MODULE: *Photosynthesis and Respiration*

Activity Sheet 1.2: Photosynthesis and respiration explained

Photosynthesis is the process by which green plants use the energy from the Sun to convert carbon dioxide and water into the simple sugar, glucose ($C_6H_{12}O_6$), and oxygen (O_2).

The process of photosynthesis begins in the leaves, where light energy is absorbed by the green pigment chlorophyll. Chlorophyll is found inside the plant's cells, in tiny structures called chloroplasts.

The leaves also absorb carbon dioxide from the air and get water from the plant's roots.

The light energy in the chlorophyll converts the carbon dioxide and the water into glucose and oxygen.

Then the leaf gives off most of the oxygen into the air. Most of the glucose goes down into the plant, to be stored as starch or used for growth, but some of the glucose stays in the leaf to be used in respiration.

Exercise 1

On the diagram of the leaf below, show the process of photosynthesis. Use different coloured arrows to show the directions of movement of the **sunlight**, **carbon dioxide** and **water** (the reactants) and most of the **oxygen** and **glucose** (the products).

Cellular respiration is a process by which cells break down glucose to release its stored energy.

In the first stage of respiration, the cytoplasm in a cell breaks down glucose into smaller molecules. This releases a small amount of energy.

In the second stage there is a further breakdown, which releases a large amount of energy plus carbon dioxide.

Exercise 2

Arrange the cards to make the word and chemical equations for photosynthesis and respiration.

Then write down the equations here:

Photosynthesis:

Word equation

Chemical equation

Respiration

Word equation

Chemical equation

Exercise 3

Now describe photosynthesis in a maximum of 5 sentences, as if you were talking to someone who has never heard of it:

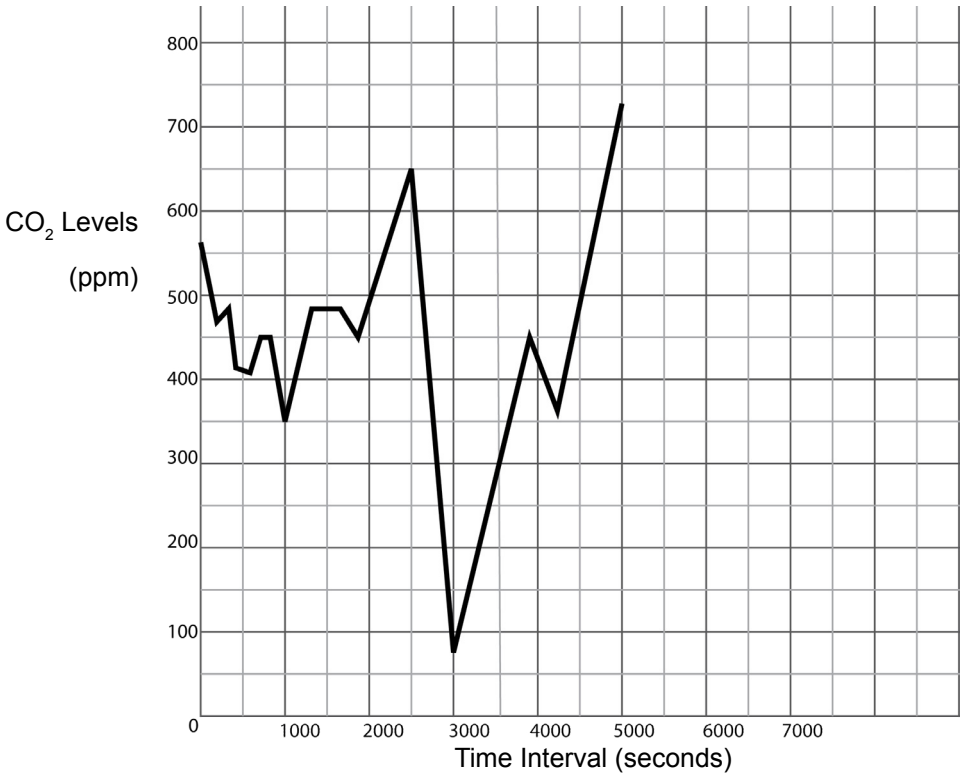
Describe respiration in a maximum of 5 sentences as if you were talking to someone who has never heard of it:

Exercise 4

An experiment was carried out to record the changes in carbon dioxide levels in a bean plant in a sealed container over a period of time.

A data logging probe was used to monitor the levels of carbon dioxide in the container, and a sheet of black paper was used to block out the light from the plant for a short time.

The graph below shows the findings under different lighting conditions.



The graph has a range of points marked when readings were taken. Say what you think is starting to happen at each of these points: photosynthesis or respiration or both. (For Point C you need to say what's been happening just before it.) Think about the conditions needed for each of these processes to help you to work out why that's beginning to happen.

A. Light turned on

B. Black paper removed

C. End of experiment

D. Bean placed in container

E. Light turned off and black paper added

Explain your answers:

A

B

C

D

E