Beckfoot

Subject: Trilogy Science (Biology)	Topic: **Bioenergetics**	Year Group: 9

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Knowledge: Photosynthesis

Photosynthesis is a chemical reaction which takes place in plants

1	It converts carbon dioxide and water into glucose and oxygen
2	It uses light energy to power the chemical reaction, which is absorbed by the green pigment chlorophyll
3	This means that photosynthesis is an example of an endothermic reaction
4	The whole reaction takes place inside the chloroplasts which are small organelles found in plant cells

Knowledge: Rate of photosynthesis/ Limiting factors

1	A limiting factor is something which stops the photosynthesis reaction from occurring at a faster rate
2	Temperature, light intensity and carbon dioxide level are all limiting factors
3	Increasing the temperature of the surroundings will increase the rate of reaction , but only up to around 45˚c

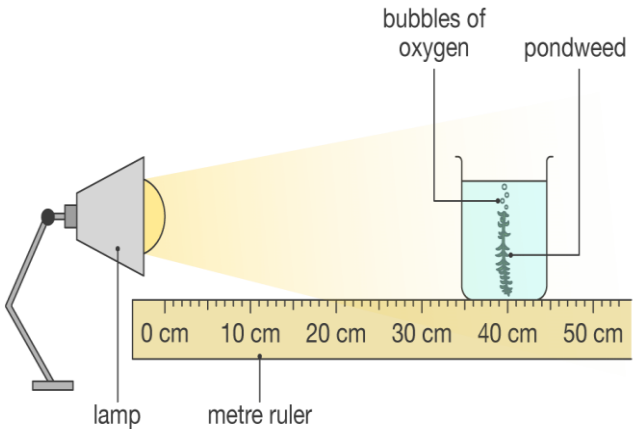
Knowledge: The Effect of Light intensity (Required practical)

The amount of light a plant receives affects the rate of photosynthesis.

1	If a plant receives lots of light, lots of photosynthesis will occur
2	If there is very little or no light, photosynthesis will stop

IV : light intensity
DV: amount of bubbles produced
CV: same amount of time/pondweed

Investigating the Effect of Light Intensity on the Rate of Photosynthesis



Key Vocabulary

1	Respiration	Is the chemical reaction which occurs inside the mitochondria Aerobic – Using oxygen Anaerobic – Without using oxygen
2	Exothermic	Meaning that energy is released to the surroundings.
3	Metabolism	Is the combination of all the reactions in a cell or in the body
4	Fermentation	In plants/yeast cells, anaerobic respiration makes different products. This is called fermentation.

Knowledge: key word + symbol equations

1	Photosynthesis: carbon dioxide + water → glucose + oxygen $6CO_2 + 6H_2O \rightarrow C_6H_{12}O_6 + 6O_2$
2	Aerobic : glucose + oxygen → carbon dioxide + water $C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O$
3	Anaerobic: glucose → lactic acid $C_6H_{12}O_6 \rightarrow 2C_3H_6O_3$ Fermentation: glucose → ethanol + carbon dioxide $C_6H_{12}O_6 \rightarrow 2C_2H_5OH + 2C_02$

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Knowledge: Effect of Exercise

When a person exercises, their body (muscles) need much more energy

1	To release more energy, the amount of respiration reactions occurring has to increase
2	The heart pumps faster and the breathing rate and breath volume all increase
3	Muscles not receiving enough oxygen then anaerobic respiration begins to occur
4	This incomplete oxidation of the glucose produces lactic acid

Knowledge: Oxygen Debt (HT only)

1	During vigorous exercise, the body can begin to carry out anaerobic respiration and produces lactic acid
2	Lactic acid is transported via blood stream to the liver which converts it into glucose
3	The oxygen debt is the amount of oxygen required by the body

Knowledge: Interaction of Limiting factors (HT only)

The limiting factors for the reaction will depend on the environmental conditions

1	At night, light intensity is the limiting factor
2	In winter, temperature is the limiting factor
3	In other conditions, carbon dioxide is usually the limiting factor

Knowledge: Inverse Square Law and Light Intensity (HT only)

1	The inverse square law is used to describe the light intensity at different distances from the source
2	The intensity of light is inversely proportional to the square distance from the source
3	intensity $\text{intensity} \propto \frac{1}{\text{distance}^2}$