OCR AS/A-level Year 1 Biology A exam practice answers

**3 Biological molecules**

**1 (a)** Storage of energy; creating structures such as cell walls; part of glycoproteins in cell membranes. [3]

 **(b)** Amylose is a long chain of α-glucose subunits. Glucose is an energy-rich molecule, so the molecule of amylose contains a lot of energy. The units are joined by 1,4 glycosidic bonds. Amylose is unbranched but highly coiled. This makes it compact, so it takes up little space in the cell. It is easy to remove glucose subunits from the end of the amylose molecule by hydrolysis. The amylose molecule is also large and insoluble, so it does not interfere with the water potential of the cell. [6]

 **(c)**

|  |  |  |
| --- | --- | --- |
| **Structural feature** | **Glycogen** | **Cellulose** |
| Sugar(s) present | α-glucose | β-glucose |
| Bonds present | 1,4 glycosidic and 1,6 glycosidic | 1,4 glycosidic |
| Branched or unbranched | Branched | Unbranched |
| Coiled or straight | Coiled | Straight |
| Forms cross-links with other molecules | No | Yes |

 [5]

**2 (a) (i)** The sequence in the chain of amino acids. [1]

 **(ii)** The initial folding or coiling of the amino acid chain. Two shapes are formed:
α-helix or β-pleated sheets. [3]

 **(b)** A number of bonds hold the tertiary structure of a protein. Hydrogen bonds are weak forces of attraction between polar *R* groups. Ionic bonds are found where one part of molecule attracts an electron from another part. Covalent bonds are where an electron is shared between two parts of the molecule. These are found between two sulfur-containing cysteine amino acid residues and form disulfide bridges. [4]

**3 (a)** Water molecules consist of one oxygen and two hydrogen atoms. The angle of the bond between the hydrogen atoms is 104.5°. The oxygen atom attracts electrons more strongly than the hydrogen atoms. This makes the oxygen end of the molecule slightly negative and leaves the hydrogen end slightly positive. The molecule is polar. The positive and negative charges on separate molecules attract each other. This force of attraction is called a hydrogen bond. [3]

 **(b)** Water is a good solvent. This is because hydrogen bonds form between water molecules and solute molecules. This helps polar and charged solutes to dissolve. Hydrogen bonds also hold water molecules together. This keeps water in a liquid state at normal temperatures. Water can change shape and flow. Hydrogen bonds create cohesion.

 A chain of water molecules in the xylem can be pulled up by tension caused by transpiration. The water molecules are held a specific distance apart by the hydrogen bonds. This means that water is incompressible. As a result, water can be put under pressure. This means that blood (which consists mostly of water) can be pumped by the heart. [10]

**4 (a)** Lipids/fats. [1]

 **(b)** To remove particles of food and so that the cloudiness was visible. [2]

 **(c)** Same mass of seeds used; same volume of alcohol used; same volume of filtrate collected; same volume of water added; compare the milkiness of the final result; use a colorimeter to measure absorption of light in samples. [6]