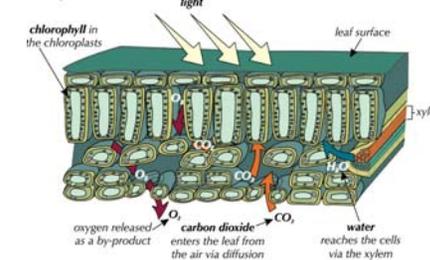
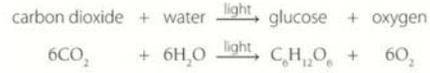


Biology Crib Sheet: Topic 4

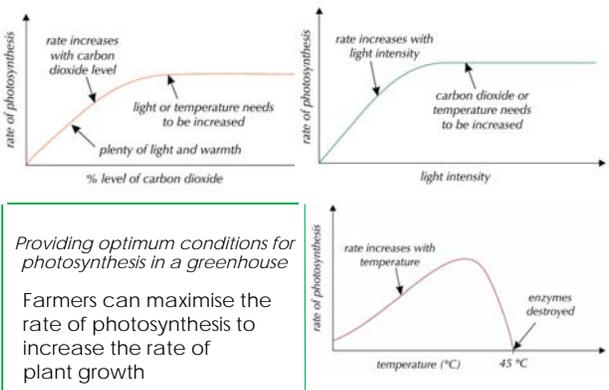
Photosynthesis – an endothermic reaction which takes place in chloroplasts in plant cells



How are the leaves adapted?

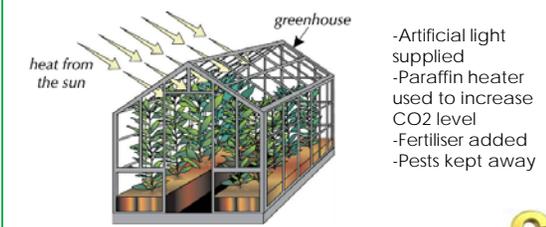
Adaptation	How this supports photosynthesis
Broad leaves	Large surface area to absorb light energy
Thin leaves	Short diffusion distance for gas
Chlorophyll in chloroplasts	Absorb light energy
Veins	Deliver water to cells and remove products
Air spaces	Allow gas exchange
Guard cells	Open and close to regulate gas exchange through stomata

Factors affecting the rate of photosynthesis



Providing optimum conditions for photosynthesis in a greenhouse

Farmers can maximise the rate of photosynthesis to increase the rate of plant growth

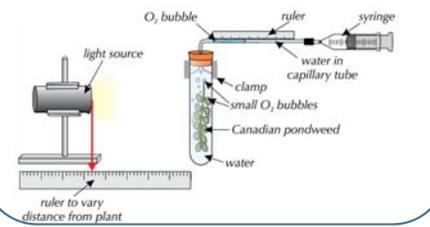


This is expensive so the farmer must ensure he uses the minimum input to get the maximum yield



Investigating the rate of photosynthesis

Rate of photosynthesis = $\frac{\text{Length of bubble}}{\text{Time taken}}$

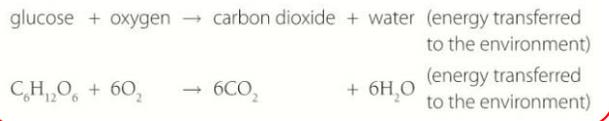


How glucose produced during photosynthesis is used

Use	How and why
Respiration	Energy is released by breaking down glucose
Making amino acids	Combined with nitrates to form amino acids. These are the building blocks of proteins
Making cellulose	A strong substance used to make cell walls
Making starch	An insoluble energy storage molecule
Making lipids	Used as an energy store and in cell walls

Respiration – an exothermic reaction which transfers energy from glucose and happens in the mitochondria in every cell

Aerobic respiration



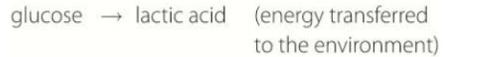
During exercise, muscles contract harder and faster so more glucose and oxygen are needed for an **increased rate of respiration**

USES OF ENERGY FROM RESPIRATION

- Building larger molecules from smaller ones (eg proteins from amino acids)
- Allowing muscles to contract so organisms can move
- Keeping their body temperature steady (mammals and birds only)
- Transferring mineral ions such as nitrates from the soil into root hair cells in plants

Response to exercise	Importance
Heart rate increases and arteries dilate	Increases delivery of oxygenated blood and glucose to muscles and removes carbon dioxide
Breathing rate and depth increases	Increases the rate of oxygen delivery to red blood cells and removal of carbon dioxide
Glycogen stored in muscle converted back to glucose	Supplies the cells with glucose for increased rate of respiration
(Vigorous exercise only) Anaerobic respiration begins	Supplies a smaller amount of energy when there is insufficient oxygen for aerobic respiration

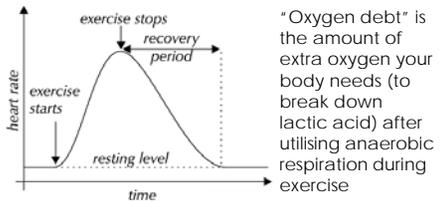
Anaerobic respiration (needed when there is insufficient oxygen)



Anaerobic respiration in plants and yeast



Anaerobic respiration in yeast is known as fermentation. It is used to produce alcohol and bread



Metabolism – the sum of all reactions that take place in a cell or in the body. These are controlled by enzymes

	Aerobic respiration	Anaerobic respiration
Is oxygen needed?	yes	no
What products are made?	CO ₂ and water	lactic acid (muscles) / CO ₂ and ethanol (plants & yeast)
How much energy is transferred?	A large amount.	A small amount.

reactant	enzyme	product	enzyme	product	enzyme	product
Endothermic reactions (take in energy)				Exothermic reactions (release energy)		
Formation of starch, cellulose or glycogen from glucose		Production of urea by breaking down excess protein				
Formation of lipid from one glycerol and three fatty acids		Respiration				
Formation of amino acids from glucose and nitrate ions						
Photosynthesis						

Metabolic functions of the liver:

- Detoxifying poisonous substances
- Breaking down old cells
- Removing lactic acid

