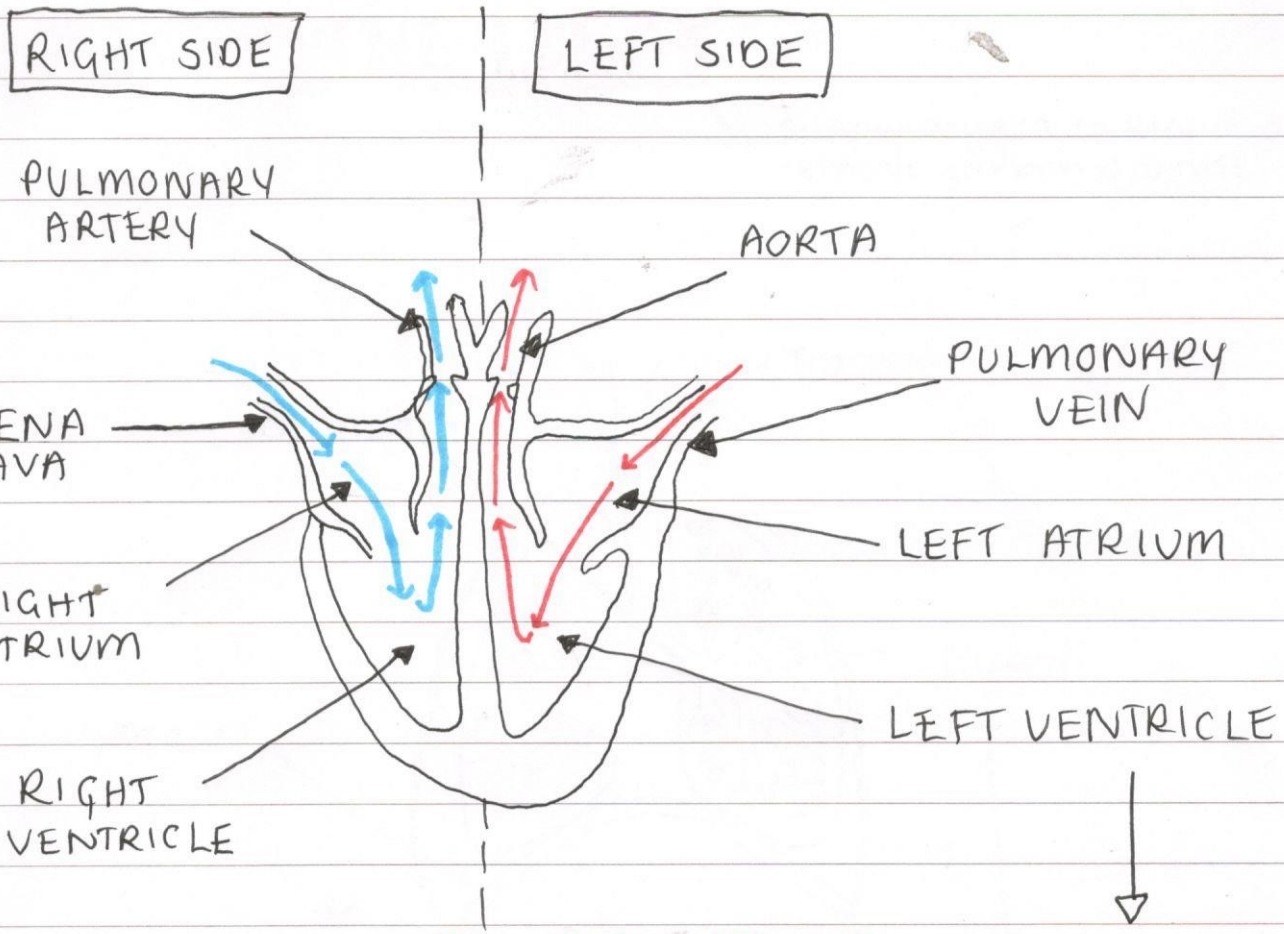


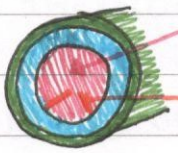
muscular wall for left ventricle is thicker as it needs to pump blood all around the body so needs to pump it far.

REMBER:

VEIN = to the heart

ARTERY = away from the heart

Veins →
TOWARD HEART



large lumen to allow low blood pressure to flow through

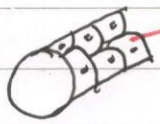
contains values so blood flows in the right direction.

Arteries →
AWAY FROM HEART

Thick elastic layer to let them streatch

Thick muscles to make them strong and withstand high pressure.

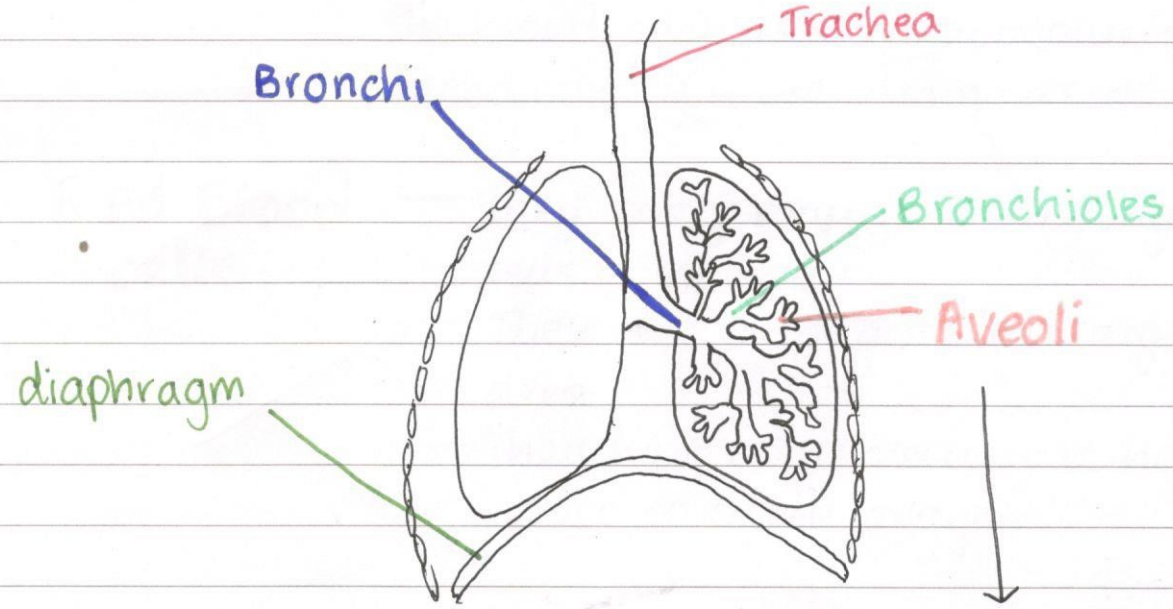
Capillaries →
LETS BLOOD FLOW CLOSE TO CELL TO ENABLE SUBSTANCES TO MOVE



one cell thick = quick diffusion pathway

THE LUNGS

↘ supply oxygen to blood and remove carbon dioxide.



Aveoli are adapted for diffusion because they're clustered so have a large surface area, they are also thin

Ventilation Process:

1. Rib cage moves up and out
2. Diaphragm moves down
3. Chest volume therefore increases
4. Increased volume = lower pressure
5. Air is therefore drawn into the chest
6. Aveoli fill with oxygen
7. Oxygen diffuses out aveoli and into capilaries, whilst carbon dioxide diffuses from capilaries into aveoli

$$\text{BREATHING RATE} = \frac{\text{NUMBER OF BREATHS}}{\text{NUMBER OF MINUTES}}$$

BLOOD

Blood is made up of :

Plasma — The **liquid** that carries the components in the blood, such as red blood cells, white blood cells, glucose, amino acids etc...

Red Blood cells
- They **carry oxygen** from lungs to all cells in the body.
- Their disc shape gives it a large surface area
- They have no nucleus so it has more space to carry oxygen

White Blood cells
- They are part of the **immune system**
- They fight pathogens by either;
  - producing antibodies against microbes
  - eating & digesting pathogens
  - producing antitoxins to neautralise toxins produced by microbes.

Platelets — They help the blood clot when theres a wound

CORONARY HEART DISEASE

When the coronary arteries, that provide blood to the heart, become blocked with the build up of fatty material.

This reduces oxygen supply to the heart which may lead to a heart attack.

Solutions:

1. Stents

- metal tubes inserted in the artery to keep them open
  - ✓ They lower risk of heart attack
  - ✓ Recovery from the surgery is quick
  - ✗ Risk of heart attack during the operation
  - ✗ Chance of blood clots forming near the stent

2. Statins

- drugs that decrease the level of LDL (bad) cholesterol so it doesn't build up on artery walls
  - ✓ Reduce the risk of strokes, CHD, and heart attacks
  - ✓ Increase levels of HDL (good) cholesterol
  - ✗ Have to take them every day
  - ✗ Can have side effects
  - ✗ Doesn't have an immediate effect

Health Issues

Health = A state of physical, mental + social well-being.

- Disease can cause ill health.

2 types of disease;
① Communicable = infectious
② Non-communicable = not infectious

factors affecting health:

★ DIET
★ STRESS
★ LIFE SITUATIONS e.g where you live, financial status, access to health care

Cancer

★ Cancer is the result of changes in cells that lead to uncontrollable growth, forming a tumor.

A tumor can be;

① malignant - **cancerous**
↳ the tumor grows and spreads to other tissues

② Benign - **NOT cancerous**

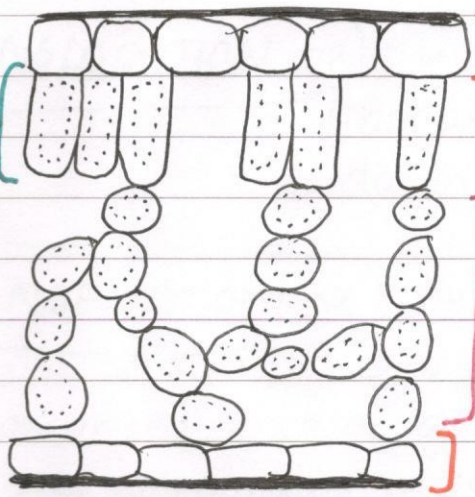
RISK factors

- Smoking
- Obesity
- UV light
- viral infection
- genetics

Plant tissues, organs + systems

The leaf is a plant organ as it is made up of tissue (such as epidermis, paliside, mesophyll, phloem + xylem.)

Plant tissue:



Epidermal tissue

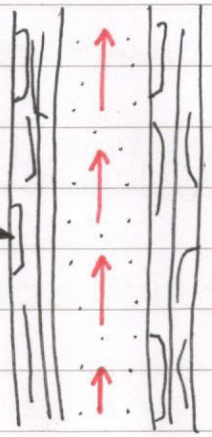
- covered with waxy cuticle, which helps reduce water loss by evaporation

Paliside mesophyll

- lots of chloroplasts as photosynthesis happens here.
- At top of leaf to receive more light

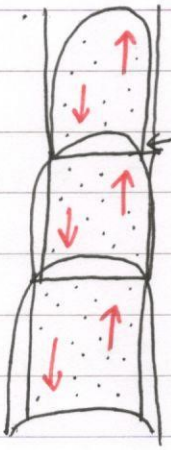
spongy mesophyll

- Has lots of air spaces to allow gases to diffuse in and out of cells



xylem.

- found in roots, stems, + leaves
- made of dead cells joined to form continous tube
- Allows movement of water + mineral ions from **root to stem + leaves**, in the leaves + stem the water evaporates + leaves plant.
  ↳ this process is called transpiration



phloem

- Also found in roots, stems + leaves
- Its made of elongated cells with holes in the cell walls.
- Food substances can be moved in both directions; from leaves or from storage to where they're needed.
  ↳ process is called translocation

Plant organ systems

- Root, stem + leaves form a plant organ system to transport substances around the plant.

① TRANSLOCATION → The movement of food substances (that are made in the leaves) up and down the phloem.

② TRANSPIRATION → The loss of water vapour from the leaves + stems.

↳ It is a consequence of gaseous exchange.

↳ As water evaporates, molecules are pulled up the xylem at the same time, forming a continous transpiration stream.

What affects transpiration rate?

★ Increase in temperature – this makes molecules move faster, so evaporation is faster

★ Increase in humidity – If humidity is high, the concentration gradient from inside to outside the plant will be reduced, so slower diffusion = slower transpiration

★ Wind – more air is moving away from the leaf = steeper concentration gradient = faster transpiration

★ increased light – causes increased photosynthesis = more stomata open = more water can evaporat = increased transpiration.

INFECTION + RESPONSE

① Communicable (INFECTIOUS) diseases

☆ Pathogens, including viruses, bacteria, protists, and fungi are microorganisms that cause infectious disease.

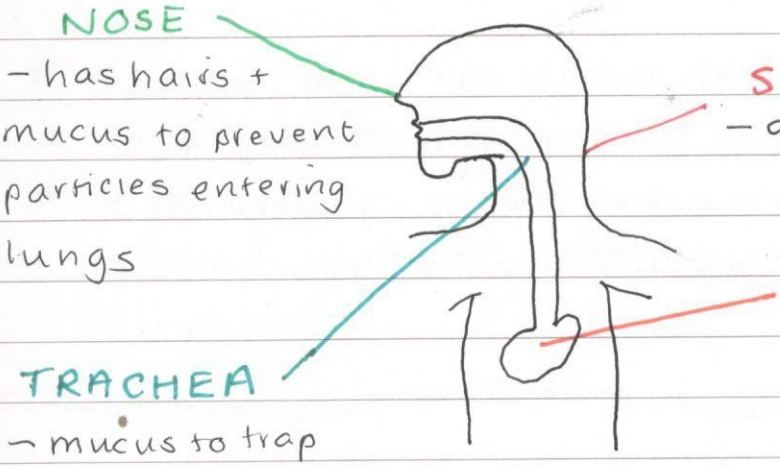
VIRUS e.g measles	• Very small. • Move into cells + copy themselves inside, so the cell bursts + release copies into bloodstream
BACTERIA e.g Gonorrhoea	• small • multiply + produce toxins to damage cells.
PROTISTS e.g. malaria	• some use body cells as a host to live.
FUNGI	• Produce spores which spread to other organisms

They can be spread by contact, air, and water.

How to reduce the spread:
- Improve hygiene
- Reduce contact
- Vaccination

REMEMBER you can only use antibiotics to kill bacteria not viruses.

The human defense system:



NOSE
- has hairs + mucus to prevent particles entering lungs

SKIN
- acts as a physical barrier

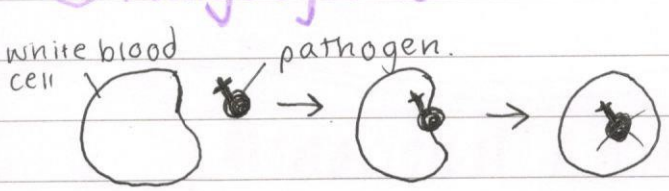
STOMACH
- produces hydrochloric acid that kills pathogens

TRACHEA
- mucus to trap pathogens

White blood cells:

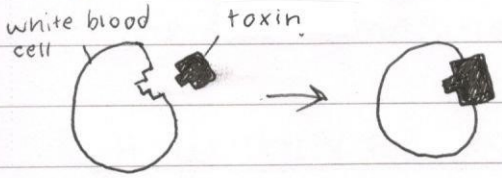
☆ White blood cells are used to destroy pathogens in the following ways:

① Phagocytosis.



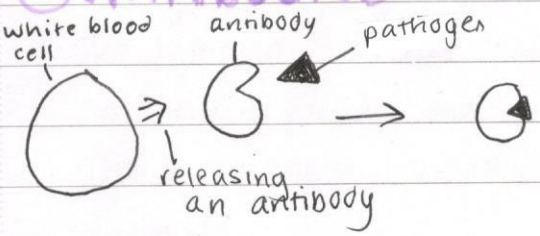
- It engulfs (eats) the pathogen which destroys it

② Antitoxins



- the white blood cell binds to the toxin, this neautralises the toxin

③ Antibodies



- The white blood cell releases an antibody with a specific shape to the pathogen so it can fit together + destroy it.
- It remembers which antibody has the right shape for when you're next infected by same pathogen.

Vaccination

★ Vaccines inject you with a dead form of the pathogen
★ Your body then makes the correct antibodies to fight it
★ It remembers which antibodies so if you become infected your body remembers how to fight it off quickly.

ANTIBIOTICS

⇒ Antibiotics kill pathogens (→ not viruses) without damaging cells

★ People can become resistant to antibiotics, this is because mutations occur so some bacteria isnt killed by the antibiotic, these then multiply so there is lots of bacteria that the antibiotic cannot kill.

Monoclonal Antibodies

= These are **identical** antibodies that have been produced from the same immune cell.

HOW THEY'RE PRODUCED:

- Scientists obtain mice lymphocytes (a type of white blood cell)
- The lymphocytes are stimulated to produce a specific antibody
- The lymphocytes are combined with tumor cells (which divide rapidly) to form a HYBRIDOMA
- The hybridoma divides + clones itself. They all release the same antibody.

Uses of monoclonal antibodies:

1. PREGNANCY TESTS:
2. IN LABS TO MEASURE + MONITOR
3. IN RESEARCH TO IDENTIFY CERTAIN MOLECULES
4. IN TREATMENT OF DISEASE

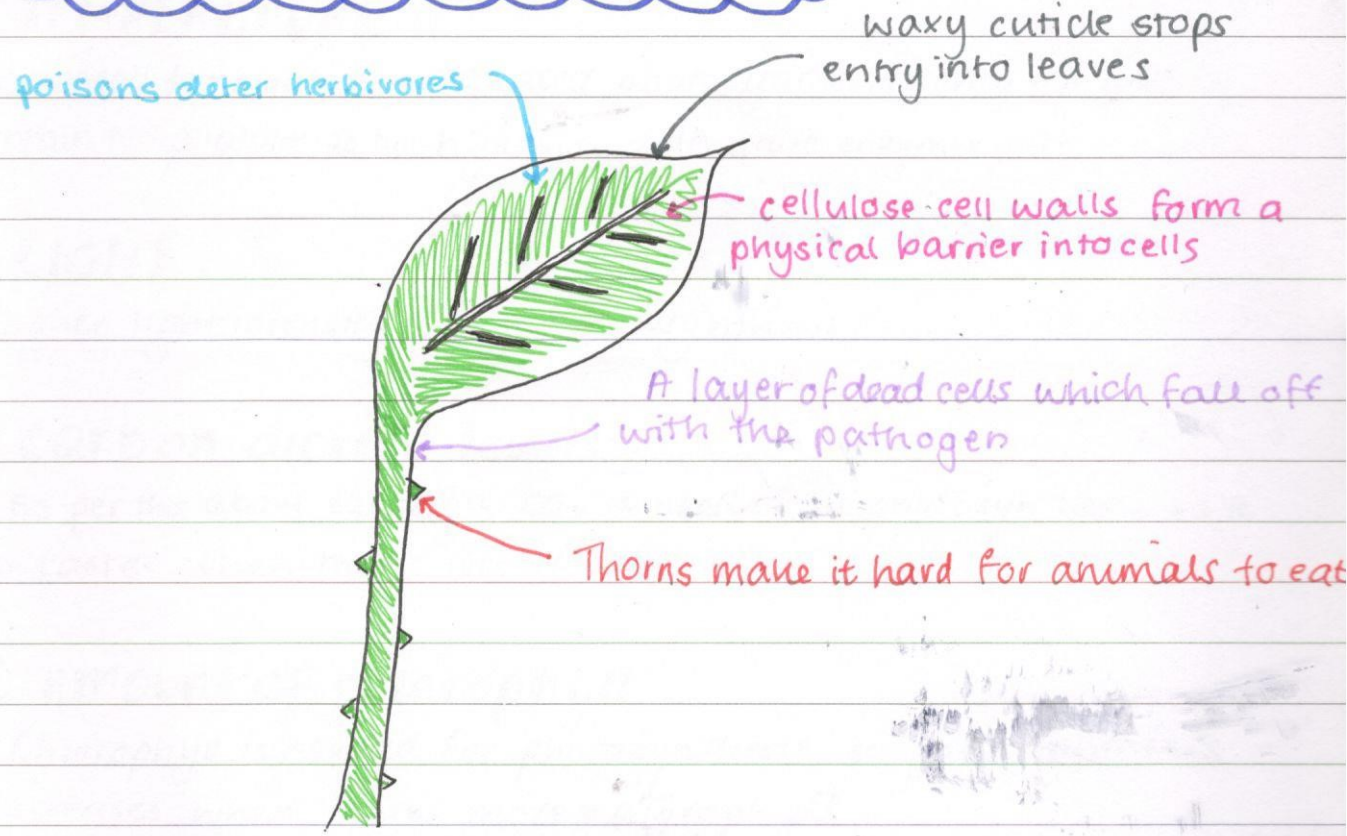
ADVANTAGES	DISADVANTAGES
They only bind to specific cells, so healthy cells aren't affected	Its difficult to attach monoclonal antibodies to drugs
They can be engineered to treat many different conditions	They're expensive to develop

PLANT DISEASE

Common signs of plant disease are:

- ★ stunted growth
- ★ spots on leaves
- ★ areas of decay
- ★ abnormal growths
- ★ malformed stems/leaves
- ★ discolouration
- ★ pests on leaves

PLANT DEFENSE RESPONSES



Photosynthesis

★ Photosynthesis is the process by which plants make glucose from sunlight.

Carbon dioxide (CO_2) + Water (H^2O) —light→ Glucose ($C_6H_{12}O_6$) + Oxygen (O_2)

What affects the rate of photosynthesis?:

① TEMPERATURE

- Increased temperature = increased photosynthesis, only up until a certain temperature as too high would denature enzymes.

② LIGHT

- Higher light intensity = faster photosynthesis

③ carbon dioxide levels

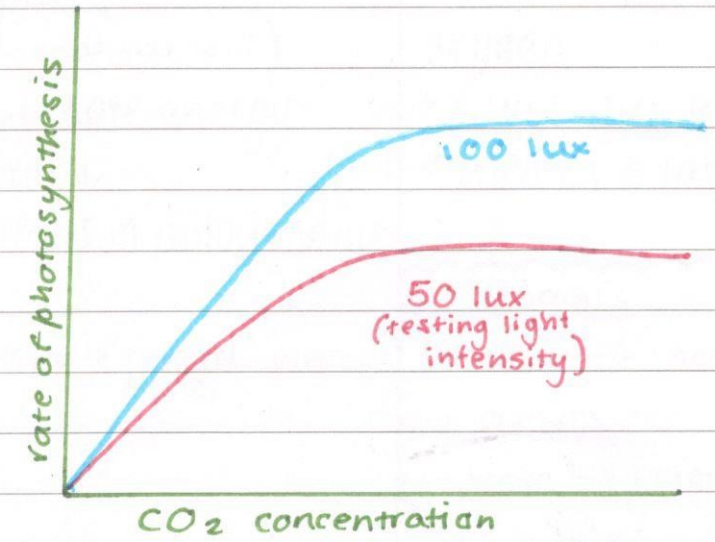
- As per the above equation, CO_2 is needed in photosynthesis so it is faster when theres lots of CO_2

④ amount of chlorophyll

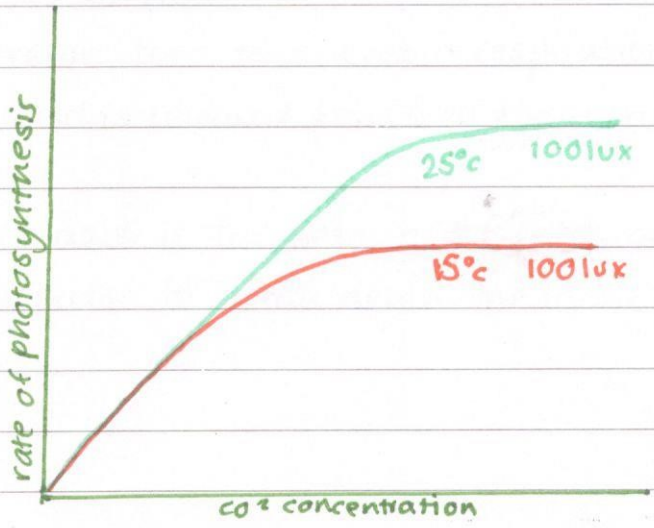
- Chlorophyll is needed for photosynthesis, so photosynthesis increases when theres more chlorophyll

* Any of the factors that affect photosynthesis can become a **limiting factor**
  → This is when one of the factors are so low that increasing any other factors would not increase the rate of photosynthesis.

This can be seen on a graph;



This graph shows the limiting factor is LIGHT INTENSITY.
- This is because at 50 lux was increased to 100 lux, the rate of photosynthesis increased with it, so light was limiting the rate.



This graph shows temperature is the limiting factor as the rate increased when it did. Its not light intensity as it didnt change

RESPIRATION

★ Respiration happens in every body cell, it is the process of transferring energy from glucose so living processes can occur.

TWO TYPES:

AEROBIC	ANEROBIC
• uses oxygen (think that the 'aer' part sounds like 'air') • Gives out more energy than anerobic • Mostly occurs in mitochondria GLUCOSE + OXYGEN → CARBON DIOXIDE + WATER	• Occurs when theres not enough oxygen • Gives out less energy • used as a last resort IN ANIMALS: GLUCOSE → LACTIC ACID IN PLANTS: GLUCOSE → ETHANOL + CARBON DIOXIDE use the ethanol to make alcohol and the CO_2 to make bread rise

Response to excercise:

★ During excercise, we get energy from aerobic respiration.

★ As we breathe faster, there is not enough oxygen to be able to respire aerobically.

★ We therefore turn to anerobic respiration

★ lactic acid is released (this is why your muscles may hurt when training)

★ Oxygen debt is the amount of extra oxygen the body needs after excercise to break down the lactic acid