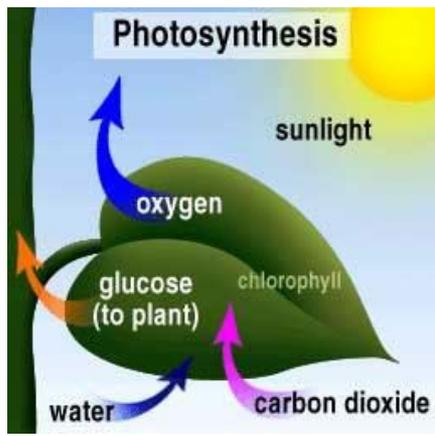
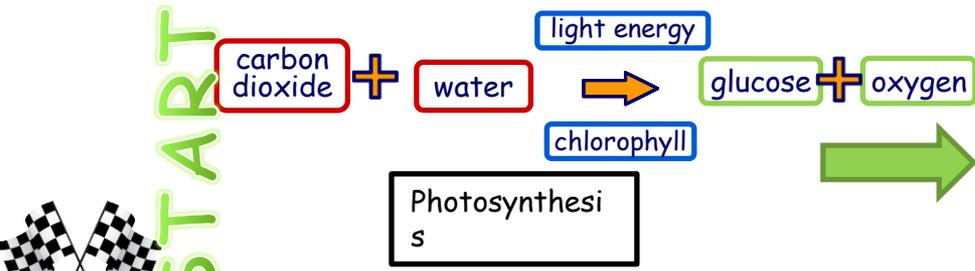
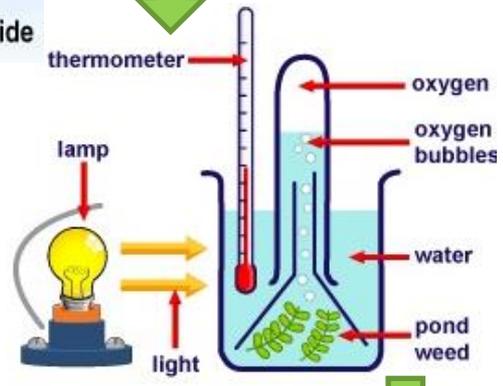


# Y8 4.4 Bioenergetics



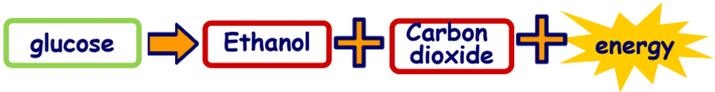
**Investigating Photosynthesis:**  
 Count the number of oxygen bubbles in a set amount of time.  
**More oxygen = more photosynthesis**



**Exercise:**

- Uses both aerobic and anaerobic respiration in order to supply enough energy, quick enough to our cells.
- After we exercise we must get rid of lactic acid by reacting it with oxygen = oxygen debt.
- This is why we are out of breath after exercise

Anaerobic Respiration in yeast



- Key words:**
1. **Photosynthesis:** Light energy is used to react carbon dioxide and water to make glucose and oxygen
  2. **Limiting factor:** A factor that affects the rate of reaction. When the factor is increased the rate of reaction goes up
  3. **Aerobic respiration:** Respiration using oxygen
  4. **Anaerobic respiration:** Respiration with **no** oxygen

**Factors that can affect how quickly photosynthesis works:**

- 1) Carbon dioxide concentration
- 2) Light intensity
- 3) Temperature

Anaerobic respiration takes place when there is no oxygen available.

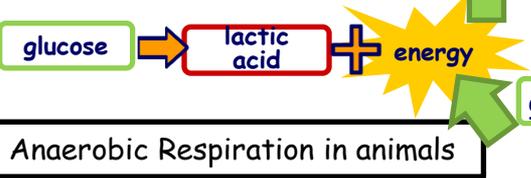
**GOOD:** Can produce some energy when there is no oxygen  
**GOOD:** Can produce energy very quickly  
**BAD:** Produces very small amount of energy  
**BAD:** produces lactic acid which is poisonous for our cells

**Respiration:** Chemical reaction that gives our cells energy

**Breathing:** A mechanical process that gets oxygen into our lungs for respiration and carbon dioxide out

**How the Plant uses glucose**

1. The plant uses glucose in respiration
2. The plant stores glucose as starch



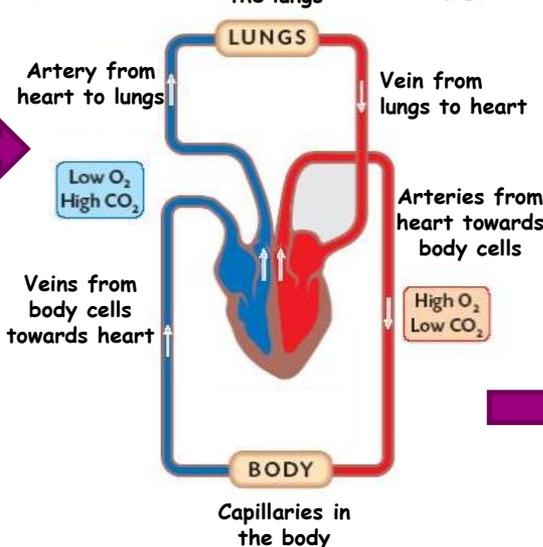
Aerobic Respiration

START

### Circulatory System

- The **circulatory system** is the heart and blood vessels (arteries, veins and capillaries)
- Arteries** carry blood away from the heart.
- Veins** carry blood towards the heart.
- Capillaries** are tiny blood vessels. Capillaries weave through all your cells. They swap substances with the cells.
- The heart pumps blood through the blood vessels

RIGHT



### Y8 4.4 Bioenergetics - 2

#### Circulatory System

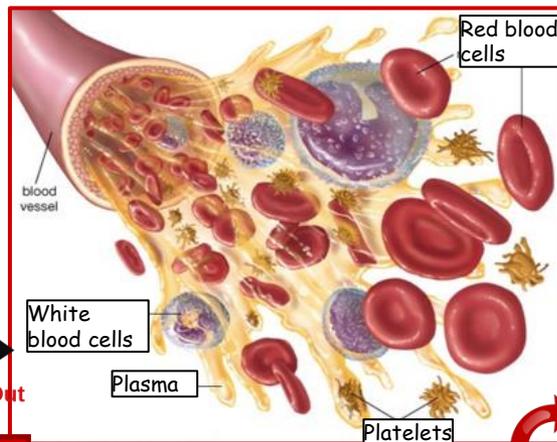
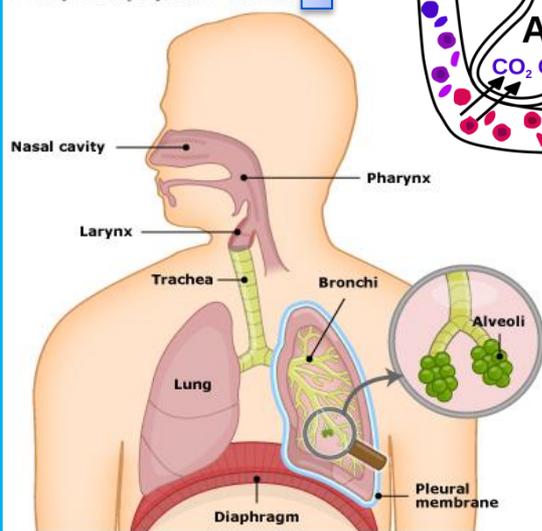
- The right side of your heart pumps blood without oxygen to the lungs,
  - blood with oxygen returns to the left side from the lungs.
  - The left side then pumps the blood around your body to your cells, to deliver the oxygen.
  - Blood without oxygen returns to the right side again.
- The left side of the heart is more powerful. It pumps blood around the whole body.

The breathing system removes waste CO<sub>2</sub> from the blood, and absorbs needed O<sub>2</sub> from the air into the blood.

The trachea branches into each lung, then it keeps branching into smaller bronchi.

It finishes at the alveoli, or air sac, where gas exchange happens

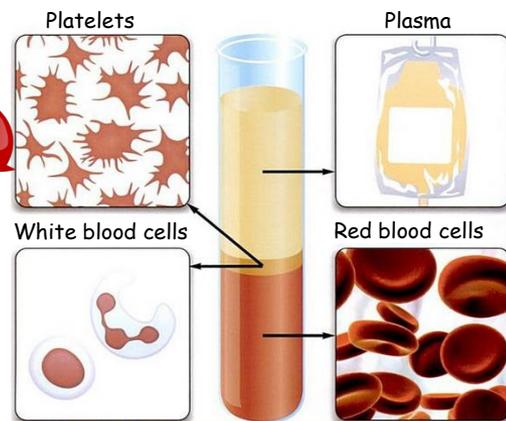
Respiratory System - Structure



#### THE BLOOD

The blood is a mix. It transports things around the body.

It has four parts

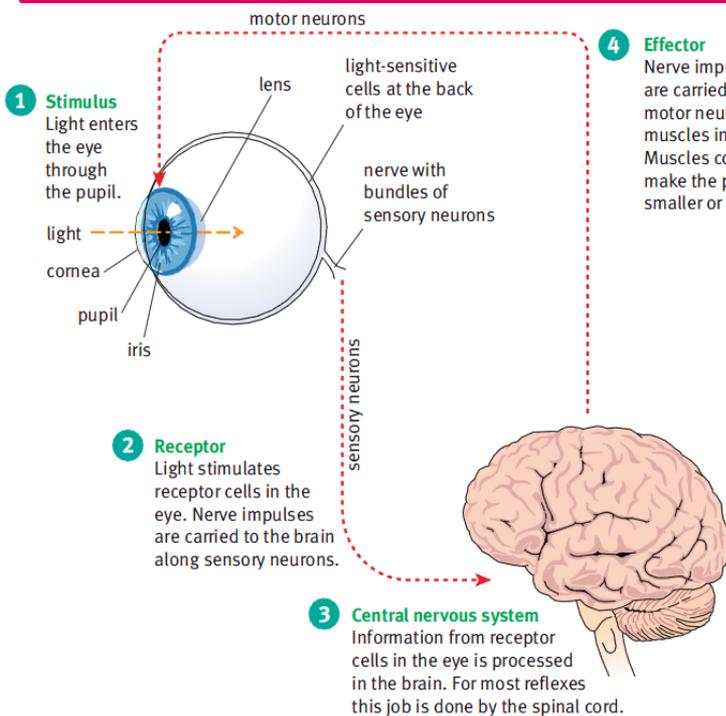


- PLATELETS** form blood clots (or scabs)
- WHITE BLOOD CELLS** kill microbes
- PLASMA** is a straw coloured liquid
- RED BLOOD CELLS** carry the oxygen. Red blood cells have no nucleus. This gives more space for oxygen

## Key words:

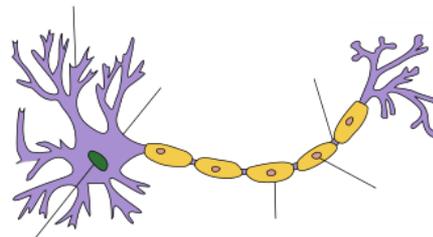
1. **Homeostasis:** Maintaining a constant internal environment
2. **Receptor:** Detect a change in the environment
3. **Effector:** Muscle or gland that carries out a response
4. **Stimulus:** A change in the environment
5. **Sensory neurone:** Carries an electrical impulse from the receptor to the CNS
6. **Relay neurone:** Carries the impulse from the sensory neurone to the motor neurone
7. **Motor neurone:** Carries the impulse from the CNS to the effector
8. **Synapse:** A tiny gap between 2 neurones
9. **Reflex:** An automatic response that does not require processing, helps an organism survive

1. Receptor detects a stimulus
2. A nervous impulse is sent along the sensory neurone to the spine.
3. A relay neurone then sends the message to a motor neurone
4. The motor neurone carries the nervous impulse to the effector
5. The effector carries out a response



**Reflex Actions:**  
Automatic responses that protect the body from harm. They are unconscious actions - require no thought

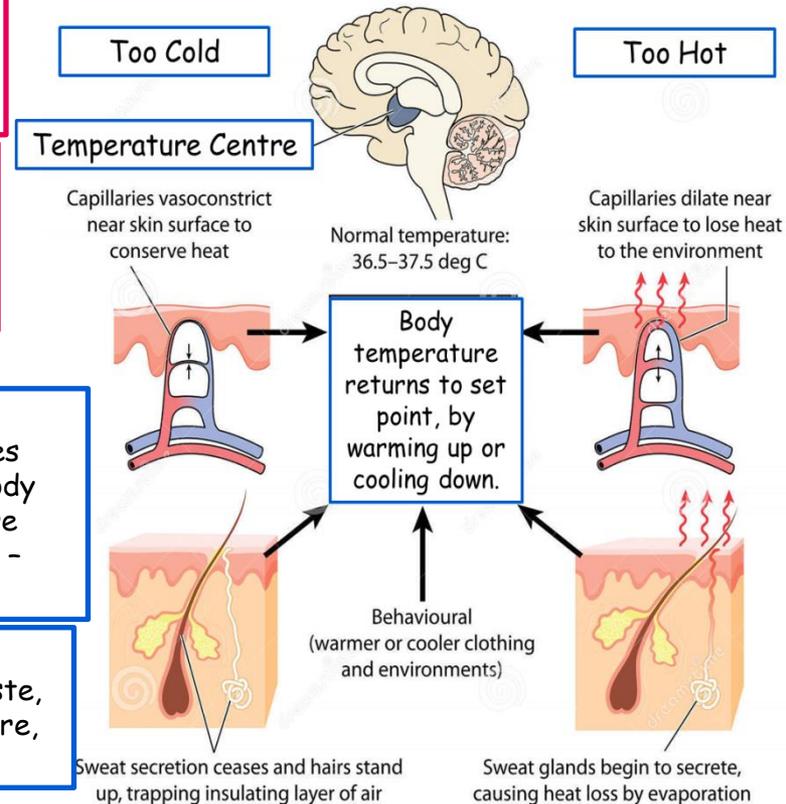
**Receptors:** Detect stimuli e.g. smell, taste, temperature, pressure, light, sound



START

## Y8 Homeostasis & Response

**Homeostasis:** Maintaining a constant internal environment e.g. temperature control and blood glucose control.



**Neurons:** Send messages by electrical impulses. Long and thin to carry messages long distances. Branches to connect to other neurons by gaps called synapses.

### Investigating the energy in food

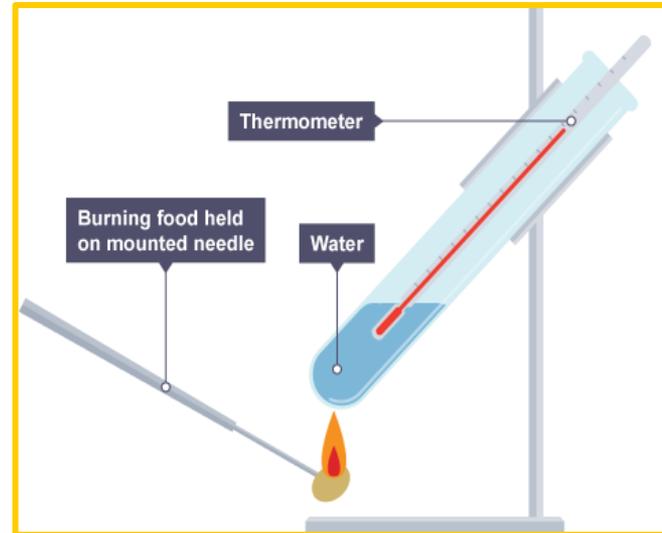
You burn the food under a test tube. You measure the temperature change of the water using a thermometer.

The chemical energy in the food is transferred into heat energy in the water.

The more energy in the food, the bigger the temperature rise.

Taking repeat readings is useful to spot results that don't find the pattern, and then calculate an average.

A lot of the heat energy from the flame isn't transferred to the water - it ends up being transferred to the air around the test tube! This causes errors in the results



#### PAGE 1 QUESTIONS

1. Write out the equation for photosynthesis
2. Where does photosynthesis happen
3. What is the glucose used for in plants?
4. How can I use Elodea pondweed to measure photosynthesis??
5. Write out the equation for respiration
6. What does aerobic respiration mean?
7. What does anaerobic respiration mean?
8. How is anaerobic respiration in yeast different to in animals?
9. What happens to our heart rate and breathing rate when we exercise?
10. Why?
11. What is oxygen debt?

#### PAGE 2 QUESTIONS

1. What is the circulatory system?
2. What are the 3 different types of blood vessel and what do they do?
3. What is the difference between arteries and veins in terms of blood flow?
4. What are the four components of blood and what are they for?

5. Why do red blood cells have no nucleus?
6. What are the alveoli?
7. What happens during gas exchange

#### PAGE 3 QUESTIONS

1. Describe how we could investigate the energy content of a range of foods.
2. How can obtaining repeat results be helpful?
3. Why is this investigation not very precise or accurate?

#### HOMEOSTASIS AND RESPONSE QUESTIONS

1. What is homeostasis?
2. Describe a reflex arc
3. Explain what a reflex is and why it is important
4. Describe how the body reduces its temperature if too hot.
5. Describe how the body increases its temperature if it is too cold.
6. Describe how a neuron is adapted to send messages.