Topic 2- Molecular Biology



**2.1 Molecules to Metabolism**

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| **You must be able to......** | **Covered in lessons / homework** | **Understood** | **Revised** | **Remembered** |
| --- | --- | --- | --- | --- |
| Understand that molecular biology explains living processes in terms of the chemical substances involved |  |  |  |  |
| Understand that carbon atoms can form four bonds allowing a diversity of compounds to exist. |  |  |  |  |
| Understand that life is based on carbon compounds including carbohydrates, lipids and proteins and nucleic acids. |  |  |  |  |
| Understand that metabolism is the web of all the enzyme catalysed reactions in a cell or organism |  |  |  |  |
| Understand that anabolism is the synthesis of complex molecules from simpler molecules including the formation of macromolecules from monomers by condensation reactions |  |  |  |  |
| Explain that urea is an example of a compound that is produced by living organisms but can also be synthesised artificially |  |  |  |  |
| Draw molecular diagrams of glucose, ribose, a saturated fatty acid and a generalised amino acid.(S) |  |  |  |  |
| Indentify biochemicals such as carbohydrate, lipid or protein from molecular diagrams (S) |  |  |  |  |

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**2.2 Water**

| **You must be able to......** | **Covered in lessons / homework** | **Understood** | **Revised** | **Remembered** |
| --- | --- | --- | --- | --- |
| Understand that water molecules are polar and hydrogen bonds form between them |  |  |  |  |
| Understand that hydrogen bonding and dipolarity explain the adhesive, cohesive, thermal and solvent properties of water. |  |  |  |  |
| Understand that substances can be hydrophilic or hydrophobic  |  |  |  |  |
| Compare the thermal properties of water with those of methane |  |  |  |  |
| Explain the relationship between the properties of water and its use in living organisms as a coolant in sweat |  |  |  |  |
| Explain the methods of transport of glucose, amino acids, cholesterol, fats, oxygen and sodium chloride in blood in relation to their solubility in water |  |  |  |  |

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**2.3 Carbohydrates and lipids**

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| **You must be able to......** | **Covered in lessons / homework** | **Understood** | **Revised** | **Remembered** |
| --- | --- | --- | --- | --- |
| Understand that monosaccharide monomers are linked together by condensation reactions to form disaccharide and polysaccharide polymers |  |  |  |  |
| Describe the structure and function of cellulose and starch in plants and glycogen in humans. |  |  |  |  |
| Understand that fatty acids can be saturated, monounsaturated or polyunsaturated. |  |  |  |  |
| Understand that fatty acids can be cis or trans isomers. |  |  |  |  |
| Describe the scientific evidence for the health risks of trans-fats and saturated fats. |  |  |  |  |
| Understand that triglycerides are formed by condensation from three fatty acids and one glycerol |  |  |  |  |
| Explain that lipids are more suitable for long-term energy storage in humans than carbohydrates |  |  |  |  |
| Evaluate evidence and the methods used to obtain evidence for health claims made about lipids. |  |  |  |  |
| Determine the body mass index by calculation or use of a nomogram |  |  |  |  |

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**2.4 Proteins**

| **You must be able to......** | **Covered in lessons / homework** | **Understood** | **Revised** | **Remembered** |
| --- | --- | --- | --- | --- |
| Understand amino acids are linked together by condensation to form polypeptides |  |  |  |  |
| Draw molecular diagrams to show the formation of a peptide bond. |  |  |  |  |
| Understand that there are twenty different amino acids in polypeptides synthesized on ribosomes |  |  |  |  |
| Understand that amino acids can be linked together in any sequence giving a huge range of possible polypeptides. |  |  |  |  |
| Understand that the amino acid sequence of polypeptides is coded for by genes |  |  |  |  |
| Understand that a protein may consist of a single polypeptide or more than one polypeptide linked together. |  |  |  |  |
| Understand that the amino acid sequence determines the three-dimensional conformation of a protein |  |  |  |  |
| Explain the denaturation of proteins by heat or pH extremes |  |  |  |  |
| Understand that living organisms synthesize many different proteins with a wide range of functions |  |  |  |  |
| Describe the function of Rubisco, insulin, immunoglobulins, rhodopsin, collagen and spider silk to illustrate the range of protein function |  |  |  |  |
| Understand that every individual has a unique proteome |  |  |  |  |

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**2.5 Enzymes**

| **You must be able to......** | **Covered in lessons / homework** | **Understood** | **Revised** | **Remembered** |
| --- | --- | --- | --- | --- |
| Understand that enzymes have an active site to which specific substrates bind |  |  |  |  |
| Understand that enzyme catalysis involves molecular motion and the collision of substrates with the active site. |  |  |  |  |
| Understand that temperature, pH and substrate concentration affect the rate of activity of enzymes |  |  |  |  |
| Understand that enzymes can be denatured |  |  |  |  |
| Design an experiment to test the effect of temperature, pH and substrate concentration on the activity of enzymes (S) |  |  |  |  |
| Understand that immobilized enzymes are widely used in industry |  |  |  |  |
| Describe methods of producing lactose-free milk and explain the advantages |  |  |  |  |

**8.1 Metabolism (AHL)**

| **You must be able to......** | **Covered in lessons / homework** | **Understood** | **Revised** | **Remembered** |
| --- | --- | --- | --- | --- |
| Understand that metabolic pathways consist of chains and cycles of enzyme-catalysed reactions. |  |  |  |  |
| Understand that enzymes lower the activation energy of the chemical reactions that they catalyse |  |  |  |  |
| Understand that enzyme inhibitors can be competitive or non-competitive. |  |  |  |  |
| Distinguish different types of inhibition from graphs at specified substrate concentrations (S) |  |  |  |  |
| Understand that metabolic pathways can be controlled by end-product inhibition. |  |  |  |  |
| Describe the end-product inhibition of the pathway that converts threonine to isoleucine |  |  |  |  |
| Describe the use of databases to identify potential new anti-malarial drugs. |  |  |  |  |
| Calculate rates of reaction from raw experimental results (S). |  |  |  |  |