Question	Answer	Mark	Guidance
1(a)(i)	**Both must be correct for mark** **U** = amino / amine (group) **and** **V** = carboxyl / carboxylic acid (group) ✓	1	**Additional incorrect answer on either line = 0 marks** **DO NOT ALLOW** imino / amide for **U** **ALLOW** carboxil / spelling that looks and sounds same **DO NOT ALLOW** carbonic / carbonyl for **V**
1(a)(ii)	**Both must be correct for mark** peptide / amide (bond) **and** condensation (reaction) ✓	1	**Additional incorrect answer on either line = 0 marks** **IGNORE** covalent **DO NOT ALLOW** dipeptide **DO NOT ALLOW** hydrolysis
1(b)(i)	**1** gene / DNA**,** copied / transcribed**,** to (m)RNA ✓ **2** (*idea that* RNA goes to / translation is at) ribosome(s) / RER ✓ **3** DNA**,** is too large to / cannot / is not able to**,** leave nucleus / cross nuclear envelope / fit through nuclear pores ✓	2 max	**Read all and mark as prose** **ALLOW** used as a template to create / AW, for 'copied to' **ALLOW** RNA, copies / takes a copy of, gene / DNA **DO NOT ALLOW** replicated for 'copied' **ALLOW ORA** 'RNA, is small enough to / can / is able to' or just 'RNA leaves nucleus' **ALLOW** nuclear membrane for 'nuclear envelope' **DO NOT ALLOW** leave the cell for 'leave nucleus'
1(b)(ii)	90 252 **or** 90 255 **or** 90 258 ✓✓	2	**Correct final answer gets 2 marks**, even if no working is shown. Wrong final answer (which may include a 90 252 stage in the working) = **ALLOW 1 mark for seeing any of these:** 327 x 92 x 3 **OR** 30 084 **OR** 981

Question	Answer	Mark	Guidance
1b(iii)	For answers marked by levels of response: Read through the whole answer from start to finish, concentrating on features that make it a stronger or weaker answer using the indicative scientific content as guidance. The indicative scientific content indicates the expected parameters for candidates' answers, but be prepared to recognise and credit unexpected approaches where they show relevance. Using a 'best-fit' approach based on the science content of the answer, first decide which set of level descriptors, Level 1, Level 2 or Level 3, **best** describes the overall quality of the answer using the guidelines described in the level descriptors in the mark scheme. Once the level is located, award the higher or lower mark. **The higher mark** should be awarded where the level descriptor has been evidenced and all aspects of the communication statement (in italics) have been met. **The lower mark** should be awarded where the level descriptor has been evidenced but aspects of the communication statement (in italics) are missing. **In summary:** • **The science content determines the level.** • **The communication statement determines the mark within a level.**	6 max	*Communication may be via bullet points, a table of comparisons, labelled diagrams or prose.* Indicative scientific points may include the following: FIBROUS PROTEINS Properties: • insoluble • elongated / long / rods / filaments / ropes / strands • strong / tough • flexible IGNORE size refs / compact / coiled / bond types / hard Functions: Look for the general category or for a named protein or glycoprotein example with supporting detail. Related categories and examples are paired or grouped together: • for structure • collagen in, bone / cartilage / connective tissue / tendons / ligaments / skin / blood vessels • fibrin + role described • for protection • keratin in, skin / hair / nails • to give, elasticity / elastic properties • elastin in, (named) blood vessels / alveoli / cartilage • for, contraction / mechanical movement • actin / myosin, in muscle • microtubules in, cilia / flagella / spindle / cytoskeleton

Question	Answer	Mark	Guidance
	Level 3 (5–6 marks) A detailed comparison of the properties **and** functions of fibrous **and** globular proteins. *There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated*. **Level 2 (3–4 marks)** A comparison of the properties **and/or** functions of fibrous **and** globular proteins. *There is a line of reasoning presented with some structure. The information presented is in the most-part relevant and supported by some evidence.* **Level 1 (1–2 marks)** A limited comparison of the properties **or** functions of fibrous **and** globular proteins. *A basic structure and some relevant information is provided, although a clear line of reasoning may not be present. The information is supported by limited evidence and the relationship to the evidence may not be clear.* **0 marks** No response or no response worthy of credit.		GLOBULAR PROTEINS Properties: • soluble • spherical / ball-shaped • have, 3D / tertiary / 3o, shape / structure • specific / complementary (to another molecule) • ref. conjugated / contain prosthetic group • temperature / pH, sensitive • hydrophilic on outside IGNORE size refs, compact, round, bond types Functions: Look for the general functional category name or description, or a named protein or glycoprotein example with some supporting detail. • enzymes / metabolic role / to catalyse reaction(s) / to lower activation energy • named enzyme + its specific role described • hormones / receptors / for cell signalling • named hormone / insulin + role described • antibody / for immunity / defence against infection • opsonin / antitoxin / agglutinin + role described • fibrinogen in blood clotting • to transport substances across cell membranes • carrier / channel / pump + role described • to transport substances in blood • haemoglobin + role described e.g. carry oxygen • to, package / organise DNA

Question	Answer	Mark	Guidance
1(b)(iv)	**EITHER** **1** 9300 / 9700 ✓ **2** deaths year $^{-1}$ or deaths per year or deaths / year ✓ **OR** **3** 9.3 / 9.7 ✓ **4** thousand deaths year $^{-1}$ or thousand deaths per year or thousand deaths / year ✓	2	Correct answer to 2 s.f. **with** correct matching units = **2 marks** **ALLOW** mark for unit even if no or wrong figure given **ALLOW** minus sign with number or 'fewer' with unit **ALLOW** from AIDS / of AIDS in unit **ALLOW** mp 3 so long as the **word thousand** appears afterwards or in the units (even if the unit is wrong in another respect) **DO NOT ALLOW** '*9.3 1000 deaths per year*' for mp3 (but gets mp 4)
1(b)(v)	*(answers must relate to **data** on graph)* **1** decrease in new diagnoses, from 1992 / already / began before 1995 ✓ **2** peak / plateau, in deaths, from 1994 / already / began before 1995 ✓ **3** no change in / same, (rate of) increase in people living with AIDS, before / after, 1995 ✓	2 max	**ALLOW** when, saquinavir / drug / medicine, was introduced for '1995' in mps **1**, **2** and **3** **ALLOW** new diagnoses decrease at same time as deaths **ALLOW** from / since / after, 1993 (instead of 1992)

Question	Answer	Mark	Guidance
1(c)(i)	*(suggestion(**S**) PLUS reason (**R**) needed)* **1 S** put pencil line / origin / amino acids, higher (than the solvent / 1cm) **+** **1 R** to stop, spots / samples / amino acids, dissolving into / mixing with / touching, <u>solvent</u> ✓ **2 S** put, amino acids / spots / them, further apart / on separate plates **+** **2 R** to stop them, merging / touching / clashing / AW ✓ **3 S** touch plate edges / wear gloves / use forceps / don't touch middle, **+** **3 R** to prevent, contamination / transfer of substances from hands ✓ **4 S** place, lid / cover, over beaker **+** **4 R** to prevent evaporation (of solvent) ✓ **5 S** support the plate / attach plate to beaker **+** **5 R** to keep plate, vertical / still / at constant height ✓ **6 S** use ninhydrin **+** **6 R** to, see / visualise, amino acids ✓ **7 S** repeat and find, mean / average (Rf value) **+** **7 R** to improve, accuracy / check for repeatability / exclude anomalies ✓ **8 S** label, amino acids / spots / samples (in pencil / on beaker) **+** **8 R** to know which is which / avoid confusion ✓	4 max	**Read all and mark as prose**. **ALLOW** paper / chromatogram / gel, for 'plate' **IGNORE** measure in mm instead of cm **ALLOW** 'or otherwise x would happen' in place of the reason 'to stop x' throughout **ALLOW 1S** ORA less solvent / make solvent lower **OR** make plate / paper, higher **DO NOT ALLOW 1S** pen / permanent marker, line **ALLOW 1R** so only bottom of plate touches solvent **ALLOW 2S** put same distance apart / spread them apart **ALLOW 2R** ORA so they are, distinguishable / clear **ALLOW 3R** amino acids / oils for 'substances' **ALLOW 3R** *idea of* not damaging, stationary phase / silica gel / alumina / AW **ALLOW 4S** close beaker / line beaker with filter paper soaked in solvent **ALLOW 5S** description e.g. use clips / pencil / clamp / rod **ALLOW 5R** ORA to stop plate, tilting / trembling / moving **IGNORE 6S** UV / iodine / permanganate **ALLOW** '*no need, to stain / for ninhydrin, as spots shown up already*' (on Fig. 1.4) **= 1 mark**

Question	Answer	Mark	Guidance
1(c)(ii)	**1** *answer must lie within this range:* 0.1(0) to 0.15 **AND** *supporting calculation must be shown, e.g:* $\frac{0.65}{4.95}$ (= 0.13) ✓ **2** glutamine ✓		**No mark** for figure in correct range unless it also shows the working out of this calculation: $\frac{\text{distance from origin to spot}}{\text{distance from origin to solvent front.}}$ **ALLOW** figures given in **mm** **ALLOW** figures with no unit shown **ALLOW** variation in measurements taken **so long as** the final answer falls within the allowed range. **ALLOW** mp2 even if no attempt is made at working stage