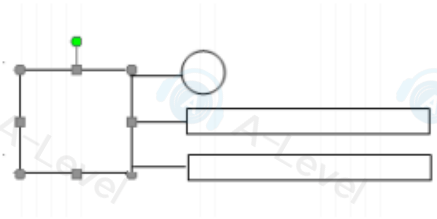
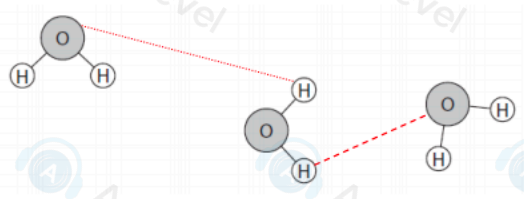
Question number	Answer	Additional guidance	Mark
1(a)(i)	A diagram that makes reference to the following points: • one glycerol (squarish / labelled), two fatty acids (rectangular / labelled), one phosphate and three bonds shown (1) • all components drawn together correctly (1)	 ecf if: {one / three} fatty acids drawn attached to glycerol but rest correct glycerol missing but two fatty acids attached to head with bonds bonds missing but all four components are touching correctly	(2)

Question number	Answer	Mark
1(a)(ii)	**The only correct answer is A** (ester) *B is incorrect because glycosidic bonds are found in carbohydrates* *C is incorrect because there are no hydrogen bonds in phospholipids* *D is incorrect because peptide bonds are found in proteins*	(1)

Question number	Answer	Mark
1(b)(i)	**The only correct answer is B** (by diffusion) *A is incorrect because active transport moves polar molecules* *C is incorrect because nonpolar molecules can diffuse through the nonpolar fatty acids* *D is incorrect because only water moves by osmosis*	(1)

Question number	Answer	Mark
1(b)(ii)	**The only correct answer is B** (one) *A is incorrect because the second statement is the only correct one* *C is incorrect because the second statement is the only correct one* *D is incorrect because the second statement is the only correct one*	(1)

Question number	Answer	Additional guidance	Mark
4(a)(i)	An explanation that includes the following points: • the oxygen (atom) is slightly negative and the hydrogens (atoms) are slightly positive} (1) • {there is (an uneven) charge distribution (across the molecule) / uneven distribution of electrons / the oxygen pulls the electrons towards it} (1)	**Penalise ref to molecules once** **ACCEPT** δ -ve / δ +ve from a diagram **ACCEPT** comparisons of electronegativity unbalanced charge oxygen has more {protons / more positive nucleus} electrons closer to the oxygen	**(2)**

Question number	Answer	Additional guidance	Mark
4(a)(ii)	• a line drawn between an O of one molecule and a H of another molecule (1)	 If more than one H bond shown then they must be both correct and using different atoms on any one molecule If other water molecules draw then mark if correct	**(1)**

Question number	Answer	Additional guidance	Mark
4(b)	• water molecules clustered around the Na^+ with the O facing the Na^+ and the Hs facing away (1)	**NB** if charges are shown, they must be correct and partial **ACCEPT** any number of water molecules but all must be correct **DO NOT ACCEPT** circles overlapping solid lines joining circles  	**(1)**

Question number	Answer	Additional guidance	Mark
4(c)	A description that includes four of the following points: • (A) (increase in temperature can) (linear) increase the solubility (1) • (B) (increase in temperature (up to 32°C) can) (exponentially) increase the solubility and then decrease it (1) • (C) (increase in temperature can have) a slight increase on the solubility (1) • (D) (increase in temperature can) decrease the solubility (1) • statement referring to different chemicals have different solubilities at different temperatures (1)	**ACCEPT** positive correlation **ACCEPT** no effect **ACCEPT** negative correlation	**(4)**

Question number	Answer	Additional guidance	Mark
3(a)(i)	• O joined to C1 on glucose and C2 on fructose by covalent bond (1)	 **ACCEPT** bonds not touching carbons provided it is clear where they are supposed to be attached to solid or dotted lines for covalent bond **DO NOT ACCEPT** other groups added to C1 or C2 **IGNORE** water shown other groups added to rest of molecule	(1)

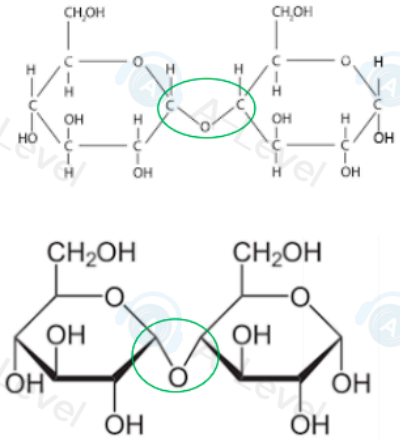
Question number	Answer	Additional guidance	Mark
3(a)(ii)	An answer that makes reference to the following points: • $C_{12}H_{22}O_{11}$ (1) • H_2O (1)	**ACCEPT** numbers that are not subscript numbers **IGNORE** if not written as part of the equation	**(2)**

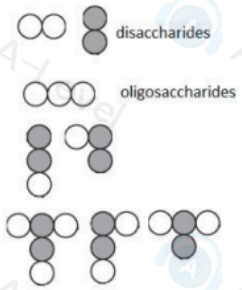
Question number	Answer	Additional guidance	Mark
3(b)(i)	• sucrose contains {the same number of / one } fructose (1)	**ACCEPT** ratio of sucrose to fructose is 1 : 1 as the concentration of sucrose increases so does the (concentration of) fructose the more sucrose there is the more fructose there will be more fructose for the chemical to bind to the same amount of chemical binds to each fructose **DO NOT ACCEPT** glucose	(1)

Question number	Answer	Additional guidance	Mark
3(b)(ii)	• the test is not sensitive enough / the colour intensity is too low (1)	**ACCEPT** a certain concentration of {fructose / sucrose} is necessary for the {colour to be visible / colour change} equipment is not sensitive enough colour change visible above concentrations 50 μg dm^{-3} sucrose **DO NOT ACCEPT** glucose	(1)

Question number	Answer	Additional guidance	Mark
3(b)(iii)	• the chemical (only) binds to fructose / there is no fructose in either maltose or lactose (1)	**ACCEPT** chemical cannot bind to maltose or lactose	(1)

Question number	Answer	Additional guidance	Mark
1	An answer that includes the following points (in order): • dipolar (1) • positive (1) • solvent (1) • hydrolysis (1) • lactose (1)	**ACCEPT** dipole / polar **ACCEPT** medium **DO NOT ACCEPT** hydration **DO NOT ACCEPT** lactase / other named molecules	**(5)**

Question number	Answer	Additional guidance	Mark
6(a)	An answer that makes reference to the following points: • glycosidic bond correctly shown (1) • rest of molecule drawn correctly (1) • an indication that (one molecule) water is formed (1)		**(3)**

Question number	Answer	Additional guidance	Mark
6(b)(i)	An answer that makes reference to the following points: • {one / two} correct diagrams (1) • correct diagrams of **one** disaccharide and **two** oligosaccharides (1)	**NB** diagrams must be white / grey circles touching or with lines joining them 	**(2)**

Question number	Answer	Additional guidance	Mark
6(b)(ii)	An explanation that makes reference to the following points: • (amylase) {is specific / is complementary / only binds / only fits} {substrates / 1 – 4 glycosidic bonds} (1) • {1 – 4 glycosidic bonds / substrate} can {fit into / bind with} the **active site** (1)	**Must be a reference to 1 – 4 bonds for 2 marks to be awarded or the converse with 1 – 6 bonds** **ACCEPT** (the parts of the glucoses joined by) 1 – 6 glycosidic bonds do not {fit into / bind with} the **active site** **NB** the active site (of amylase) is complementary to the 1 – 4 glycosidic bond = 2 marks	**(2)**

Question number	Answer	Additional guidance	Mark
6(c)(i)	An answer that makes reference to the following points: • by hydrolysis (of glycosidic bonds) (1) • (different) enzymes needed to break each type of (glycosidic) bond (1) • different enzymes needed for {disaccharides and oligosaccharides / each type of oligosaccharide / each type of sugar} (1)		**(3)**

Question number	Answer	Additional guidance	Mark
6(c)(ii)	An explanation that makes reference to the following points: • because it is a {polar / hydrophilic} molecule (1) • so cannot pass {through / into} the {phospholipids / fatty acids / tails} (which are non-polar) (1)		**(2)**

Question number	Answer	Additional guidance	Mark
1(a)	peptide (1) amino / NH_2 / NH_3^+ / amine (1) carboxyl / COOH / CO_2H / COO^- / carboxylic (acid) (1) condensation (1) translation (1)	**DO NOT ACCEPT** dipeptide / polypeptide / amide **ACCEPT** second and third point either way round **ACCEPT** polymerisation / addition elimination	**(5)**

Question number	Answer					Mark
1(b)						**(2)**

Structure	Hydrogen bonds only	Ionic bonds only	Both hydrogen and ionic bonds	Neither of these bond
secondary structure	**X**	☒	☒	☒
three-dimensional structure	☒	☒	**X**	☒

Question number	Answer	Mark
2(a)	**C** glycogen The only correct answer is C. ***A*** *is incorrect because amylopectin is found in plant cells only* ***B*** *is incorrect because cellulose is found in plant cells only* ***D*** *is incorrect because starch is found in plant cells only*	**(1)**

Question number	Answer	Mark
2(b)	**D** lactose and sucrose The only correct answer is D. ***A*** *is incorrect because fructose is a monosaccharide and therefore not digested* ***B*** *is incorrect because fructose and galactose are both monosaccharides and therefore not digested* ***C*** *is incorrect because galactose is a monosaccharide and therefore not digested*	**(1)**

Question number	Answer	Additional guidance	Mark
2(c)(i)	• 190 900 000 / 191 000 000 / 190.9 million / 191 million / 1.909×10^8 / 1.91×10^8		**(1)**

Question number	Answer	Additional guidance	Mark
2(c)(ii)	An explanation that includes three of the following points: • because (prenatal testing) can cause abortion (1) • because false negative or false positive results can be avoided (if patient already has diabetes) (1) • because of issues arising if another genetic condition is found (1) • because an individual could live a healthy life (as only a genetic predisposition) (1) • because of the ethics associated with destroying embryos (IVF) (1)		**(3)**

Question number	Answer	Mark
1(a)(i)	A -70 mV B is not correct as -78 mV is the potential when the axon is hyperpolarised C is not correct as 38 mV is the action potential D is not correct as 108 mV is the change in potential from resting to action potential	**(1)**

Question number	Answer	Mark
1(a)(ii)	C voltage-gated potassium ion channel only A is not correct as the voltage-gated sodium ion channels will be closed and the potassium ion channels open at Y B is not correct as the voltage-gated sodium ion channels will be closed and the potassium ion channels open at Y D is not correct as the voltage-gated sodium ion channels will be closed and the potassium ion channels open at Y	**(1)**

Question number	Answer	Mark
1(a)(iii)	B hyperpolarised A is not correct as the membrane at Z is hyperpolarised C is not correct as the membrane at Z is hyperpolarised D is not correct as the membrane at Z is hyperpolarised	**(1)**

Question number	Answer	Mark
1(a)(iv)	B one A is not correct as only the third statement is correct. C is not correct as only the third statement is correct D is not correct as only the third statement is correct	**(1)**