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** **A** *is not correct because anticoagulants prevent blood clotting* **B** *is not correct because platelet inhibitors act on platelets* **D** *is not correct because statins reduce cholesterol levels*	**(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)(i)	1. idea that the populations of the countries are different ; OR 2. idea that it allows for standardisation or comparison ;	I-ref to sample size/reliability/accuracy	(1)

Question Number	Answer	Additional guidance	Mark
2(d)(ii)	1. 141 – 115 = 26 ; 2. 18.44 (%) ;	Correct answer no working gains 2 marks No ecf A-18/18.4/18.439 DNA-18.43	(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% / ½ / 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** **A** *is not correct because only RNA is single stranded* **B** *is not correct because only DNA contains deoxyribose* **D** *is not correct because only RNA contains uracil*	**(1)**

Question Number	Answer	Additional guidance	Mark
4(b)(i)	Sequence: 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** **A** *is not correct because it is a triplet code so 100 is too few* **C** *is not correct because it is a triplet code so 600 is too many* **D** *is not correct because it is a triplet code so 900 is too many*	**(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 x { 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** **A** *is not correct because its only role is to convert fibrinogen to fibrin* **C** *is not correct because its only role is to convert fibrinogen to fibrin* **D** *is not correct because its only role is to convert fibrinogen to fibrin*	**(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} ;	Mp1 & 2 A-peak Mp1 I-refs to rate of decrease in mass	**(3)**
	2. the increase is non-linear / exponential / eq ;	Mp2 A-increases at an increasing rate	
	3. credit correct manipulation of data linked to mp1 or 2 ;	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	

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)	1. idea of determining the mass of {starch / peas / seeds } at start and end ; 2. allow {peas / seeds} to { germinate / grow / eq } ; 3. controlled variable in { peas /seeds } ; 4. description of how rate is calculated ; 5. temperature controlled in a water bath / eq ; 6. 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)**