

Blue = Recap

Small intestines	<i>Villi – increase surface area, good blood supply – to maintain concentration gradient, thin membranes – short diffusion distance</i>
Lungs	<i>Alveoli – increase surface area, good blood supply – to maintain concentration gradient, thin membranes – short diffusion distance</i>
Gills in fish	<i>Gill filaments and lamella – increase surface area, good blood supply – to maintain concentration gradient, thin membranes – short diffusion distance</i>
Roots	<i>Root hair cells – increase surface area</i>
Leaves	<i>Large surface area, thin leaves for short diffusion path, stomata on the lower surface to let O₂ and CO₂ in and out</i>

ADAPTATIONS FOR DIFFUSION

The greater the difference in concentrations the faster the rate of diffusion

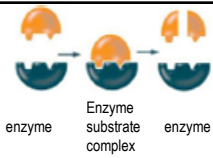
**AQA
Cell Biology 2**

Transport in cells

Diffusion <u>No</u> energy required	<i>Movement of particles in a solution or gas from a higher to a lower concentration</i>	e.g. O ₂ and CO ₂ in gas exchange, urea in kidneys. Factors that affect the rate are concentration, temperature and surface area
Osmosis <u>No</u> energy required	<i>Movement of water from a dilute solution to a more concentrated solution</i>	e.g. Plants absorb water from the soil by osmosis through their root hair cells. Plants use water for several vital processes including photosynthesis and transporting minerals
Active transport <u>ENERGY</u> required	<i>Movement of particles from a dilute solution to a more concentrated solution</i>	e.g. movement of mineral ions into roots of plants and the movement of glucose into the small intestines

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

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

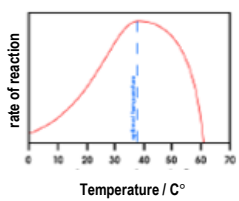


Enzymes catalyse specific reactions in living organisms due to the shape of their active site

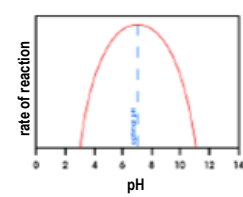
Digestive enzymes speed up the conversion of large insoluble molecules (food) into small soluble molecules that can be absorbed into the bloodstream

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

Enzymes activity has an optimum temperature



Enzyme activity has an optimum 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

Enzymes in digestion

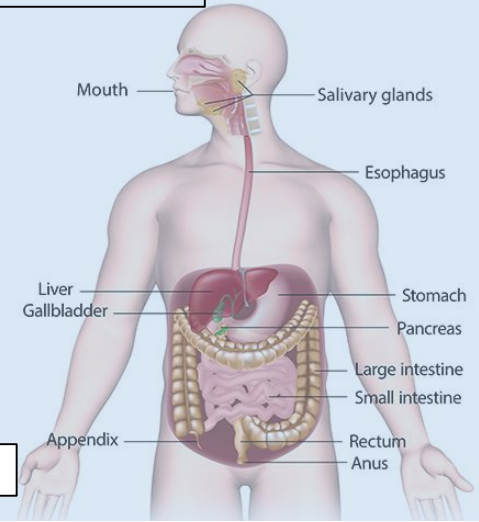
The human digestive system

AQA GCSE ORGANISATION Part 1

Principles of organisation

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

Blue = Recap



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)

Proteases

Lipases

Bile (not an enzyme)



Made in salivary glands, pancreas, small intestine

Made in stomach, pancreas

Made in pancreas (works in small intestine)

Made in liver, stored in gall bladder

Break down carbohydrates to simple sugar (e.g. amylase breaks down starch to glucose)

Break down protein to amino acids

Break down lipids (fats) to glycerol and fatty acids

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

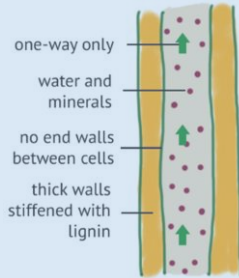
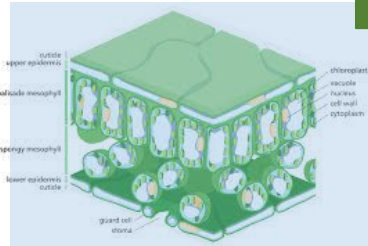
Cells	e.g. muscle cells	The basic building blocks of all living organisms
Tissues	e.g. muscle tissues	A group of cells with a similar structure and function
Organs	e.g. the heart	Aggregations (working together) of tissues performing a specific function
Organ systems	e.g. the circulatory system	Organs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

Heart failure can be treated with a transplant or artificial heart

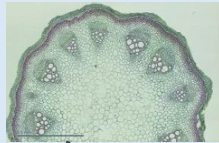
Faulty heart valves	Coronary heart disease (CHD)	Disease
<i>Valves don't open or close properly</i>	<i>A build up for fatty substances in the coronary arteries (atherosclerosis)</i>	Cause
Blood can leak or flow in the wrong direction	Oxygen-ated blood cannot get to the cardiac muscle	Effect
Biological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

Plant organ systems

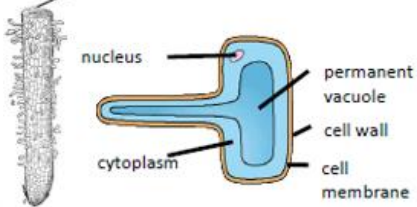
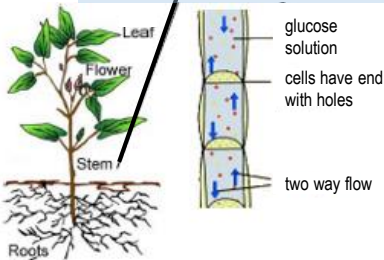
The roots, stem and leaves form a plant organ system for transport of substances around the plant



xylem



phloem



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

Ecosystem	<i>Environment</i>	The conditions surrounding an organism; abiotic and biotic
	<i>Habitat</i>	Place where organisms live e.g. woodland, lake etc.
	<i>Population</i>	Individuals of a species living in a habitat
	<i>Community</i>	Populations of different species living in a habitat

Organisms require a supply of materials from their surroundings and from the other living organisms

Surviving and reproducing	<i>Competition</i>	Plants in a community or habitat compete with each other for light, space, water and mineral ions Animals compete with each other for food, mates and territory
	<i>Interdependence</i>	Species depend on each other for food, shelter, pollination, seed dispersal etc. removing a species can affect the whole community



EXAMPLE: introduction of grey squirrels to UK increased competition for food for red squirrels. The greys also carry a pathogen that kills reds.

EXAMPLE: climate change is leading to more dissolved CO₂ in oceans lowering the pH of the water affecting organisms living there.

Material Cycling

AQA GCSE ECOLOGY PART 1

Interdependence and competition

Adaptations

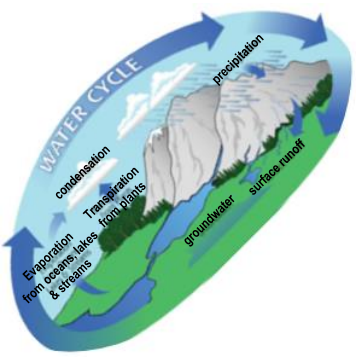
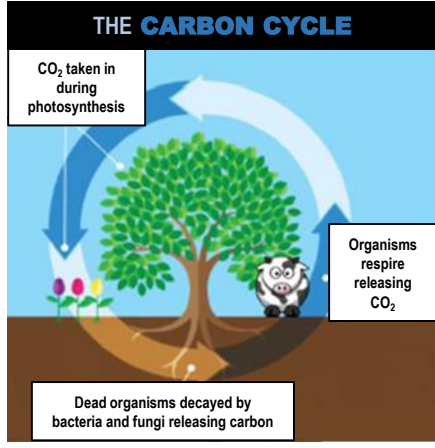
Abiotic and biotic factors

Levels of organisation

Organisms adaptions enable them to survive in conditions where they normally live

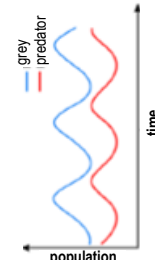
Adaptations may be structural, behavioural or function

Abiotic	biotic
Non-living factors that affect a community	Living factors that affect a community
Living intensity	Availability of food
Temperature	New predators arriving
Moisture levels	
Soil pH, mineral content	New pathogens
Wind intensity and direction	One species outcompeting so numbers are no longer sufficient to breed
Carbon dioxide levels for a plant	
Oxygen levels for aquatic organisms	



Photosynthetic organisms are the producers of biomass for life on Earth

Food Chains			
<i>Feeding relationships in a community</i>			
Producer	Primary consumer	Secondary consumer	Tertiary consumer
Grass	Grasshopper	Mouse	Owl
All food chains begin with a producer e.g. grass that is usually a green plant or photosynthetic algae		Consumers that kill and eat other animals are predators and those eaten are prey	



In a stable community the numbers of predators and prey rise and fall in cycles

Adaptions		
<i>Plants</i>	<i>Animals</i>	<i>Extremophiles</i>
Cactus in dry, hot desert	Polar bear in extreme cold arctic	Deep sea vent bacteria
No leaves to reduce water loss, wide deep roots for absorbing water	Hollow hairs to trap layer of heat. Thick layer of fat for insulation	Populations form in thick layers to protect outer layers from extreme heat of vent