

1)

Question Number	Answer	Mark
1(a)(i)	A ;	(1)

1(a)(ii)	A ;	(1)
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1(a)(iii)	D ;	(1)
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1(a)(iv)	B ;	(1)
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1(a)(v)	D ;	(1)
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2)

(a) QWC	<p>(QWC - Spelling of technical terms (<i>shown in italics</i>) must be correct and the answer must be organised in a logical sequence)</p> <ol style="list-style-type: none"> 1. idea of (<i>mutation</i> / named mutation) causing different base sequence ; 2. reference to different {sequence of <i>amino acids</i> / <i>primary structure</i>} / eq ; 3. reference to {β chain / <i>haemoglobin</i> / <i>protein</i> / <i>polypeptide</i>} being the wrong shape ; 4. <i>haemoglobin</i> no longer binds oxygen / binds less <i>oxygen</i> / eq ; 5. {less / no } <i>oxygen</i> {supplied / carried / eq} (to the cells) / eq ; 6. correct reference to <i>respiration</i> / eq ; 7. idea of breathlessness due to body trying to take in more <i>oxygen</i> ; 8. idea of tiredness due to lack of energy ; 	max (4)
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(b)	<table border="1"> <tr> <td>25(%)</td><td>25(%)</td><td>50(%)</td></tr> <tr> <td>no chance / 0 (%)</td><td>no chance / 0 (%)</td><td>100 (%)</td></tr> </table> <p>All 3 in a row = 2 marks 1 or 2 in a row correct = 1 mark</p>	25(%)	25(%)	50(%)	no chance / 0 (%)	no chance / 0 (%)	100 (%)	(4)
25(%)	25(%)	50(%)						
no chance / 0 (%)	no chance / 0 (%)	100 (%)						

(c) QWC	<ol style="list-style-type: none"> 1. reference to use of {normal / correct} {allele / gene}; 2. for {haemoglobin / B chain}; 3. reference to introduction of {gene / allele / DNA} into cells ; 4. cells named as (bone) marrow / eq ; 5. reference to use of vector (to introduce gene into cells) ; 6. (named vector) e.g. virus, liposome ; 7. credit reference to appropriate mode of delivery of vector e.g. injection into (bone) marrow ; 8. reference to need for repeated treatment ; 	max (4)
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3)

a)(i)	<ol style="list-style-type: none"> 1. both hexose molecules in disaccharide correctly drawn ; 2. indication that water is formed ; 3. glycosidic bond correctly drawn ; 	(3)
a)(ii)	condensation / polymerisation ;	(1)
a)(iii)	(1, 4) glycosidic (bond / link) ;	(1)
b)(i)	A ;	(1)
b)(ii)	B ;	(1)
b)(iii)	B ;	(1)
c)(i)	<ol style="list-style-type: none"> 1. genotypes of parents correctly shown ; 2. alleles present in gametes correctly shown ; 3. possible genotypes of offspring correctly shown ; 4. probability stated as {0.5 / 50% / 1 in 2 / ½ / 50:50} ; 	(4)
c)(ii)	The same (as the probability is for the first child) ;	(1)

4)

(a) QWC	<p>(QWC - Spelling of technical terms must be correct and the answer must be organised in a logical sequence)</p> <ol style="list-style-type: none"> 1. reference to CFTR {gene / channel} not functioning properly ; 2. reference to {thicker / stickier / eq } <i>mucus</i> ; 3. (<i>mucus</i>) blocks (<i>pancreatic</i>) {duct(s) / eq } ; 4. in the <i>pancreas</i> ; 5. idea that <i>enzymes</i> cannot {be secreted into / reach} small <i>intestine</i> ; 6. idea of reduced <i>digestion</i> of {food / named food} ; 7. reference to reduced <i>absorption</i> / eq ; 8. idea of {<i>malnutrition</i> / <i>weight loss</i>} ; 9. idea of {<i>self-digestion</i> of (<i>pancreatic</i>) cells / problems controlling blood sugar levels / <i>cysts</i> / <i>fibroids</i>} ; 	(4)
b)	<ol style="list-style-type: none"> 1. reference to {IVF / description of preimplantation} ; 2. {embryo / eq} DNA analysed / eq ; 3. presence of CFTR {gene mutation / faulty allele / eq} tested for / eq ; 	(3)

(c)	<p>Any of the following paired points</p> <ol style="list-style-type: none"> 1. who has right to decide if tests should be performed / eq ; 2. {implications of medical costs / disagreements over next step / embryo has rights} ; <p>OR</p> <ol style="list-style-type: none"> 3. issues relating to confidentiality of {parents / child} / eq ; 4. idea that {some other abnormality may be found / paternal DNA does not match / other family members have right to know results} ; <p>OR</p> <ol style="list-style-type: none"> 5. idea some other abnormality may be found / false negative ; 6. comment on possible problems with e.g. future employment / insurance / what constitutes a serious condition / eq ; <p>OR</p> <ol style="list-style-type: none"> 7. idea that embryo could be {damaged / destroyed / discarded / eq} / false positive ; 8. embryo {is a potential life / has rights} / destroying embryo is {wrong / unethical / murder / eq} ; 	(2)
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5)

(a)	(DNA) { polymerase / helicase / ligase} ;	(1)
b)	<p>Stage 1</p> <p>1. only one bond drawn in lower half of tube ;</p> <p>Stage 2</p> <p>2. one only bond drawn (higher than the one drawn in stage 1) ;</p> <p>Stage 3</p> <p>Diagram</p> <p>3. {1 / 2} molecules shown with one light and one heavy strand ;</p> <p>4. {1 / 2} molecules shown with two light strands;</p> <p>Test tube</p> <p>5. 2 bands shown in roughly correct position (middle to upper half of test tube) ;</p> <p>6. bands should be of (roughly) equal width ;</p> <p>[consequential error from stage 2 should apply for both marking points 5 and 6]</p>	(6)

6)

(a)	1. presence of amine group / eq ; 2. presence of carboxyl group / eq ; 3. reference to R group ; 4. reference to central carbon atom ; [award marks on correctly drawn diagram]	(2)
(b)	1. correct reference to transcription ; 2. DNA {unwinds / strands separate / eq} ; 3. (RNA) (mono)nucleotides {line up against / attach / eq} to one (DNA) { strand / template / eq} ; 4. reference to <u>complementary</u> base pairing (between DNA and (mono)nucleotides) ; 5. reference to {(mono)nucleotides joining together / formation of phosphodiester bonds} ; 6. correct reference to condensation reaction ; 7. correct reference to named enzymes involved / eq ; 8. mRNA detaches (from DNA) / eq ;	(4)

(c) (i) Discounted Question / Do Not Mark

(c)(ii)	B ;	(1)
(c)(iii)	D ;	(1)

7)

(a) (i)	<ol style="list-style-type: none"> 1. group on diet Q loses more mass (overall in the 6 months) / eq ; 2. both groups lost mass in the first { 2 / 6 } months ; 3. the group on diet Q {lost the most mass / lost mass the fastest} in the first 2 months ; 4. between 2 and 6 months there was {no more loss of mass / slight increase in mass} in the group on diet P AND those on diet Q lost more mass / eq ; 5. credit correct manipulation of figures to compare mass loss between two of the groups ; 	(3)
(a) (ii)	not following the diet {anymore / so strictly} / not doing so much exercise / eq ;	(1)
(a)(iii)	<p>Any two from:</p> <ol style="list-style-type: none"> 1. gender / eq ; 2. age / eq ; 3. extent to which individuals were over-weight / eq ; 4. occupation / eq ; 5. alcohol intake / eq ; 6. standardised exercise programme / amount of exercise taken eq ; 7. health / disability / stress / eq ; 8. timing of meals / eq ; 9. time of weighing / eq ; 	(2)
(b)	<ol style="list-style-type: none"> 1. idea that exercise uses energy ; 2. the {longer / more intense} the exercise, the more {energy used / weight loss} / eq ; 3. idea of {mass / weight} loss depends on energy input lower than energy output ; 4. idea that exercise increases metabolism / muscles use more energy than fat ; 	(3)

8)

(a)	1. amino acids ; 2. peptide ; 3. condensation / polymerisation ; 4. amino / amine / NH_3^+ / NH_2 ; 5. carboxyl / carboxylic (acid) / COO^- / COOH ; [Accept answers for 4 and 5 the opposite way round]	(5)
(b)(i)	ALLOW Mps in context of clearly labelled diagram 1. globular / eq ; 2. reference to active site ; 3. reference to specific shape of active site ; 4. reference to {bonds / named bond / interaction / eq} between R groups ; 5. credit correctly named {bond/interaction} e.g. disulphide bond, hydrogen bonds, hydrophobic interactions (between R groups) ;	(3)
(b)(ii)	1. (primary structure) {position / sequence / order / eq} of the {amino acids / R groups} / eq ; 2. idea that this determines the {positioning / type} of the {bonds / folding / eq} ; 3. determining the {shape / properties} of the active site / eq ; 4. idea of interaction of active sites and substrates e.g. enzyme substrate complex forms ; 5. idea of {polar / hydrophilic} on the outside of enzymes / {non polar / hydrophobic} on the inside / eq ; 6. reference to solubility ;	(3)