

Enzymes catalyse (increase the rate of) specific reactions in living organisms

An organ system in which organs work together to digest and absorb food.

Enzymes in digestion

The human digestive system

AQA GCSE ORGANISATION Part 1

Principles of organisation

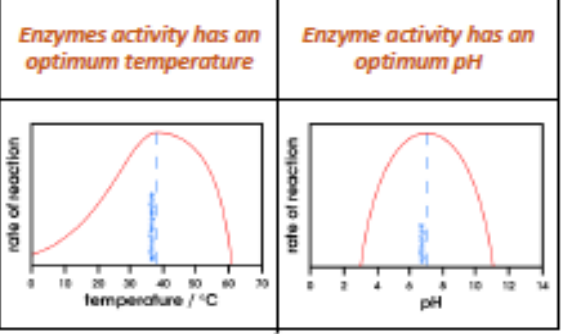
The 'lock and key theory' is a simplified model to explain enzyme action



Enzymes catalyse specific reactions in living organisms due to the shape of their active site

Digestive enzymes speed up the conversion of large insoluble molecules (food) into small soluble molecules that can be absorbed into the bloodstream

The activity of enzymes is affected by changes in temperature and pH



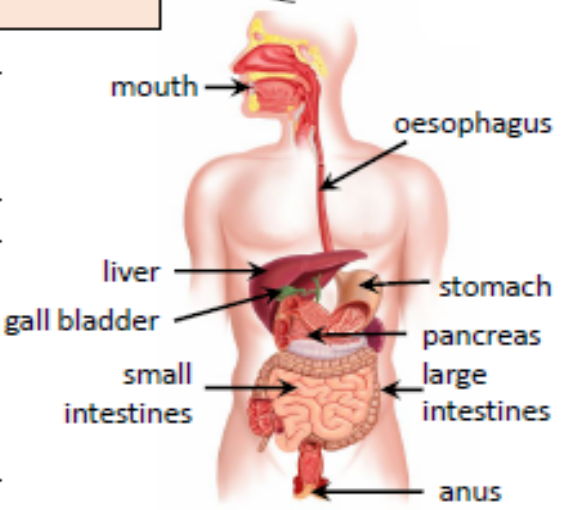
Large changes in temperature or pH can stop the enzyme from working (denature)

Temperature too high pH too high or too low
Enzyme changes shape (denatures) the substrate no longer fits the active site.

Non-communicable diseases
More energy consumed in food and drink than used
obesity
Linked to increased rates of cardiovascular disease and development of diabetes type 2.

Food tests

Sugars (glucose)	<i>Benedict's test</i>	Orange to brick red precipitate.
Starch	<i>Iodine test</i>	Turns black.
Biuret	<i>Biuret reagent</i>	Mauve or purple solution.



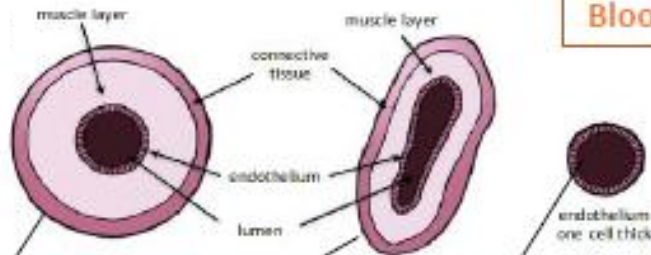
Carbohydrases (e.g. amylase)		<i>Made in salivary glands, pancreas, small intestine</i>	Break down carbohydrates to simple sugar (e.g. amylase breaks down starch to glucose).
Proteases		<i>Made in stomach, pancreas</i>	Break down protein to amino acids.
Lipases		<i>Made in pancreas (works in small intestine)</i>	Break down lipids (fats) to glycerol and fatty acids.
Bile (not an enzyme)		<i>Made in liver, stored in gall bladder.</i>	Emulsifies lipids to increase surface area to increase the rate of lipid break down by lipase. Changes pH to neutral for lipase to work

The products of digestion are used to build new carbohydrates, lipids and proteins. Some glucose is used for respiration.

Cells, tissues, organs and systems

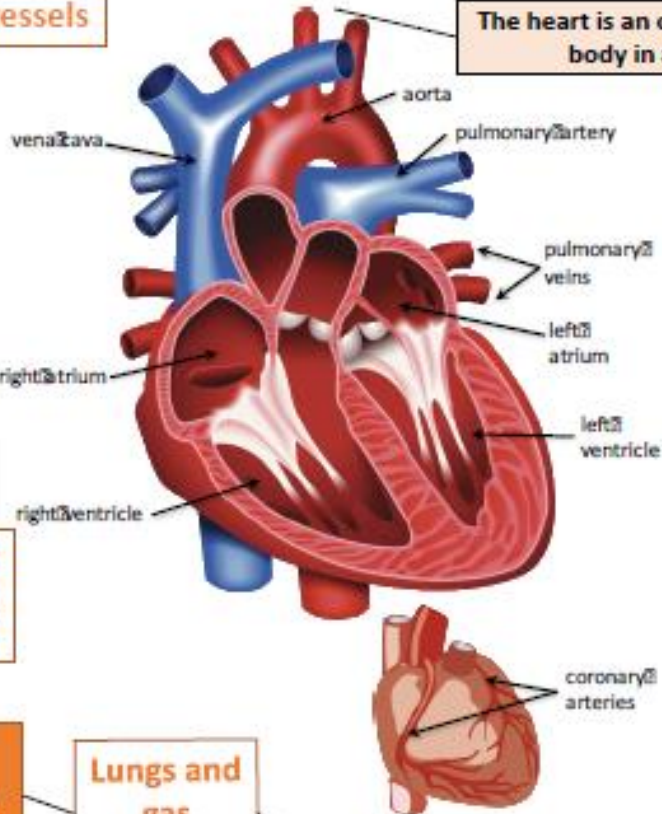
Cells		<i>e.g. muscle cells</i>	The basic building blocks of all living organisms.
Tissues		<i>e.g. muscle tissue</i>	A group of cells with a similar structure and function.
Organs		<i>e.g. the heart</i>	Aggregations (working together) of tissues performing a specific function.
Organ systems		<i>e.g. the circulatory system</i>	Organs working together to form organ systems, which work together to form an organism.

Blood vessels



Artery	Vein	Capillary
Carry blood away from the heart	Carry blood to the heart	Connects arteries and veins
Thick muscular walls, small lumen, carry blood under high pressure, carry oxygenated blood (except for the pulmonary artery).	Thin walls, large lumen, carry blood under low pressure, have valves to stop flow in the wrong direction, carry deoxygenated blood (except for the pulmonary vein).	One cell thick to allow diffusion, Carry blood under very low pressure.

Heart



The heart is an organ that pumps blood around the body in a double circulatory system

Different structure in the heart have different functions	Right ventricle	Pumps blood to the lungs where gas exchange takes place.
	Left ventricle	Pumps blood around the rest of the body.
	Pacemaker (in the right atrium)	Controls the natural resting heart rate. Artificial electrical pacemakers can be fitted to correct irregularities.
	Coronary arteries	Carry oxygenated blood to the cardiac muscle.
	Heart valves	Prevent blood in the heart from flowing in the wrong direction.

Blood

Blood is a tissue consisting of plasma, in which blood cells, white blood cells and platelets are suspended

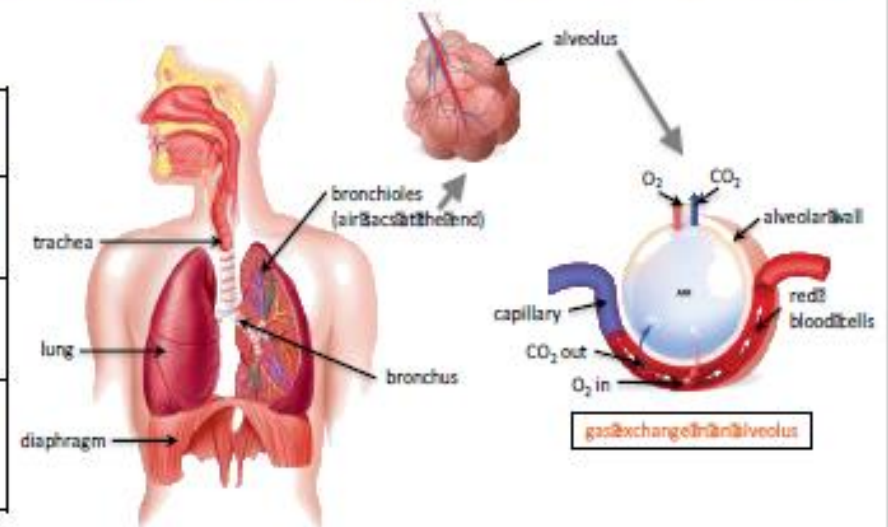
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Lungs and gas exchange

The heart pumps low oxygen/high carbon dioxide blood to the lungs

Plasma (55%)	Pale yellow fluid	Transports CO ₂ , hormones and waste.
Red blood cells (45%)	Carries oxygen	Large surface area, no nucleus, full of haemoglobin.
White blood cells (<1%)	Part of the immune system	Some produce antibodies, others surround and engulf pathogens.
Platelets (<1%)	Fragments of cells	Clump together to form blood clots.

Trachea	Carries air to/from the lungs	Rings of cartilage protect the airway.
Bronchioles	Carries air to/from the air sacs (alveoli)	Splits into multiple pathways to reach all the air sacs.
Alveoli	Site of gas exchange in the lungs	Maximises surface area for efficient gas exchange.
Capillaries	Allows gas exchange between into/out of blood	Oxygen diffuses into the blood and carbon dioxide diffuses out.



gas exchange in an alveolus

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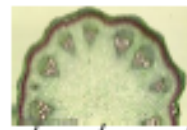
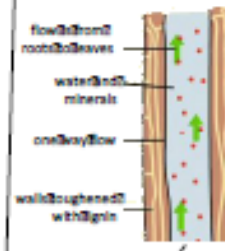
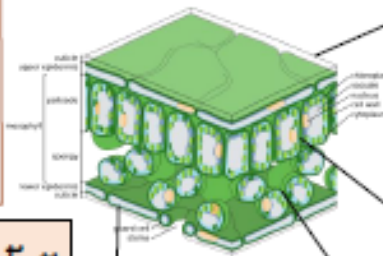
Plant tissues

Heart failure can be treated with a transplant or artificial heart

	Cause	Effect	Treatment
Coronary heart disease (CHD)	A build up for fatty substances in the coronary arteries (atherosclerosis)	Oxygenated blood cannot get to the cardiac muscle.	Stents: inserted into the blocked artery to open it up. Statins: lower harmful cholesterol.
Faulty heart valves	Valves don't open or close properly	Blood can leak or flow in the wrong direction	Biological valve transplant or a mechanical valve can be inserted

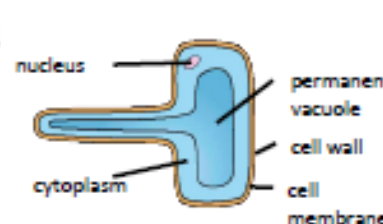
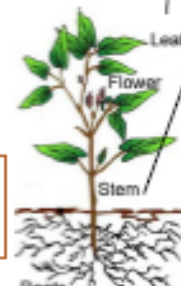
Plant organ systems

The roots, stem and leaves form a plant organ system for transport of substances around the plant



xylem

phloem



Epidermal tissues	Waxy cuticle (top layer of the leaf)	Reduces water loss from the leaf
	Guard cells and stomata	Guard cells open and close the stomata to control water loss and allow for gas exchange (oxygen and carbon dioxide).
Palisade mesophyll	Palisade cells	Cells near the top surface of the leaf that are packed with chloroplasts that contain chlorophyll. Both adaptations maximize photosynthesis.
Spongy mesophyll	Air spaces in the leaf between cells	Increased surface area for gas exchange so that carbon dioxide can diffuse into photosynthesising cells.
xylem	Hollow tubes strengthened by lignin adapted for the transportation of water in the transpiration stream	Allows transport of water and mineral ions from the roots to the stem and the leaves.
phloem	Cell sap moves from one phloem cell to the next through pores in the end walls	Transports dissolved sugars from the leaves to the rest of the plant for immediate use or storage (translocation).
Meristem tissue	New cells (roots and shoot tips) are made here including root hair cells	Root hair cells have an increased surface area for the uptake of water by osmosis, and mineral ions by active transport.

Cancer

Non-communicable diseases

The result of changes in DNA that lead to uncontrolled growth and division

Benign tumour	Contained in one area of the body (usually by a membrane) – not cancer.
Malignant tumour	Invade tissues and spread to different parts of the body to form secondary tumours.

Some cancers have genetic risk factors.

Carcinogens and ionising radiation increase the risk of cancer by changing/ damaging DNA

Risk factors for heart/lung disease and certain types of cancer include drinking alcohol, diet, obesity and smoking

These risks factors can also affect the brain, liver and the health of unborn babies

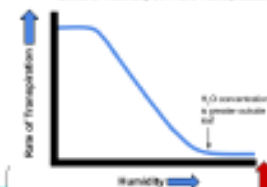
A potometer is used to measure the amount of water lost over time (rate of transpiration)

Transpiration

The rate at which water is lost from the leaves of a plant. The transpiration stream is the column of water moving through the roots, stem and leaves

Temperature, humidity, air movement and light intensity affect the rate of transpiration.

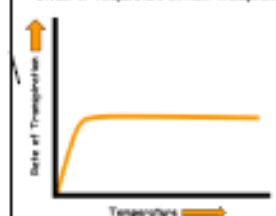
Effect of Humidity on Plant Transpiration



Effect of Wind Velocity on Plant Transpiration



Effect of Temperature on Plant Transpiration



The shape of the graph for light intensity is the same for temperature (energy)