AQA Biology GCSE - **Student Progress Sheet**

Name: **Target:**

Unit 4.4 – Bioenergetics

4.4.1. Photosynthesis

4.4.1.1. Photosynthetic Reaction

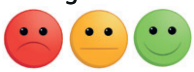
a	I know that photosynthesis is an endothermic reaction that can be represented by the equation: carbon dioxide + water $\xrightarrow{\text{light}}$ glucose + oxygen			
b	I know that CO_2 is the chemical formula for carbon dioxide.			
c	I know that H_2O is the chemical formula for water.			
d	I know that O_2 is the chemical formula for oxygen.			
e	I know that $C_6H_{12}O_6$ is the chemical formula for glucose.			

4.4.1.2. Rate of Photosynthesis

a	I can explain the effects of temperature, light intensity, carbon dioxide concentration, and the amount of chlorophyll on the rate of photosynthesis.			
b	I can explain graphs of photosynthesis rate involving two or three factors and decide which is the limiting factor (HT only).			
c	I can explain how limiting factors are important in enhancing the conditions in greenhouses to gain the maximum rate of photosynthesis while still maintaining profit (HT only).			

4.4.1.3. Uses of Glucose from Photosynthesis

a	I know that the glucose produced in photosynthesis may be: • used for respiration; • converted into insoluble starch for storage; • used to produce fat or oil for storage; • used to produce cellulose, which strengthens the cell wall; • used to produce amino acids for protein synthesis.			
b	I know that plants also use nitrate ions (that are absorbed from the soil) to produce proteins.			



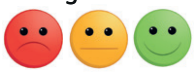
4.4.2. Respiration

4.4.2.1. Aerobic and Anaerobic Respiration

a	I know that respiration in cells can take place aerobically (using oxygen) or anaerobically (without oxygen), to transfer energy.			
b	I know that aerobic respiration (with oxygen) is an exothermic reaction that is continuously occurring in living cells to supply all the energy needed for living processes and that it can be represented by the equation: glucose + oxygen ⟶ carbon dioxide + water			
c	I know that organisms need energy for: • chemical reactions to build larger molecules; • movement; • keeping warm.			
d	I know that anaerobic respiration (without oxygen) in muscles is represented by the equation: glucose ⟶ lactic acid			
e	I know that anaerobic respiration (without oxygen) in plant and yeast cells is represented by the equation: glucose ⟶ ethanol + carbon dioxide			
f	I know that, as the oxidation of glucose is incomplete in anaerobic respiration, much less energy is transferred than in aerobic respiration.			
g	I know that anaerobic respiration in yeast cells is called fermentation.			
h	I can explain the economic importance of fermentation in the manufacture of bread and alcoholic drinks.			
i	I can compare the processes of aerobic and anaerobic respiration with regard to the need for oxygen, the differing products and the relative amounts of energy transferred.			

4.4.2.2. Response to Exercise

a	I know that, during exercise, the human body has an increased demand for energy.			
b	I can describe how, during exercise, the heart rate, breathing rate and breath volume increase to supply the muscles with more oxygenated blood.			
c	I know that, if insufficient oxygen is supplied, anaerobic respiration takes place in muscles.			
d	I can describe how, during anaerobic respiration, the incomplete oxidation of glucose causes a build-up of lactic acid and creates an oxygen debt.			
e	I know that, during long periods of vigorous activity, muscles become fatigued and stop contracting efficiently.			
f	I know that oxygen debt is the amount of extra oxygen the body needs after exercise to react with the accumulated lactic acid and remove it from the cells (HT only).			



4.4.2.3. Metabolism

a	I know that metabolism is the sum of all the reactions in a cell or the body and that it includes: • conversion of glucose to starch, glycogen and cellulose; • the formation of lipid molecules from a molecule of glycerol and three molecules of fatty acids; • the use of glucose and nitrate ions to form amino acids which in turn are used to synthesise proteins; • respiration; • the breakdown of excess proteins to form urea for excretion.			
b	I know that the energy transferred by respiration in cells is used by the organism for the continual enzyme controlled processes of metabolism that synthesise new molecules.			
c	I can explain the importance of sugars, amino acids, fatty acids and glycerol in the synthesis and breakdown of carbohydrates, proteins and lipids.			