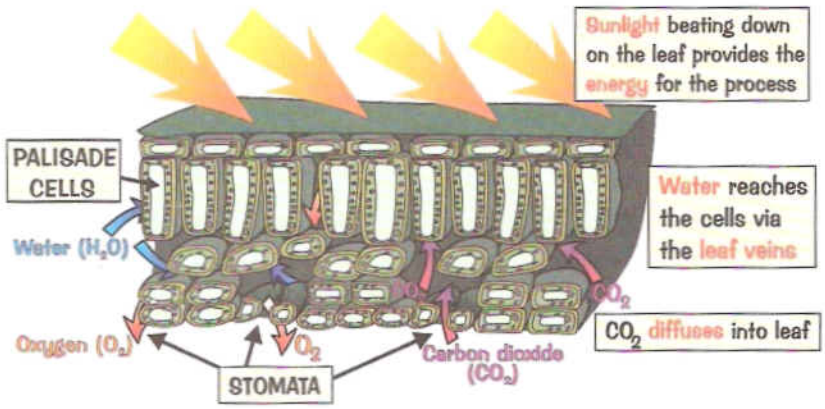
Photosynthesis

Photosynthesis produces glucose from sunlight

1) Photosynthesis is the process that produces "food" in plants. The "food" it produces is glucose.
2) Photosynthesis takes place in the leaves of all green plants — this is what leaves are for.



Three Features:

1) Leaves are thin and flat to provide a big surface area to catch lots of sunlight.
2) The palisade cells are near the top of the leaf and are packed with chloroplasts.
3) Guard cells control the movement of gases into and out of the leaf through pores called stomata.

Learn the equation for photosynthesis:

$$\text{Carbon dioxide} + \text{Water} \xrightarrow[\text{chlorophyll}]{\text{SUNLIGHT}} \text{glucose} + \text{oxygen}$$

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

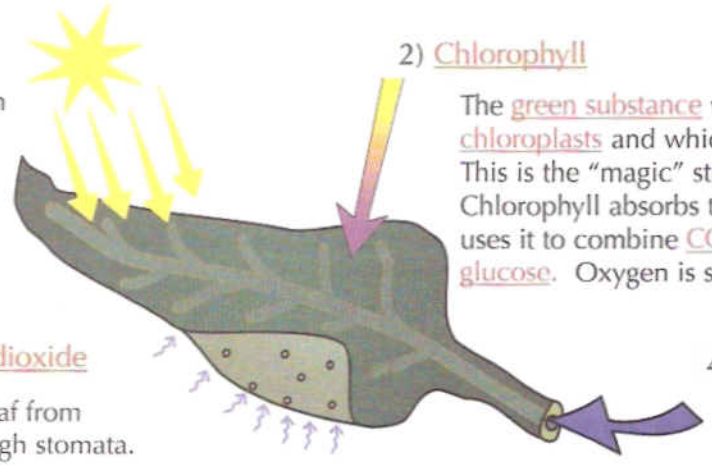
Four things are needed for photosynthesis to happen:

1) Light

Usually from the Sun.

2) Chlorophyll

The green substance which is found in chloroplasts and which makes leaves look green. This is the "magic" stuff that makes it all happen. Chlorophyll absorbs the energy in sunlight and uses it to combine CO_2 and water to produce glucose. Oxygen is simply a by-product.



3) Carbon dioxide

Enters the leaf from the air through stomata.

4) Water

Comes from the soil, up the stem and into the leaf.

Live and learn...

What you've got to do now is learn everything on this page. Photosynthesis is certain to be included on the Regents exam. On this page you've got two diagrams, two points about photosynthesis and the equations, and then the four necessary conditions. Just keep learning them until you can cover the page and write them all down from memory. Only then will you really know it all.

Cellular Respiration

In all organisms, the energy stored in organic molecules may be released during cellular respiration.

Energy for exercise comes from respiration

Respiration is the release of energy from food. When you exercise, you respire more to get more energy. Glucose is the main substance used for respiration, but if it's not available the body can use glycogen (stored energy) or triglycerides (lipids). The energy released by respiration is then stored as ATP (a short-term energy store), ready for use.

There are two kinds of respiration — aerobic and anaerobic. You'll need to know all about both of them for your Regents exam...

Aerobic respiration uses oxygen

Aerobic respiration occurs in cells when there is oxygen around.
The process of cellular respiration ends in the mitochondria of the cell.

Aerobic Respiration —

1) Uses oxygen and produces waste CO_2 that's released through the lungs.
2) Releases more energy from each glucose molecule than anaerobic respiration.

$$C_6H_{12}O_6 + 6O_2 \longrightarrow 6CO_2 + 6H_2O + 38\ ATP$$

glucose + oxygen → carbon dioxide + water + ATP (contains energy)

Anaerobic respiration takes over when oxygen runs out

Anaerobic respiration takes place in cells when all the oxygen has been used up — for example, when you're exercising hard.

Anaerobic Respiration —

1) It's less efficient at releasing energy.
2) It doesn't need oxygen to release energy.
3) It produces lactic acid, which builds up in the blood. This lowers the pH in muscle cells that are respiring anaerobically, which causes the pain known as muscle fatigue.

$$C_6H_{12}O_6 \longrightarrow 2CH_3CHOHCOOH + 2ATP$$

glucose → lactic acid + ATP (contains energy)

Respiration — even more important than studying...

You don't have to memorize the equations on this page, but you definitely need to understand the two processes of respiration — aerobic and anaerobic. Make sure you are 101% happy with this stuff...