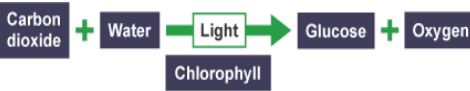
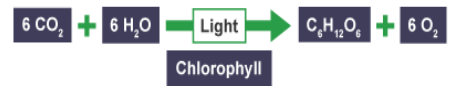
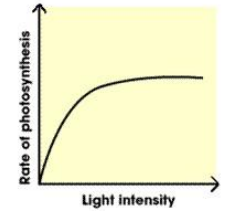
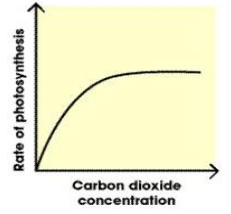
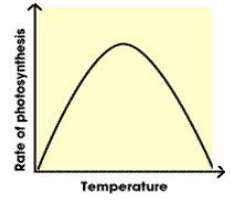
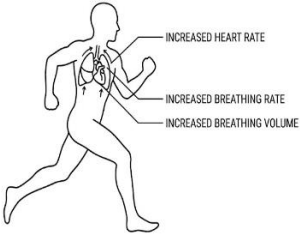
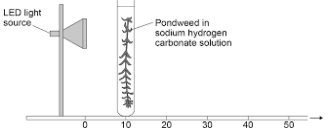


**GCSE Knowledge Organiser: Unit B4 Bioenergetics**

Key terms	Photosynthesis		Uses of glucose	
Photosynthesis: Process where plants use light to convert carbon dioxide and water into glucose and oxygen.			<b>Respiration:</b> To release energy for the cell.	<b>Cellulose production:</b> To strengthen cell walls.
Chlorophyll: Green pigment in chloroplasts that absorbs light energy.			<b>Storage:</b> Converted into insoluble starch or fats/oils.	<b>Protein production:</b> Combined with nitrates for protein synthesis.
Glucose (C <sub>6</sub> H <sub>12</sub> O <sub>6</sub> ) : The sugar produced in photosynthesis.	<b>Forms of respiration</b>			
Starch: Insoluble storage form of glucose in plants.	<b>Limiting factors of photosynthesis</b>		Aerobic	Glucose + Oxygen → Carbon dioxide + Water
Limiting factor: Anything that stops the rate of photosynthesis from increasing		<b>Light Intensity:</b> Increases rate until another factor becomes limiting.	Anaerobic (Muscles)	Glucose → Lactic acid
Aerobic respiration: Respiration using oxygen; yields the most energy.			Anaerobic (plants / yeast)	Glucose → Ethanol + Carbon dioxide
Anaerobic respiration: Respiration without oxygen; yields less energy.			<b>CO<sub>2</sub> Concentration:</b> Increases rate until another factor becomes limiting.	In yeast, this is called fermentation. Used in bread and alcoholic drink production.
Fermentation: Anaerobic respiration in yeast; produces ethanol and CO <sub>2</sub>				
Lactic acid: Waste product of anaerobic respiration in muscles; causes fatigue.	<b>Temperature:</b> Low temperatures limit kinetic energy; too high denatures enzymes.	Insufficient oxygen leads to anaerobic respiration and lactic acid build-up.		 <p>Increased heart rate: supplies muscle cells with oxygen and glucose. More respiration provides more energy for muscle contraction.</p>
Mitochondria: Organelle where aerobic respiration occurs.		<p>Increased breathing rate: Increases oxygen uptake and removes CO<sub>2</sub></p>		
Oxygen debt: Amount of extra oxygen needed after exercise to react with accumulated lactic acid.			<b>Required practical : Investigating Photosynthesis</b>	
Metabolism: The sum of all chemical reactions in a cell or the body.	 <p>Pondweed is placed in a solution of sodium hydrogen carbonate (to provide CO<sub>2</sub>) as the plant photosynthesises, oxygen bubbles are produced. Counting bubbles can be difficult. To be more accurate, oxygen is collected in a gas syringe to measure the actual volume of gas produced.</p>		Breathing and heart rate remains high to remove accumulated lactic acid from cells and react this with oxygen.	Breathing and heart rate remains high to remove accumulated lactic acid from cells and react this with oxygen.
Urea: A waste product formed from the breakdown of excess proteins, excreted by kidneys.			Increased breathing rate: Increases oxygen uptake and removes CO <sub>2</sub>	Increased breathing rate: Increases oxygen uptake and removes CO <sub>2</sub>