1.a) B (1)
1.b) C (1)
1.c) D (1)
1.d) B (1)
1.e) B (1)
1.f) C (1)

(g)	**mRNA** 1. idea of mRNA being a copy of the { antisense DNA strand / template DNA strand / coding DNA strand / gene / allele / part of DNA / eq } ; 2. idea that mRNA {made up of codons / codes for specific amino acids / code for amino acid sequence / eq} ; 3. idea of mRNA being taken {into the cytoplasm / to the ribosomes / out of the nucleus / eq} ; 4. used in translation ; 5. binds to ribosome ; **tRNA** 6. (tRNA) {attaches to / transports / eq } (specific) amino acid / eq ; 7. idea that tRNA binds to mRNA / reference to anticodon codon interaction ; 8. idea that two tRNA bring amino acids together (for peptide bonds to be formed) ;	**(4)**

2)

a)(i)	1. no {amino / amine / NH_2 / NH_3^+ } group ; 2. no {carboxyl / carboxylic acid / COOH / COO^- } group ; 3. no {central / alpha} carbon (atom) / eq ; 4. no {R / residual} group(s) ; 5. ring structures present (amino acids only have them in some R groups) / eq ;	**(2)**

a)(ii)	1. idea that position of CH_3 different ; 2. idea that position of {H / NH/ N-H} different ; 3. reference to being isomerically different ;	**(2)**
a)(iii)	1. idea of specificity of {active site/enzyme} ; 2. idea that the products are different {shapes / structures} ; 3. idea that P450 consists of (at least) three {enzymes / active sites} ; 4. idea that products could be interconverted ;	**(3)**
(b)	**Conclusion 1:** 1. idea that the first conclusion is {valid for some of the data / not valid (for all data) / misleading /eq} ; 2. coffee and hot chocolate do have different concentrations **OR** only 4 drinks tested / concentration not measured / volumes not controlled / eq ; **Conclusion 2:** 3. idea that the second conclusion is not valid ; 4. no indication of the volumes of tea and cola / volume not controlled / impossible to calculate concentration of caffeine in all four drinks (using information given) / eq ;	**(3)**

3)

(a)	1. idea that DNA (molecule){ unwinds / unzips / uncoils / eq} (DNA) strands separate ; 2. (RNA mono) nucleotides {line up against / attach to} {one strand / template / antisense strand / eq} / eq ; 3. ref to complementary base pairing (between DNA and mononucleotides) ; 4. ref to formation of phosphodiester bonds ; 5. ref to condensation reaction ; 6. correct name of enzyme involved ; 7. idea that mRNA detaches from the DNA;	1. ALLOW description e.g. breaking of hydrogen bonds 2. NOT DNA strands, DNA nucleotides 3. ALLOW description of complementary base pairing 6. (DNA) helicase, RNA polymerase, DNA ligase NOT DNA polymerase, polymerase 7. NOT leaves nucleus alone / eq	**(4)**
b)(i)	B ;		**(1)**
b)(ii)	B ;		**(1)**
b)(iii)	D ;		**(1)**
(c)	1. tRNA is folded (and mRNA is {straight / unfolded}) / eq ; 2. tRNA has hydrogen bonds (holding the structure together) (but the mRNA does not / eq) ; 3. tRNA is a fixed {size / length} (but mRNA {is not / length depends on size of gene}) / eq ; 4. tRNA has an anticodon (but mRNA has codons) ; 5. tRNA has an amino acid binding site ;	1. IGNORE double stranded / branched ALLOW tRNA clover shaped / looped 2. ALLOW tRNA has complementary base pairing / double stranded sections NOT (all) double stranded 4. NOT is an anticodon	**(2)**

4)

(a)	1. phospholipid (bilayer) ; 2. credit details of phospholipid bilayer ; 3. proteins ; 4. credit details of proteins ; 5. reference to other named membrane components ;	ALLOW a clearly labelled diagram 2. e.g orientation because of hydrophobic and/or hydrophilic regions eg phospholipids are fluid 4. e.g. description of channel/carrier protein structure or position. (Intrinsic, extrinsic or transmembrane) 5.e.g. glycolipid, cholesterol, glycoprotein, carbohydrate chain, glycocalyx	**(3)**
(b)(i)	**Solute P:** 1. (up to 30 minutes) the {concentration / number} of molecules of P increases inside the cell / eq ; 2. ref to {diffusion / facilitated diffusion}(of molecules of P into the cell) ; 3. down the concentration gradient (of P) / eq ; 4. {between 30 and 40 minutes / after 30 minutes } the {concentration / number} of molecules (of P) inside the cell stays the same / eq ; 5. concentration (of P) inside cell equals concentration outside cell / reaches equilibrium / eq ; **Solute R:** 6. solute R does not enter cell / eq ; 7. membrane is impermeable to R ;	IGNORE amount **max 4 marks for solute P** 2. NOT osmosis 3. ALLOW high to low concentration NOT high to low concentration gradient 4. ALLOW no net movement	**(5)**
(b)(ii)	six white circles inside and outside the cell and 4 black circles outside cell ;		**(1)**

5)

(a)	(QWC– Spelling of technical terms must be correct and the answer must be organised in a logical sequence) 1. (α) *glucose* ; 2. *glycosidic* {bonds / links} ; 3. *amylose* and *amylopectin* ; 4. *amylose* has 1- 4 *(glycosidic)* {bonds / links} **AND** *amylopectin* has 1- 4 and 1- 6 (glycosidic) bonds / eq ; 5. *amylose* is {spiralled / coiled} ; 6. *amylopectin* is branched / eq ; 7. compact *molecule* / eq ;	QWC spelling of words in italics should be correct. Penalise just once – ALLOW max score of 5 if 6 mpts met but one lost due to spelling mistake.	**(5)**
(b)(i)	1. speeds up the rate of reaction / eq ; 2. without being {changed/used up / eq} ; 3. lowers activation energy / provides an alternative reaction pathway / eq ; 4. does not change {products / position of equilibrium / eq } / eq ;		**(2)**
(b)(ii)	1. breaks the (glycosidic) bonds / eq ; 2. reference to use of water ;	1. IGNORE hydrogen bonds 2. NOT makes water / eq	**(2)**
(c)	idea that { maltose / disaccharide / glucose / monosaccharide} {is produced / tastes sweet} ;	ALLOW dextrins / sugar NOT any other named sugar eg sucrose	**(1)**

6)

a)(i)	1. reference to {H on the N / NH} in the reduced DCPIP ; 2. reference to more {H on the O / OH / hydroxyl} in the reduced DCPIP ; 3. more Hs in the reduced DCPIP / eq ; 4. idea of double bonds different in {number / location /eq} e.g. fewer in reduced DCPIP ; 5. idea of CN double bond not present in reduced ; 6. idea of CO double bond not present in reduced ;	IGNORE hydrogen bonds ACCEPT converse for oxidised DCPIP ACCEPT a clear statement about one implies a difference 2. e.g. two OH groups in reduced form ACCEPT alcohol groups 3. NOT more than two more Hs 4. IGNORE reduced more saturated 6. ACCEPT ref to ketone group	(2)
a)(ii)	idea that the Hs come from the vitamin C / idea that vitamin C acts as a reducing agent ;	ACCEPT Description in terms of electrons (Vit C loses electrons/DCPIP gains electrons) ACCEPT vitamin C is oxidised ACCEPT vitamin C reduces DCPIP DCPIP is reduced alone is not enough	(1)
(b)(i)	1. pH increases during storage (over 4 days) / eq ; 2. greatest increase in pH at 12°C / smallest increase in pH at 24°C / eq ; 3. idea that pH changes are similar at 6 °C and 8 °C ; 4. reference to slight decrease in pH during first {one / two} days at 24 °C ; 5. credit correct manipulation of figures for a time period;	ACCEPT reduction in acidity for increase in pH 1. ACCEPT for all or for any one temperature 2. ACCEPT 12°C highest pH 3. ACCEPT the same up to day 2 5. Assume value is for four days unless otherwise stated, as four days specified in question stem. E.g. 12°C increased 0.45 / 12°C 0.4 higher than 24°C / only 0.03 between 6 °C and 8 °C (after 4 days)	(3)
(b)(ii) QWC	(QWC– Spelling of technical terms must be correct and the answer must be organised in a logical sequence) 1. idea of using juice (from stored fruits) ; 2. reference to {titration / eq} (of juice) ; 3. correct colour change described ; 4. compare volumes of {juice / DCPIP} used ; 5. use of {repeats / replicates / eq } ; 6. reference to extended storage ;	QWC points must be clear and unambiguous for awarding 1. NOT storing the juice 2. can be described or named 3. must be checked for context e.g. blue to colourless / clear / pink when titrating juice into the DCPIP, colourless to blue if DCPIP to juice. ACCEPT suitable description of use of colourimeter 4. ACCEPT in context of calibration of DCPIP against a standard concentration of vitamin C.	(5)

7)

(a)	1. {phosphate group / heads} are hydrophilic ; 2. Idea that heads can be attracted to water ; 3. {fatty acids / tails} are hydrophobic ; 4. Idea that tails orientate themselves away from water / eq ; 5. Idea of aqueous environment on both sides of the membrane ;	ACCEPT marks for annotated diagram, phonetic spelling OK IGNORE "water loving / hating" 1. ACCEPT polar 2. not just facing water 3. ACCEPT non polar 4. ACCEPT repel water, face away from water, away from polar environment 5. ACCEPT polar environment	(3)
(b)	B ; C ; A ;		(3)

(c)(i)	1. both have a phospholipid bilayer and protein / eq ; 2. idea that the fluid mosaic model has {proteins within the phospholipid layer / protein channels } while the Davison – Danielli model has protein layer on the outside of the membrane only ; 3. reference to other components present in fluid mosaic model e.g. glycolipid, glycoprotein, cholesterol ;	1. ACCEPT point pieced together in response 2. needs clear comparative statement re the position of the proteins in the two models, but can be expressed in a number of ways.	(2)
(c)(ii)	1. idea that molecules would not be able to diffuse through the (two) protein layers / eq ; 2. idea of no {channels / carriers / protein } for {facilitated diffusion / active transport / osmosis} ; 3. comment on fluidity of membrane / limits fusion of vesicles /eq ;	1. ACCEPT osmosis in context of water passing through protein layer 2. ACCEPT pumps for active transport 3. ACCEPT endo/exocytosis	(2)