**Topic 2.3: Carbohydrates and Lipids**

**Essential Idea: Compounds of carbon, hydrogen and oxygen are used to supply and store energy.**

**Statements & Objectives:**

**2.3.U1 Monosaccharide monomers are linked together by condensation reactions to form disaccharides and polysaccharide polymers.**

Define monosaccharide, disaccharide and polysaccharide.

**(Define**: Give the precise meaning of a word, phrase, or physical quantity.)

List three examples of monosaccharides.

**(List**: Give a sequence of brief answers with no explanation.)

List three examples of disaccharides.

**(List**: Give a sequence of brief answers with no explanation.)

List three examples of polysaccharides.

**(List**: Give a sequence of brief answers with no explanation.)

Use molecular diagrams to draw the formation of maltose from two glucose monomers.

(**Draw:** Represent by means of pencil lines.)

Explain a condensation reaction connecting two monosaccharides in the formation of a disaccharide.

(**Explain**: Give a detailed account including reasons or causes)

**2.3.U2 Fatty acids can be saturated, monounsaturated and polyunsaturated.**

Describe the differences between saturated and unsaturated (mono- or poly-) fatty acids.

**(Describe**: Give a detailed account)

**2.3.U3 Unsaturated fatty acids can be cis or trans isomers.**

Describe the differences between cis- and trans- fatty acids.

**(Describe**: Give a detailed account)

**2.3.U4 Triglycerides are formed by condensation from three fatty acids and one glycerol.**

Outline the difference between fats and oils.

**(Outline**: Give a brief account or summary)

Explain a condensation reaction connecting fatty acids and glycerol to form a triglyceride.

(**Explain**: Give a detailed account including reasons or causes)

State two functions of triglycerides.

**(State**: Give a specific name, value or other brief answer without explanation or calculation)

**2.3.A1 Structure and function of cellulose and starch in plants and glycogen in humans.**

State the structural difference between alpha and beta glucose.

**(State**: Give a specific name, value or other brief answer without explanation or calculation)

Contrast the structure and functions of cellulose, amylose, amylopectin and glycogen.

**(Compare and Contrast:** Give an account of similarities and differences between two (or more) items or situations, referring to both (all) of them throughout.)

**2.3.A2 Scientific evidence for health risks of trans fat and saturated fatty acids.**

Discuss the relationship between saturated fatty acid and trans-unsaturated fat intake and rates of coronary heart disease.

(**Discuss**: Give an account including, where possible, a range of arguments for and against the relative importance of various factors, or comparisons of alternative hypotheses)

**2.3.A3 Lipids are more suitable for long term energy storage in humans than carbohydrates.**

Explain the energy storage of lipids compared to that of carbohydrates.

(**Explain**: Give a detailed account including reasons or causes)

**2.3.A4 Evaluation of evidence and the methods used to obtain the evidence for health claims made about lipids.**

Define evaluation in respect to evidence from and methods of research.

**(Define**: Give the precise meaning of a word, phrase, or physical quantity.)

Outline the manner in which the implications of research can be assessed.

**(Outline**: Give a brief account or summary)

Outline the manner in which the limitations of research can be assessed.

**(Outline**: Give a brief account or summary)

Evaluate a given health claim made about lipids.

(**Evaluate:** Assess the implications and limitations)

**2.3.S1 Use of molecular visualization software to compare cellulose, starch and glycogen.**

Demonstrate use of JMol to view molecular structures, including changing image size, rotating the image and changing the style of the molecular model.

Identify carbon, hydrogen and oxygen atoms by color.

**2.3.S2 Determination of body mass index by calculation or use of a nomogram.**

Calculate BMI using the formula.

(**Calculate:** Find a numerical answer showing the relevant stages in the working.)

Determine BMI using a nomogram.

(**Determine:** Find the only possible answer.)

Outline effects of a BMI that is too high or too low.

**(Outline**: Give a brief account or summary)

**2.3.NOS Evaluating claims- health claims made about lipids in diets need to be assessed.**

Describe how the effect of lipids on health can be assessed scientifically.

**(Describe**: Give a detailed account)

**Key Terms**

Organic

Carbohydrate

Monosaccharide

Disaccharide

​fatty acids

​cis

triglycerides

coronary heart disease

inorganic

pentose

hexose

ribose

​lipids

​trans

condensation

​energy storage

fructose

isomer

maltose

sucrose

polymer

isomers

​fats

​BMI

lactose

starch

glycogen

cellulose

monounsaturated

polyunsaturated

​oils

​nomogram

glucose

monomer

polysaccharide

chitin

​unsaturated

glycerol

amylose

​amylopectin