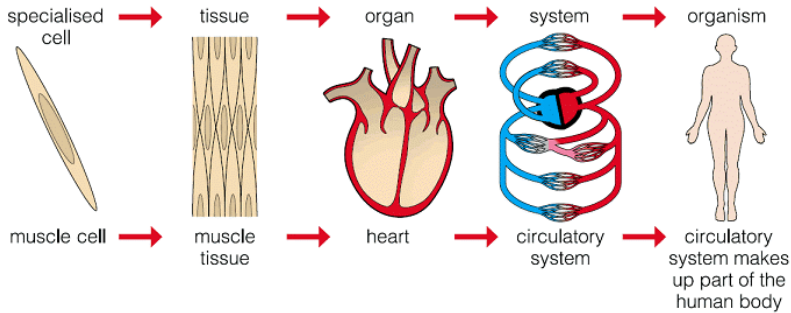


# B2 – Organisation

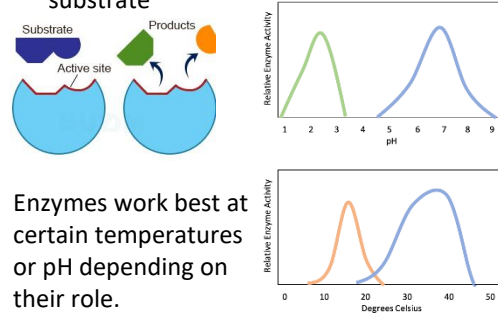
## Levels of Organisation

Cells = basic building blocks of all living organisms.  
 A tissue = group of cells with a similar structure and function.  
 Organs = aggregations of tissues performing specific functions.  
 Organ systems = organs organised to form organisms.



## Enzymes

- Biological catalysts
- Digestive enzymes speed up the break down of insoluble food molecules
- Specific shape active site that matches substrate



## Bile

The liver makes an **alkaline** solution called bile. Stored by the gall bladder.  
 Has two jobs:

- Emulsifies fats
- Neutralises stomach acid.



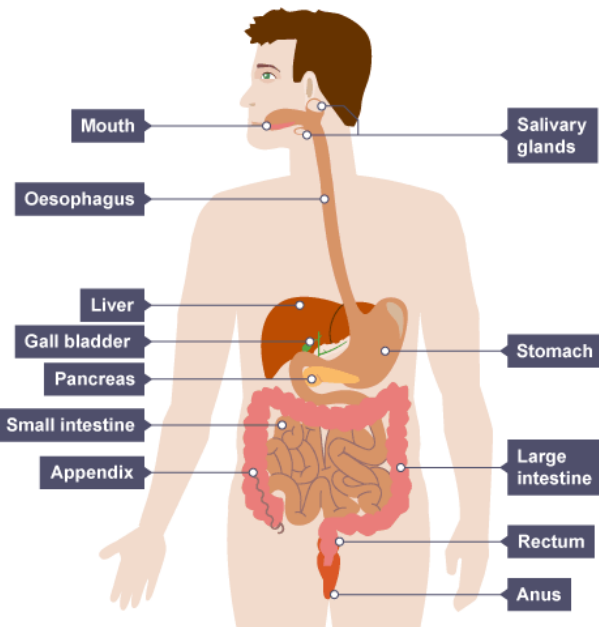
## Digestive Enzymes

Starch  $\xrightarrow{\text{amylase}}$  Glucose

Protein  $\xrightarrow{\text{protease}}$  Amino Acids

Fats  $\xrightarrow{\text{lipase}}$  Fatty acids + Glycerol

## Digestive System



Organ	Function
Mouth	Teeth and tongue to chew food.
Salivary Glands	Releases saliva containing enzymes.
Oesophagus	Muscle tube to squeeze food along.
Stomach	Contains enzymes and hydrochloric acid. Is made of muscle to churn food. Hydrochloric acid kills bacteria in food
Small Intestine	Where digestion is completed and soluble food particles (glucose, amino acids, fatty acids, glycerol). are absorbed
Large Intestine	Absorbs water.
Liver	Produces bile.
Gall Bladder	Stores bile.
Pancreas	Releases enzymes.

## Where are the enzymes?

Enzyme	Salivary glands	Stomach	Pancreas	Small intestine
Amylase	X		X	X
Protease		X	X	X
Lipase			X	X

## RP3 – Food Tests

Summaries of the four food tests.

<b>Protein</b> Add Biuret's reagent Positive test; Blue solution turns <b>Purple</b>	<b>Starch</b> Add Iodine Positive test; solution turns from orange to <b>Black</b>
<b>Fats</b> Add Ethanol and water Positive test – solution turns <b>Cloudy</b>	<b>Glucose</b> Add Benedict's and heat Positive test blue solution turns <b>Brick red</b>

Water Bath

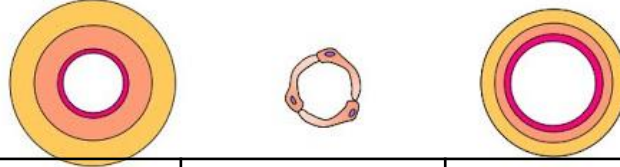
# B2 – Organisation

## The effect of pH on the rate of reaction of amylase

1. Add 2cm<sup>3</sup> amylase solution, 2cm<sup>3</sup> of starch solution and 2cm<sup>3</sup> of pH2 buffer to a water bath (37°) in separate test tubes. Wait 10 minutes.
2. While waiting, add 2 drops of iodine solution to each well on the spotting tile.
3. Once the solutions in the water bath have reached 37° pour the amylase and PH2 buffer into the starch solution.
4. Immediately take a sample with a pipette and add to the first well of the spotting tile.
5. Repeat step 4 every 30 seconds until there is no colour change when testing with iodine solution.
6. Repeat steps 1-5 with pH4, pH6, pH8 and pH10 buffers.



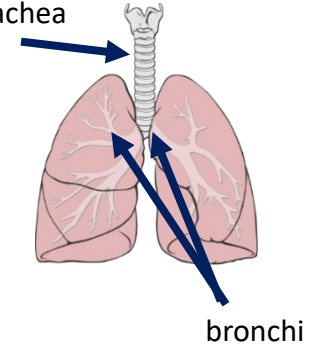
## Blood Vessels



Arteries	Capillaries	Veins
<ul style="list-style-type: none"> <li>• Blood carried away from heart</li> <li>• Thick muscular and elastic walls = withstands high pressure</li> <li>• Small lumen = maintains high pressure</li> </ul>	<ul style="list-style-type: none"> <li>• Walls only one cells thick = shorter diffusion pathway</li> <li>• Lumen just bigger than red blood cell</li> <li>• Blood flows very slowly</li> <li>• Diffusion takes place here</li> </ul>	<ul style="list-style-type: none"> <li>• Blood carried back to heart</li> <li>• Thin walls as blood is low pressure</li> <li>• Large lumen – lower resistance for blood passing through</li> <li>• Valves prevent back flow</li> </ul>

## Respiratory System

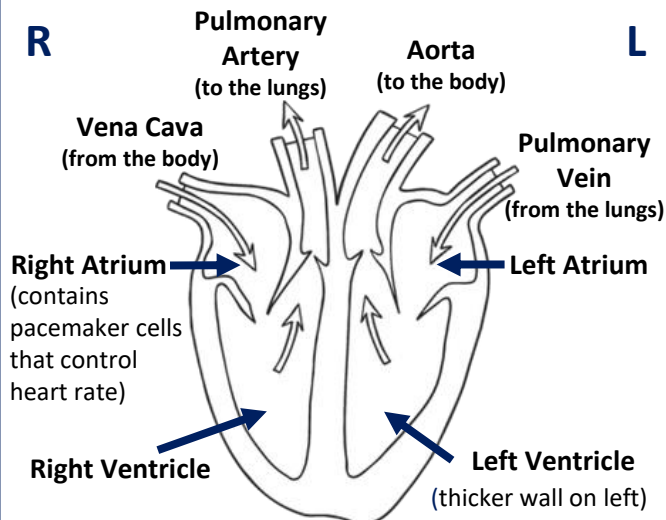
The lungs have two jobs – to get oxygen into the blood and remove carbon dioxide



Structures that cannot be seen on this diagram are the **alveoli and capillary network** – see 'unit 1 - diffusion'.

## The Human Heart

Double pump because - left side pumps to whole body, right side pumps to the lungs.



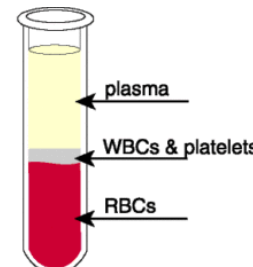
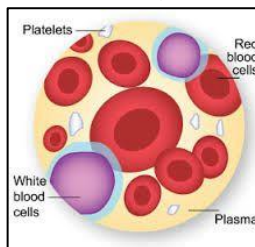
## Blood – 4 components

Red blood cells – contain haemoglobin to carry oxygen. More detail... →

White blood cells – fight pathogens (see unit 3 – infection and response).

Platelets – cell fragments that clot blood.

Plasma – liquid part that transports cells, cell fragments and dissolved substances (salts, urea, CO<sub>2</sub>, hormones...)

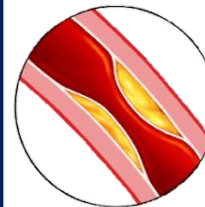


## Red Blood Cells (RBCs)

- Contain chemical 'haemoglobin'.
- This reacts/ binds with oxygen to be carried around the body.
- RBCs are ~8µm (relative small animal cell) allows them to fit through capillaries
- Bi-concave disc shape for large SA:V



## Coronary Heart Disease (CHD)



- Coronary arteries supply heart muscle with blood (containing glucose and oxygen for respiration)
- Can become narrowed/blocked by fatty deposits if cholesterol high, reducing blood flow.
- Reduced muscle contraction in heart

# B2 – Organisation

## Heart Disease Treatment – Statins vs Stents

Statins	Stents
<ul style="list-style-type: none"> <li>Medication to be taken everyday</li> <li>Lowers blood cholesterol</li> <li>Does not work immediately</li> </ul>	<ul style="list-style-type: none"> <li>Mesh tube to be inserted into artery to hold it open</li> <li>Surgery required</li> <li>Works immediately</li> </ul>



## Faulty Valves

- Valves in veins and the heart prevent backflow of blood
- Faulty valves = don't open or close fully
- Can be replaced with man-made valves or transplants from donors



faulty



healthy

## Cancer

Uncontrolled cell growth

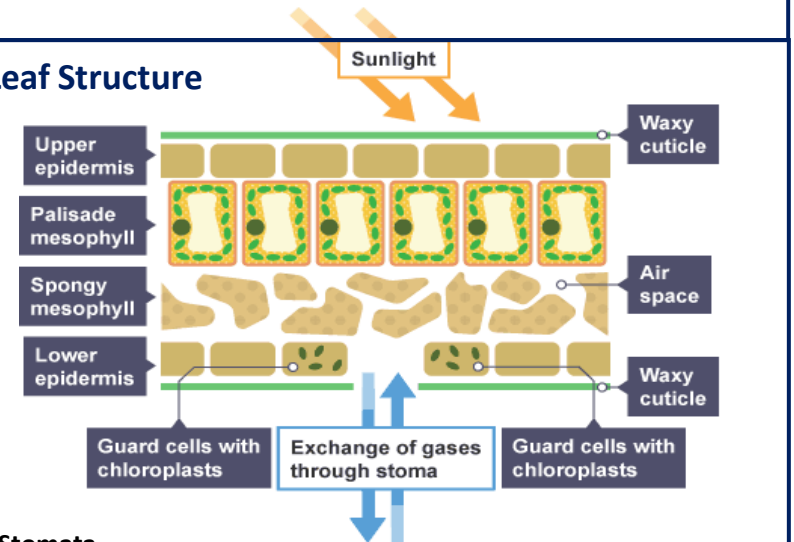
**Benign tumours** = abnormal cells, contained in one area, in a membrane, do not invade other parts of body.

**Malignant tumours** = cancer cells, not in a capsule, invade neighbouring tissue, and spread into blood and form secondary tumours.

## Risk Factors

Lifestyle factors can have be risk factors for certain diseases. E.g. obesity is a risk factor for type 2 diabetes, or drinking and smoking while pregnant affects the development of the foetus.

## Leaf Structure

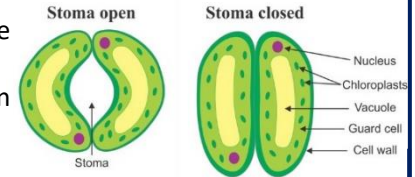


## Stomata

Tiny pores on the underside of the leaf.

Allow oxygen and CO<sub>2</sub> to diffuse in and out

Guard cells surround the stomata and can open and close the pore

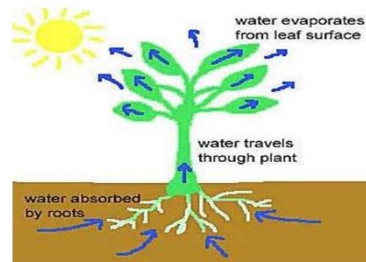


## Interaction of Diseases

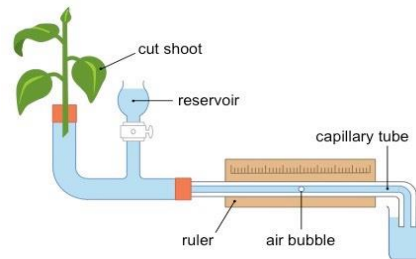
- Defects in the immune system - individual is more likely to suffer from infectious diseases.
- Viruses can trigger cancers, e.g. HPV can trigger cervical cancer.
- Immune reactions caused by pathogens can trigger allergies such as asthma or rashes
- Severe physical ill health can lead to depression and other mental illness.

## Transpiration

Movement of water through plant from roots to leaves, driven by evaporation through the stomata



## Measuring transpiration



Record the distance the bubble of air moves along the scale during set amount of time to calculate volume of water uptake per minute.

Transpiration	Translocation
Movement of water from roots to leaves	Movement of dissolved sugars from leaves all round the plant
Xylem - hollow tubes strengthened by lignin.	Phloem – tubes of elongated cells.
One way system – roots to leaves.	Two way system – sugars taken to wherever they are needed.

## Increasing the rate of transpiration

- Higher temperature
- Lower humidity
- Higher light intensity
- Higher air movement