/CO2/glucose/amino acids/sodium ion/proteins	(3)

Question Number	Answer	Additional guidance	Mark
2(a)	1. it affects the blood vessels and the heart / eq ; 2. correct description of an effect/named effect ;	1. A-named / type of vessel I-CV/circulatory system 2. A-narrowed or blocked blood vessel / atherosclerosis / plaques / atheroma / reduced blood or O2 supply "A blockage of the coronary artery"=mp1 & 2 I-named CVDs / CHDs(these are consequences not effects)	(2)

Question Number	Answer	Mark
2(b)	The only correct answer is B - antihypertensives <i>A is not correct because anticoagulants prevent blood clotting</i> <i>B is not correct because platelet inhibitors act on platelets</i> <i>D is not correct because statins reduce cholesterol levels</i>	(1)

Question Number	Answer	Additional guidance	Mark
2(c)	Any two from: genetics / diet* / age / gender / smoking / exercise / alcohol / stress /obesity/inactivity/high cholesterol/eq ;	I-lifestyle only I-high blood pressure *A-eg high fat / salt /sugar intake A-high BMI/overweight	(2)

Question Number	Answer	Additional guidance	Mark
2(d)(iii)	1. idea of improvements in education (health related); 2. idea of improvements in healthcare; 3. idea of improvements in lifestyle;	1. A- increased public awareness/knowledge/literacy 2. A-preventative measures e.g. screening, diagnosis, medication, treatment/named treatment eg statins 3. A- examples of lifestyle changes eg more exercise/improved diet/stop smoking All 3 mps should imply an improvement eg ref to more/better/eq I-ref to changes only	(3)

Question Number	Answer	Additional guidance	Mark
3(a)(i)	1. {alteration / change / eq} in DNA ; 2. a change in {base / codon / nucleotide} sequence / a named type of mutation ;	MP1 and 2 ACCEPT "a change in the base sequence of DNA" for 2 marks 2. A- (base) substitution, insertion, deletion	(2)

Question Number	Answer	Additional guidance	Mark
3(a)(ii)	1. it is always expressed / always shown in the phenotype ; 2. an allele is {form / version / alternative / variant} of a gene ;	1. A- only one dominant allele is needed I-present only Mp2 DNA-a type of gene	(2)

Question Number	Answer	Additional guidance	Mark
3(b)(i)	1. genotypes of parents shown correctly ; 2. correct gametes shown ; 3. all four correct genotypes for all offspring ; 4. phenotypes correctly matched to genotypes of offspring ;	ecf from mp1 A-any letter/penalize use of 2 diff letters once MP2 and 3 ACCEPT in Punnett square 4.A- normal / healthy / sufferer / affected/eq If pedigree diagram drawn-0 marks unless genotypes stated then mp1, 3 and 4	(4)

Question Number	Answer	Mark
3(b)(ii)	0.5 / 50% / $\frac{1}{2}$ / 1 in 2 / 2 in 4 / 1:1;	ecf from 3bi mp4 DNA-2:4 (1)

Question Number	Answer	Mark
4(a)	The only correct answer is C - contain phosphate groups <i>A is not correct because only RNA is single stranded</i> <i>B is not correct because only DNA contains deoxyribose</i> <i>D is not correct because only RNA contains uracil</i>	(1)

Question Number	Answer	Additional guidance	Mark							
4(b)(i)	Sequence:									
	<table><tr><td>A</td><td>C</td><td>T</td><td>T</td><td>C</td><td>G</td><td>C</td><td>C</td><td>G</td><td>A</td></tr></table>			A	C	T	T	C	G	C
A	C	T	T	C	G	C	C	G	A	
	1. both adenines correct;									
	2. rest of sequence correct;		(2)							

Question Number	Answer	Mark
4(b)(ii)	The only correct answer is B - 300 <i>A is not correct because it is a triplet code so 100 is too few</i> <i>C is not correct because it is a triplet code so 600 is too many</i> <i>D is not correct because it is a triplet code so 900 is too many</i>	(1)

Question Number	Answer	Additional guidance	Mark
*4(c)	1. transcription named as stage ; 2. DNA {separates / unwinds / unzips / uncoils/ eq} ; 3. by breaking hydrogen bonds ; 4. (mono) nucleotides line up with complementary bases / complementary base pairing occurs ; 5. phosphodiester bonds form (between mononucleotides) ; 6. ref to any correctly named enzyme ; 7. messenger RNA / mRNA {detaches / leaves the nucleus / enters cytoplasm} ;	QWC-emphasis is on logical sequence. 1. A-DNA is transcribed 4. A-RNA nucleotides not-DNA nucleotides A-named bases / letters e.g. A-U / T-A / G-C 6. A-(RNA) polymerase / helicase not-DNA polymerase **If candidate talks about transcription AND translation then max marks available(read whole response) If they incorrectly name the stage as translation but then describe transcription they lose mp1 only	(5)

Question Number	Answer	Additional guidance	Mark
5(a)	1. $x = 30 \times \{ 3.8025 / 3.8 / 1.95^2 \};$ 2. 114.075 / 114 / 114.1 / 114.08 (kg) ;	Correct answer without working gains 2 marks No ecf	(2)

Question Number	Answer	Additional guidance	Mark
5(b)(i)	1. idea that as BMI increases % diabetes increases (overall); 2. a decrease between 20-24 ; 3. credit correct manipulation of figures linked to mp1 / 2 ;	1.A-positive correlation I-ref to womens data 3. eg.58% less in 35-39 cf 40+/2% less n 20-24 cf less than 20/overall increase of 94%	(2)

Question Number	Answer	Additional guidance	Mark
5(b)(ii)	1. incidence higher in men (in all categories) ; 2. ≥ 40 there is the greatest difference / 20-24 has the smallest difference ; 3. credit correct manipulation of data linked ;	1. A- converse 2. A-67% greatest / 3% smallest	(3)

Question Number	Answer	Additional guidance	Mark
5(c)	1. take exercise ; 2. reduce {energy intake / calorie or kJ intake / eq} ;	1. A- named exercise/sport 2. A-correct ref to energy budgets eg energy output exceeding energy input I-ref to diet / dietary components/named foods only eg a low fat / sugar diet 3.	(2)

Question Number	Answer	Additional guidance	Mark
5(d)	1. idea of {under / overestimation/ eq} of food intake ; 2. idea of lack of education about {nutrition / diet / eq} ; 3. idea that they may be {untruthful / forgetful / eq } ;	1.A-portions incorrectly weighed/calculated 2. A-lack of awareness/knowledge 3 A-lie/biased I-ref to other variables not being controlled	(2)

Question Number	Answer	Mark
6(a)(i)	The only correct answer is B - catalyse the conversion of fibrinogen to fibrin <i>A is not correct because its only role is to convert fibrinogen to fibrin</i> <i>C is not correct because its only role is to convert fibrinogen to fibrin</i> <i>D is not correct because its only role is to convert fibrinogen to fibrin</i>	(1)

Question Number	Answer	Additional guidance	Mark
6(a)(ii)	1. the {coronary artery/eq} becomes {blocked/narrowed/eq}; 2. blood flow to the heart is reduced/eq ; 3.(this) prevents {oxygen/glucose} from reaching the heart {cells / muscle / tissue}; 4. (cardiac) muscle is {unable to contract / respire /eq} ;	1. ACCEPT-artery carrying blood to the heart "oxygenated blood cannot reach heart cells"=mp2/3 4. ACCEPT no or less ATP made/heart cells die I-refs to anaerobic respiration/lactic acid I-heart fatigues/stops working	(3)

Question Number	Answer	Additional guidance	Mark
6(b)	1. 8.0mm ; 2. 0.67 ;	1. measurement within range of 7.0mm to 9.0mm ; A correct answer in cm; 2. answer within range of 0.58 to 0.75 ;	(2)

Question Number	Answer	Additional guidance	Mark
*6(c)	1. artery walls {are thick / contain collagen } ; 2. to withstand high pressure / eq ; 3. arteries contain elastic fibres ; 4. help to maintain pressure / allow stretch and recoil ; 5. arteries have smooth muscle ; 6. changes the diameter of the artery / allow contraction and relaxation ; 7. arteries have a smooth endothelium / eq ; 8. to reduce { friction / resistance / eq } ; 9. arteries have a folded endothelium /eq ; 10. to allow expansion ;	QWC emphasis on clarity of expression Paired responses-1/3/5/7/9 are independent structure marks and 2/4/6/8/10 are associated function marks. Mp6 A-constriction and dilation Mp7 and 9 A-inner lining	(5)

Question Number	Answer	Additional guidance	Mark
(7)(a)	1. idea that the mutation changes the {primary structure / sequence of amino acids} in the (CFTR) protein ; 2. idea that this leads to a {non-functional / faulty / absent / eq} (CFTR) protein/ (chloride) channel ; 3. chloride ions {do not move out of / move into} the cell ; 4. water {does not move out of / moves into} the cell ;	Mp3 I-ref to sodium ions A-chlorine ion DNA-chlorine only Mp3 & 4 A-stay in the cell	(3)

Question Number	Answer	Additional guidance	Mark
7(b)(i)	1. amniocentesis ; 2. amniotic fluid collected ; 3. between 14 and 20 weeks of pregnancy ; 4. {DNA/genes} analysed / cells cultured ; Or 5. chorionic villus sampling / CVS ; 6. sample taken from placenta ; 7. between 8 and 12 weeks of pregnancy ; {DNA/genes/alleles} analysed / cells cultured ;	If method does not match description do not award first mark. Mp3 & 7-accept any figure within the given range Mp4 & 8-accept DNA is tested Mp5 accept testing	(3)

Question Number	Answer	Additional guidance	Mark
7(b)(ii)	1. idea that the condition is rare / no family history / eq ; OR 2. idea that the test is {expensive / unavailable / eq } ;	Mp1 A-parents not carriers I-refs to risks/ethics or religion	(1)

Question Number	Answer	Additional guidance	Mark
7(b)(iii)	1. idea that it may result in a miscarriage / spontaneous abortion ; 2. idea of risk of false {positive / negative} / inaccurate result ; 3. comment on consequence e.g. healthy fetus may be aborted ; 4. {killing / eq} is {wrong / unethical / eq} ; 5. who has right to decide if tests should be performed / eq ;	Mp1 A-harms/damages fetus/embryo I-ref baby Mp4 A-fetus has a right to life/eq	(3)

Question Number	Answer	Additional guidance	Mark
8(a)	1. activity increases up to {40 °C / optimum temperature} and decreases above {40 °C / optimum temperature} ; 2. the increase is non-linear / exponential / eq ; 3. credit correct manipulation of data linked to mp1 or 2 ;	Mp1 & 2 A-peak Mp1 I-refs to rate of decrease in mass Mp2 A-increases at an increasing rate Mp3-eg from 10-40/up to 40 there is a 312.5% or 25mg/min increase Mp3-eg above 40/from 40-50 there is a 69.7/70% or 23mg/min decrease	(3)

Question Number	Answer	Additional guidance	Mark
8(b)	1. ref to the enzyme is { denatured / denaturing } ; 2. because { R-groups are vibrating / bonds are breaking / eq } ; 3. therefore { no starch / less starch } binds to the active site / { no / fewer } ESCs formed ; 4. therefore the { glycosidic bond / starch } is not { hydrolysed / broken down } ;	2.DNA-peptide bond 2.A-other named bonds 3.A-substrate as eq to starch and fits into as eq to binds 4. A less broken down if in context with mp3	(3)

Question Number	Answer	Additional guidance	Mark
8(c)	- idea of determining the mass of {starch / peas / seeds } at start and end ; - allow {peas / seeds} to { germinate / grow / eq } ; - controlled variable in { peas /seeds } ; - description of how rate is calculated ; - temperature controlled in a water bath / eq ; - repeat and calculate of a mean / average ;	Mp1 I-amount of peas Mp3 A-eg age/species/type I-size/volume/mass Mp4 A-correct equation/calculation Mp5 A-incubator/temp controlled room If wrong experiment described 2 marks max-mp 5/6	(4)

