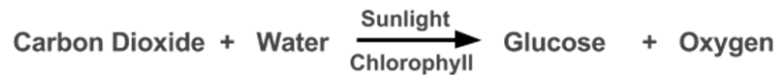# Year 10 Trilogy Biology 4: Bioenergetics Knowledge Organiser
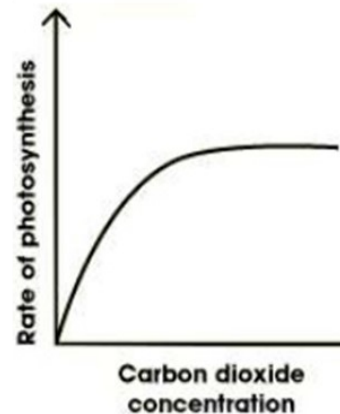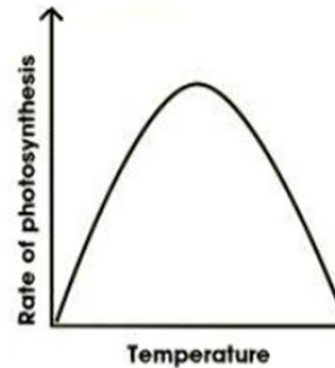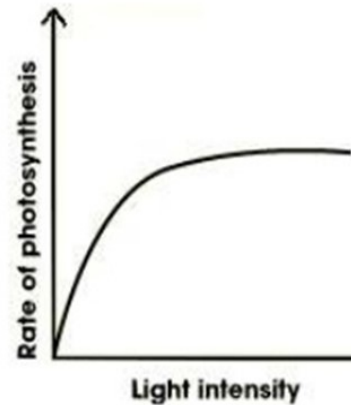
1. Photosynthesis

$$6CO_2 + 6H_2O \xrightarrow[\text{Chlorophyll}]{\text{Sunlight}} C_6H_{12}O_6 + 6O_2$$

$$\text{Carbon Dioxide} + \text{Water} \xrightarrow[\text{Chlorophyll}]{\text{Sunlight}} \text{Glucose} + \text{Oxygen}$$

Photosynthesis	An endothermic reaction where sunlight is absorbed and used to convert carbon dioxide and water into glucose and oxygen
Uses of glucose	•Respiration •Converted into starch •Produce fat or oil •Produce cellulose cell walls •Produce amino

2. Rate of photosynthesis

Factor	Affect on photosynthesis	Reason
Light	Increases	More energy for the reaction
Carbon dioxide	Increases	More reactants (provided there is no limiting reactant)
Amount of chlorophyll	Increases	More energy for the reaction
Temperature	Increases then decreases	Initially more energy but then enzyme denatures
Limiting factor		The factor that can limit the rate of a reaction

Rate of photosynthesis vs Light intensity

Rate of photosynthesis vs Temperature

Rate of photosynthesis vs Carbon dioxide concentration

3. Aerobic respiration

Respiration	An exothermic reaction which continuously happens in living cells
Purpose	Transfer energy for: •Chemical reactions •Movement •Warmth
Aerobic	With oxygen

$$C_6H_{12}O_6 + 6O_2 \Rightarrow 6CO_2 + 6H_2O + ATP$$

Glucose · Oxygen · Carbon Dioxide · Water · Energy

Anaerobic	Without oxygen
Anaerobic respiration in muscle cells	glucose à lactic acid
Anaerobic respiration in yeast cells (fermentation)	glucose à ethanol + carbon dioxide
Lactic acid	A chemical that when built up in muscles causes fatigue
Oxygen debt HT ONLY	The amount of oxygen the body needs after exercise to remove the lactic acid

4. Metabolism

Metabolism	The sum of all the reactions in a cell or the body
Includes:	•Conversion of glucose to starch, glycogen and cellulose •Formation of lipids from glycerol and 3 fatty acids •Use of glucose and nitrates to make proteins (PLANTS) •Respiration •Breakdown of protein to from urea.