Revision Guide

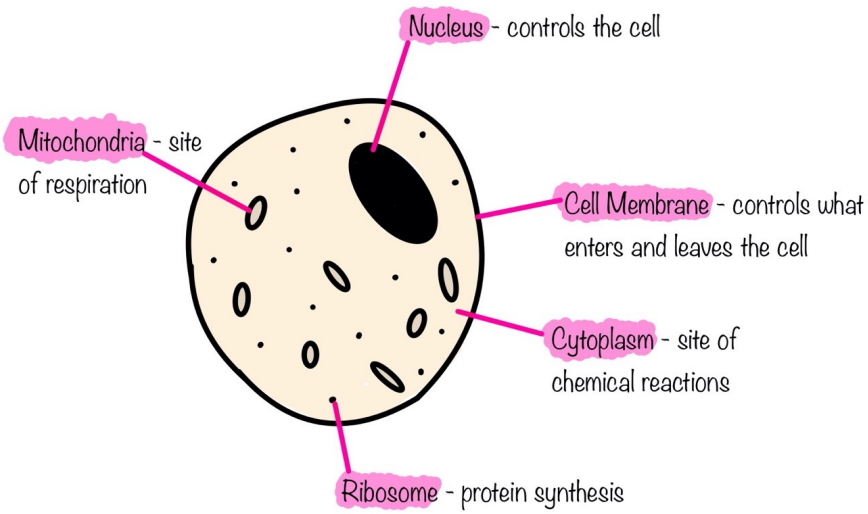
AQA GSCE Triple Biology Paper 1 Higher

Name: Class:

10 Minutes on....

Animal Cells

Labelled diagram of an animal cell.

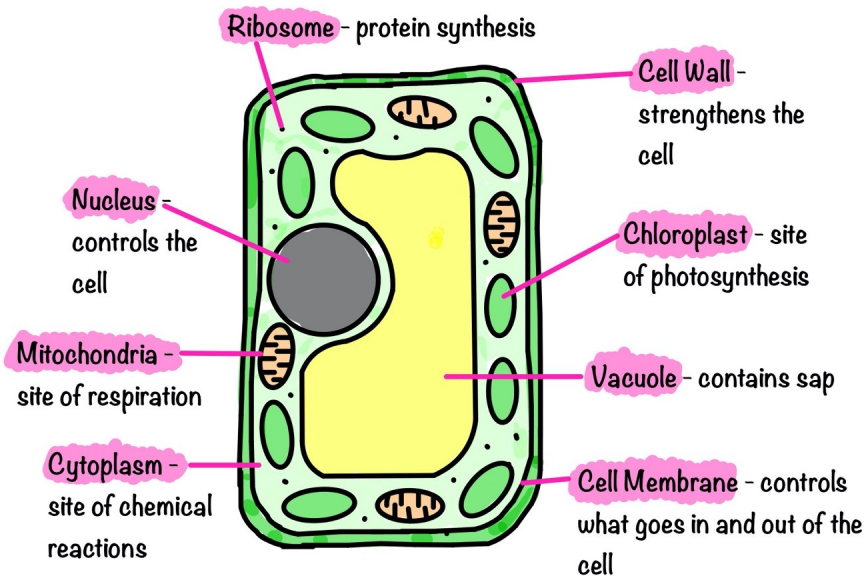


Cell Part	Function
Nucleus	Controls the cell
Cytoplasm	Site of chemical reactions
Cell Membrane	Controls what enters and leaves the cell.
Mitochondria	Respiration
Ribosome	Protein Synthesis

10 Minutes on....

Plant Cells

Labelled diagram of a plant cell.

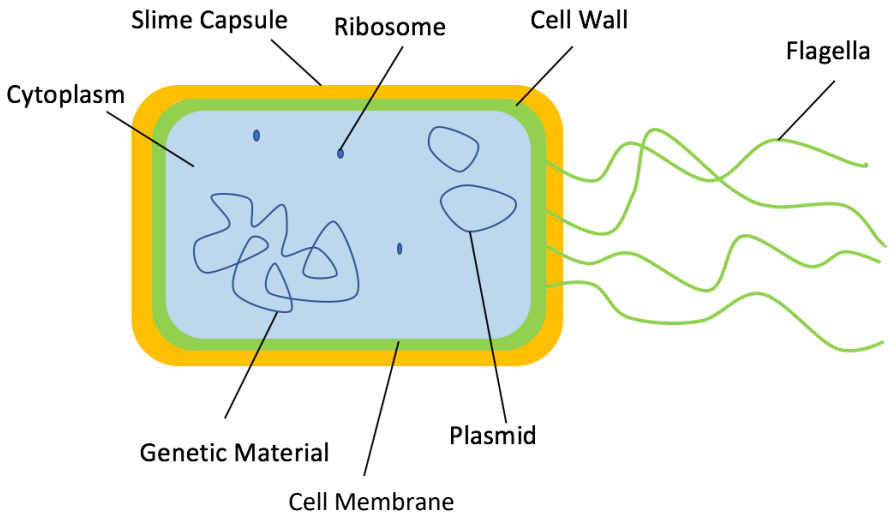


Cell Part	Function
Nucleus	Controls the cell
Cytoplasm	Site of chemical reactions
Cell Membrane	Controls what enters and leaves the cell.
Mitochondria	Respiration
Ribosome	Protein Synthesis
Vacuole	Contains Sap
Cell Wall	Strengthens the Cell
Chloroplast	Photosynthesis

10 Minutes on....

Bacterial Cells

Labelled diagram of a bacterial cell.



Cell Part	Function
Cytoplasm	Site of chemical reactions
Slime Capsule	Protects the cell
Ribosome	Protein Synthesis
Cell Wall	Support the cell
Flagella	Rotate to bring about movement
Plasmid	Small section of DNA that often provides a genetic advantage to the cell.
Genetic Material	Controls the cell.
Cell Membrane	Controls what enters and leaves the cell

10 Minutes on....

Specialised Animal Cells

Sperm Cell

Diagram

Function

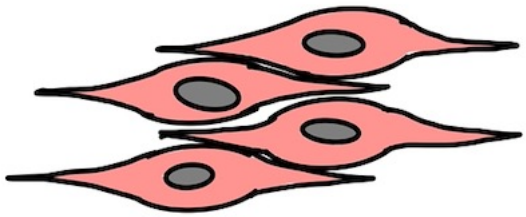
Transport genetic material from the father and fertilise an egg cell.

Adaptations

A tail which whips from side to side for movement.
Lots of mitochondria to provide energy for the movement of the tail.
Streamlined shape.

Muscle Cell

Diagram



Function

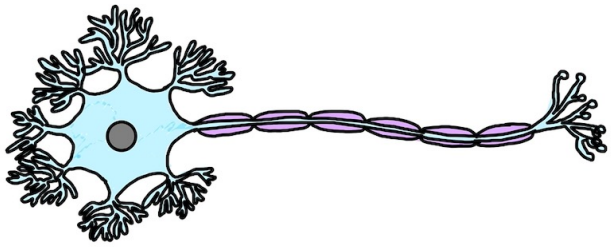
To contract and relax to bring about movement.

Adaptations

Have lots of mitochondria to transfer energy required for contraction.
They can store glycogen.
Have special proteins that can slide over each other making fibres contract.

Nerve Cell

Diagram



Function

Carry electrical impulses around the body.

Adaptations

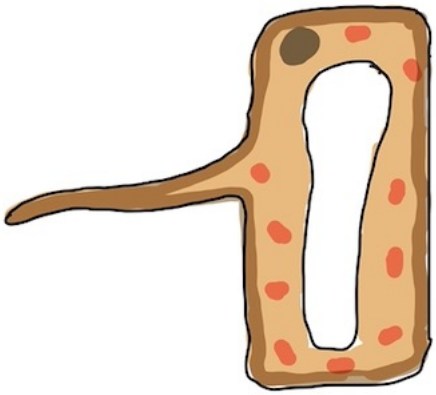
Lots of dendrites to connect to other cells.
A long axon to carry the nerve impulses.
Myelin sheath for insulation.

10 Minutes on....

Specialised Plant Cells

Root Hair Cell

Diagram



Function

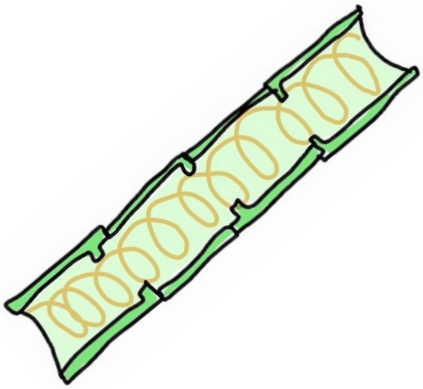
Absorb water and dissolved mineral ions.

Adaptations

Large surface area for increased absorption.
Lots of mitochondria to provide energy for active transport

Xylem

Diagram



Function

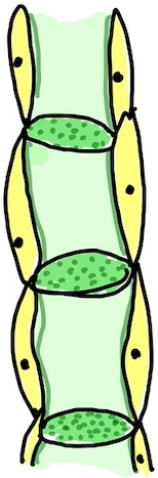
Transports water

Adaptations

Hollow tube to allow more water to travel through.
Spirals of lignin to make it strong to withstand the pressure of water moving through.

Phloem

Diagram



Function

Transports sugars

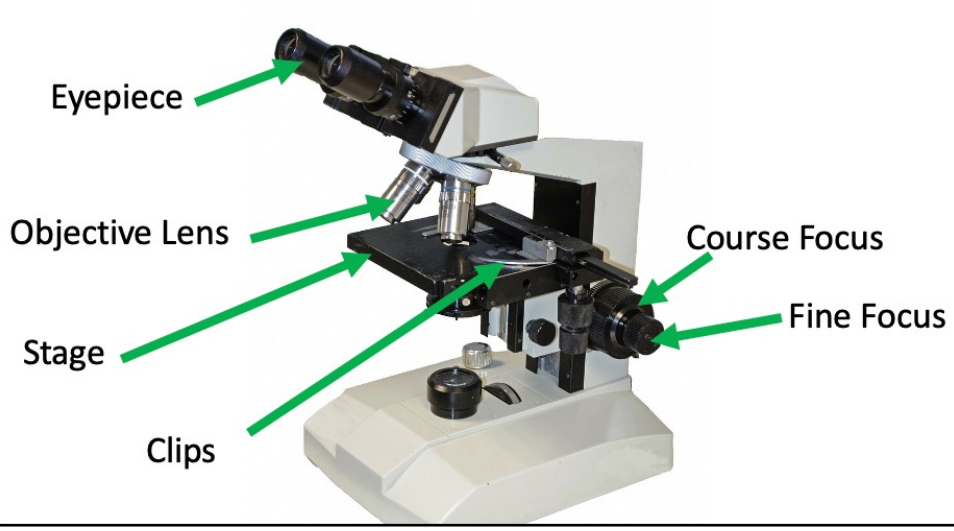
Adaptations

Have sieve plates to allow water carrying dissolved sugars to move freely.
Lose internal structure for more space.
Have companion cells to help keep them alive.

10 Minutes on....

Microscope RP

Diagram of a Microscope



How to set up a microscope to observe a sample on a slide

1. Add a drop of water to the microscope slide.
2. Place a thin layer of tissue on the slide. It is thin so that light can penetrate through the layers.
3. Stain the tissue with a couple of drops of iodine solution so that cell parts are visible.
4. Lower the cover slip at an angle to prevent air bubbles
5. Place the slide on the stage and use the lowest power objective lens.
6. Turn the course focus wheel to bring the image into focus.
7. Increase the power of the objective lens to increase magnification.
8. Turn the fine focus wheel to bring the image into clearer focus.

Hazard	Risk	Plan to Minimise Risk
Iodine Solution is an Irritant	May cause allergic reaction or skin rash.	Wash skin immediately Wear gloves Clean up spills
Sharp Knife	Cuts	Cut away from the body Cut on chopping board Cover blade when not in use.

10 Minutes on....

Microscopy

Type of Microscope	Advantages	Disadvantages
Light Microscope	Can look at live speculums under the microscope. Cheap Easy to set up Portable	Low resolution Low magnification
Electron Microscope	High resolution High magnification	Can't look at live speculums under the microscope. Expensive Difficult to set up Large Have to be kept in rooms with temperature pressure and humidity controlled

Key Term	Definition
Magnification	The ability of a microscope to produce an image of an object at a scale larger than its actual size.
Resolution	The ability to distinguish between two separate points.

10 Minutes on....

Magnification

Equation for Magnification

Magnification = Size of Image / Size of Real Object

Converting Units

1km = 1000m
1m = 100cm
1cm = 10mm
1mm = 1000µm
1µm = 1000nm
1nm = 1 x 10^{-9}m

Example Calculations

1. A microscope has a magnification of x1000 and the image of a cell that is observed has a width of 2.5mm. What is the actual size of the cell? Give your answer in micrometres. **2.5mm = 2500µm (2500 / actual size, 2500/1000 = actual size) Actual size = 2.5µm**

2. A microscope has a magnification of x400 and the image of a cell that is observed has a width of 5mm. What is the actual size of the cell? Give your answer in micrometres. **5mm = 5000µm (Actual Size = 5000 / 400) = 12.5µm**

3. A microscope has a magnification of x400 and the image of a cell that and the cell that is being observed has an actual size of 25 micrometres. How large will the size of the image appear? Give your answer in millimetres. **Size of Image = Mag x Size of Object = 400 x 25 = 10000µm = 10mm**

10 Minutes on....

Magnification

Equation for Magnification

Magnification = Size of Image / Size of Real Object

	The average diameter of a red blood cell is 0.008mm. On a photograph, the diameter of the red blood cell is 10cm. Calculate the magnification.	A drawn cell is 125mm. The real length of the cell was 0.015625mm. Calculate the magnification of the drawing.	A drawn cell is 3.5cm. The real length of the cell was 0.02916mm. Calculate the magnification of the drawing t0 2s.f.	A drawn cell is 112mm. The real length of the cell was 280 micrometres (µm). Calculate the magnification of the drawing.
Write the equation for Magnification	Magnification = Size of Image / Size of Real Object	Magnification = Size of Image / Size of Real Object	Magnification = Size of Image / Size of Real Object	Magnification = Size of Image / Size of Real Object
Identify the size of image Identify the real size of Object	Size of Image = 10cm Read Size of Object = 0.008mm	Size of Image = 125mm Read Size of Object = 0.015625mm	Size of Image = 3.5cm Read Size of Object = 0.02916mm	Size of Image = 112mm Read Size of Object = 280µm
Ensure that the values for size and real size of are the same units	Size of Image = 10cm = 100mm Read Size of Object = 0.008mm	Size of Image = 125mm Read Size of Object = 0.015625mm	Size of Image = 35mm Read Size of Object = 0.02916mm	Size of Image = 112,000µm Read Size of Object = 280µm
Substitute values into equation	Magnification = 100 / 0.008	Magnification = 125/0.015625	Magnification = 35 / 0.02916	Magnification = 112,000 / 280
Complete equation	Magnification = 12,500	Magnification = 8000	Magnification = 1200	Magnification = 400
State the final answer	The magnification of the photograph is x 12,500.	The magnification of the photograph is x 8000	The magnification of the photograph is x 1200	The magnification of the photograph is x 400

10 Minutes on....

Culturing Microorganisms

Step	Justification
Heat the inoculating loop using a Bunsen Burner	Sterilise it.
Dip the sterilised loop in a suspension of the bacteria you want to grow and make zigzag streaks across the agar surface	Ensures an even spread of the microbes.
Relace the lid quickly	Reduces the chance of other microbes from the air landing on the agar.
Fix the lid with adhesive tape. Do not seal all the way around.	Keeps the lid in place without preventing air getting into the dish. Air is needed to prevent harmful anaerobic bacteria growing.
Store and incubate upside down.	Prevents condensation falling on the agar.

How the method above could be changed to investigate the effect of antibiotics and disinfectants on bacterial growth.

After setting up the dish you could then add some pieces of filter paper that have been soaked in different antibiotics or disinfectants. After allowing time for the bacteria to incubate and grow you could then measure the clear area around the discs. The larger the clear area (area of inhibition) the more effective that substance is at preventing the growth of that bacterium.

10 Minutes on....

Mitosis

Key Term	Definition
Chromosome	A structure found in the nucleus that is made up of DNA and carries genetic information in the form of genes.
Mitosis	A type of cell division that results in two identical daughter cells.

Stages during the cell cycle.

During the cell cycle the genetic material is doubled and then divided into two identical cells.

1. The DNA replicates to form two copies of each chromosome.
2. In mitosis one set of chromosomes is pulled to each end of the cell.
3. The nucleus divides.
4. The cytoplasm and cell membranes divide to form two identical cells.
5. The set of chromosomes in each new cell is identical.

What needs to happen before a cell divides

Before a cell can divide it needs to grow and increase the number of sub-cellular structures such as ribosomes and mitochondria. The DNA replicates to form two copies of each chromosome.

10 Minutes on....

Stem Cells

Key Term	Definition
Stem Cell	Undifferentiated cell with the potential to form a wide variety of different cell types.
Undifferentiated Cell	A cell that does not yet have a specialised internal structure or a function.

Type of Stem Cell	Description
Meristem	Meristems make unspecialised cells that have the potential to become any type of specialised cell. They are only found is certain parts of the plant such as the tip of roots.
Embryonic Stem Cell	Cells at the early stages in the development of the embryo are stem cells. They have the potential to become any type of cell from that animal.
Adult Stem Cell	A type of stem cell found in specific locations in adults. Adult stem cells can only differentiate into a limited number of related cell types. They can be found is some areas of the body including bone marrow.

Comparing adult and embryonic stem cells.

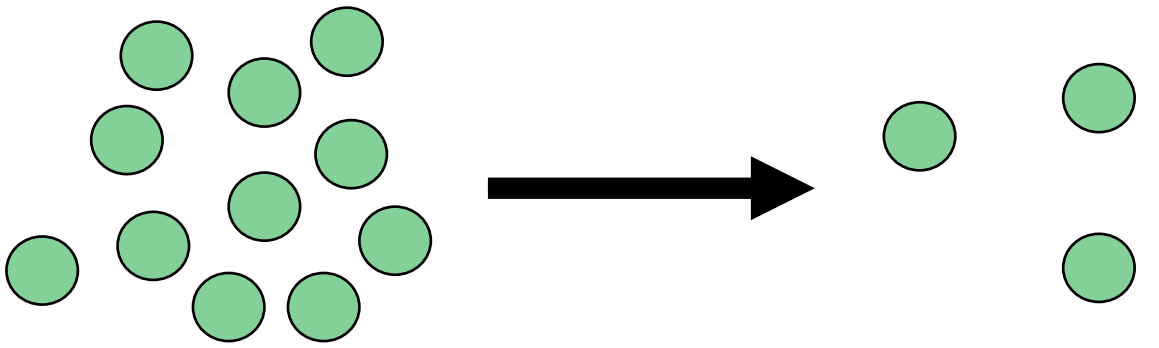
Embryos are made from embryonic stem cells which can develop into any cell type. Adult stem cells are found only in specific areas of the body and can only develop into a limited number of cell types.

10 Minutes on....

Diffusion

Key Term	Definition
Diffusion	The spreading out of particles from an area of high concentration to low concentration. It is a passive process.

Model of Diffusion



High Concentration **Low Concentration**

Examples of Diffusion

Movement of oxygen in and out of red blood cells.
Movement of carbon dioxide in and out of red blood cells.
Movement of water and oxygen out of the leaf through stomata.

Factors That Affect Diffusion	Description
Temperature	The higher the temperature the faster the rate of diffusion. The particles have more kinetic energy and so are moving faster.
Concentration	The steeper the concentration gradient the greater the rate of diffusion.
Surface Area (Within an Organism)	The larger the surface area the greater the rate of diffusion.

10 Minutes on....

Osmosis

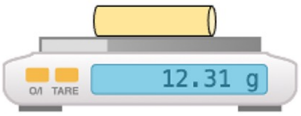
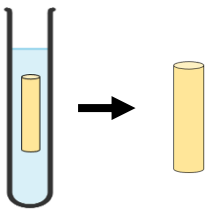
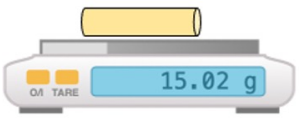
Key Term	Definition
Diffusion	The movement of particles from an area of high concentration to low concentration.
Osmosis	The movement of water from a dilute to concentration solution across a semi permeable membrane.
Dilute Solution	A solution with little solute dissolved in the solvent.
Concentrated Solution	A solution with lots of solute dissolved in the solvent.
Isotonic Solution	A solution with the same solute concentration as in normal body cells and blood.
Hypertonic Solution	A solution with a higher solute concentration than in normal body cells and blood.
Hypotonic Solution	A solution with a higher solute concentration than in normal body cells and blood.

What will happen to a cell if it is placed in a hypertonic solution.
Water will move by osmosis across the partially permeable membrane from inside the cell to outside of the cell. This is because the hypertonic solution has a lower water potential than inside the cell and water will move along this concentration gradient.

What will happen to a cell if it is placed in a hypertonic solution.
Water will move by osmosis across the partially permeable membrane from inside the cell to outside of the cell. This is because the hypertonic solution has a lower water potential than inside the cell and water will move along this concentration gradient.

10 Minutes on....

Osmosis RP

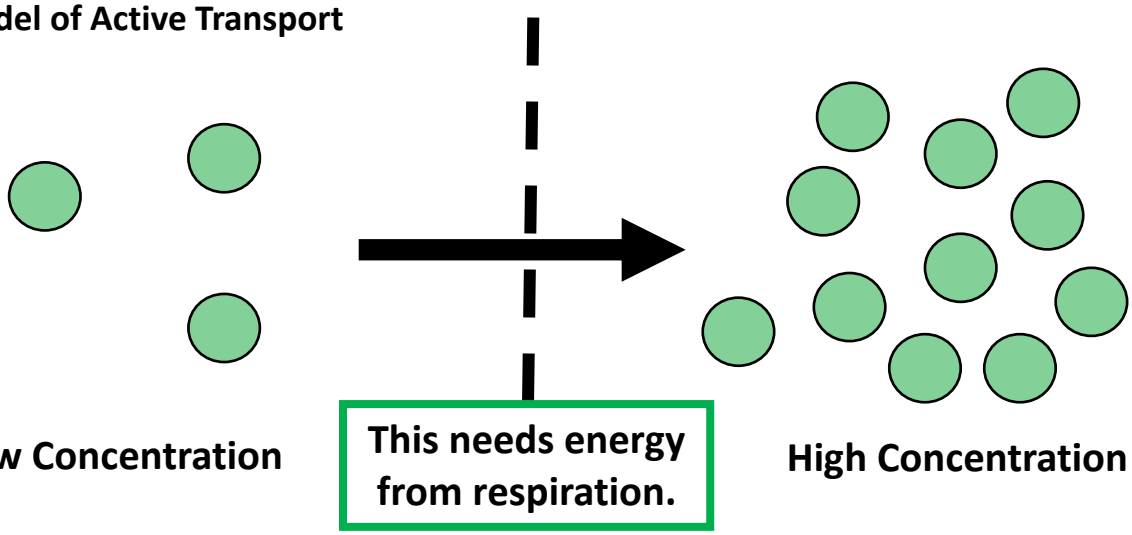
Step	Image
Cut a tube of potato using a cork borer.	
Trim the potato to 5cm in length.	
Weigh the potato piece.	
Place the potato in 25cm^3 of 0M solution and leave for 1 hour.	
Remove the potato and blot dry.	
Reweigh the potato.	
Calculate the change in mass.	
Calculate the percentage change in mass.	
Repeat for 0.2, 0.4, 0.6, 0.8 and 1M solutions	
Plot a graph to show the percentage change in mass for each concentration and draw a line of best fit.	
To determine the concentration, find the point that the line crosses the x axis and there is no change in mass	

10 Minutes on....

Active Transport

Key Term	Definition
Active Transport	Transport of particles from a low to high concentration (against the concentration gradient) across a cell membrane.

Model of Active Transport



Examples of Active Transport

Mineral ions from the soil absorbed by the roots.
Glucose absorbed in the small intestine.

Comparing active transport to diffusion.

Active transport requires energy while diffusion is passive.

Active transport takes place across a membrane, diffusion does not require a membrane.

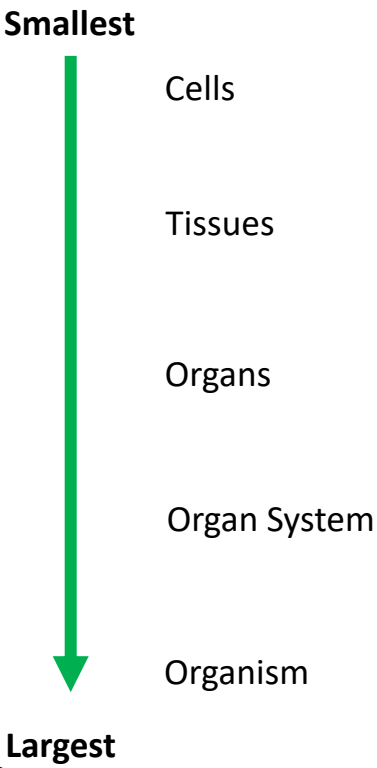
Across transport is the movement of substances from a low to high concentration while diffusion is the movement of substances from a high to low concentration.

10 Minutes on....

Organisation

Key Term	Definition	Example
Cell	Basic building blocks of all living organisms.	Blood cells, nerve cells, muscle cells.
Tissue	A group of cells with a similar structure and function.	Muscle tissue, glandular tissue.
Organ	Groups of tissues performing specific functions.	Stomach, liver, small intestine, large intestine.
Organ System	A group of organs which work together to form organisms.	Digestive system, circulatory system.
Organisms	An individual animal, plant or single celled life form.	Human, Beetle, Tomato Plant

Modelling the levels of organisation in an organism.

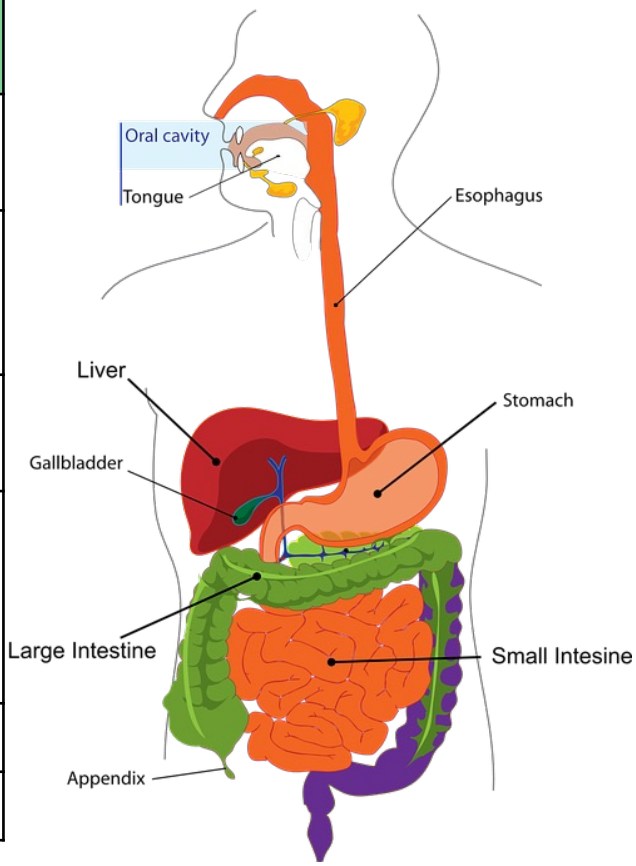


10 Minutes on....

Digestive System

Key Term	Definition
Digestive System	An example of an organ system in which several organs work together to digest and absorb food.
Enzyme	Enzymes are biological catalysts. They are proteins with a specific shape and active site that speed up chemical reactions.

Part	Function
Teeth	Mechanically break down food.
Stomach	Churns and mixes the food up with enzymes to start digestion of proteins.
Pancreas	Secretes digestive enzymes into the small intestine.
Small Intestine	Large insoluble molecules are broken down into smaller soluble ones and absorbed.
Liver	Produces bile.
Gall Bladder	Stores bile.



How organs in the digestive system work together for digestion.

The function of the digestive system is to break down large insoluble substances in our food into smaller soluble ones. These smaller substances can then be absorbed by diffusion in the small intestine into our blood stream and used by the body. Different organs in the body work to break down the food.

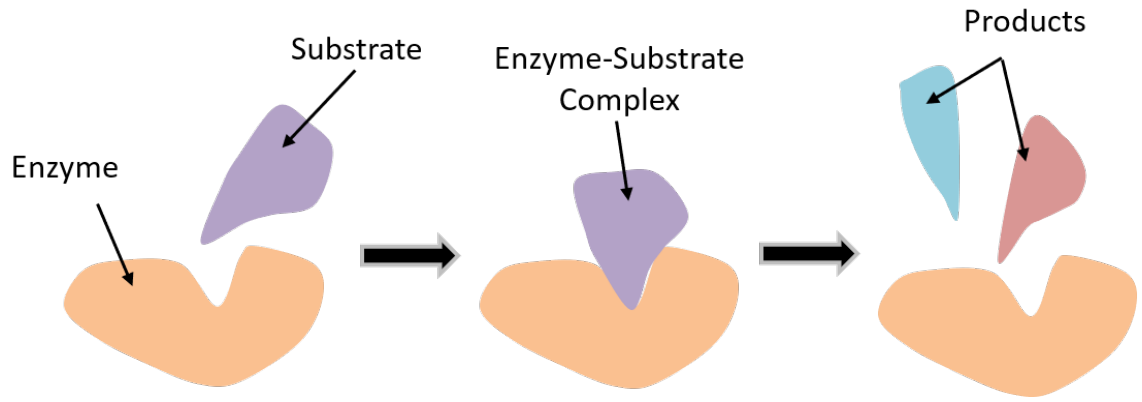
10 Minutes on....

Enzymes

Lock and key model

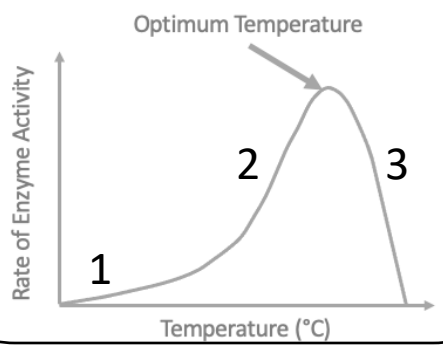
The lock and key model is a theory about how enzymes work. In the model we can see that we have an enzyme with an active site with a specific shape. A substrate has a complimentary shape to the active site and so is able to bind to it.

Model of how enzymes work.



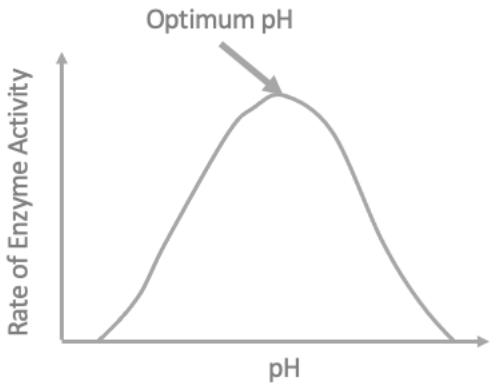
The effect of temperature on enzyme activity.

1. At low temperatures enzyme activity is low. The enzyme is moving slower and so there are fewer collisions with the substrate.
2. As temperature increases, the enzyme and substrate move faster, there are more collisions and so enzyme activity increases.
3. Once the optimum temperature has been passed enzyme activity begins to decrease as the enzyme is denatured.



The effect of pH on enzyme activity.

The enzyme is a chain of amino acids that is folded in a particular way to give its protein shape. The folds in the chain are held together by forces. A change in the pH affects these forces which affects the shape of the protein. When the shape of the active site changes the enzyme becomes denatured and stops working. The optimum pH is the pH at which the enzyme works best and has the highest activity. Different enzymes have different optimum pH's.



10 Minutes on....

Digestive Enzymes

Enzyme	Site of Production	What it Does
Carbohydrase	Salivary Glands Pancreas Small Intestine	Breaks down carbohydrates into simple sugars.
Protease	Stomach Pancreas Small Intestine	Breaks down proteins into amino acids.
Lipase	Pancreas Small Intestine	Breaks down lipids into fatty acids and glycerol.

Why carbohydrase does not work in the stomach.

Chemical digestion of starch stops in the stomach because of how acidic the stomach is. The enzyme is denatured and so unable to continue to work.

How bile aids digestion

Bile is made in the liver and stored in the gall bladder. It is alkaline to neutralise hydrochloric acid from the stomach. It also emulsifies fat to form small droplets which increases the surface area. The alkaline conditions and large surface area increase the rate of fat breakdown by lipase.

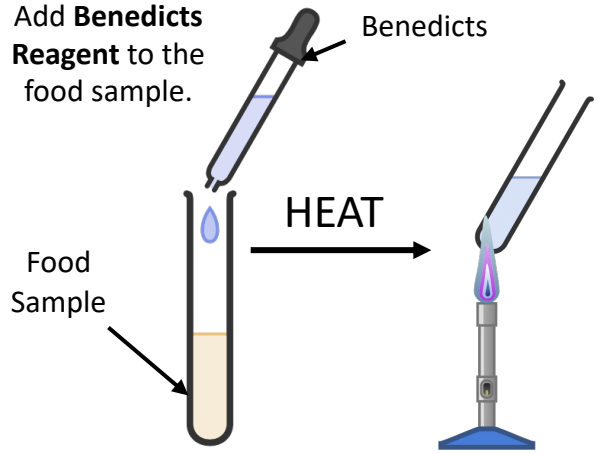
10 Minutes on....

Food Tests RP

Sugar

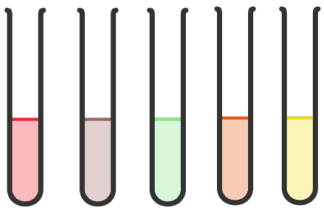
Description of Test For Nutrient

Add **Benedicts Reagent** to the food sample.



Positive Result

If there is no glucose the sample doesn't change colour.

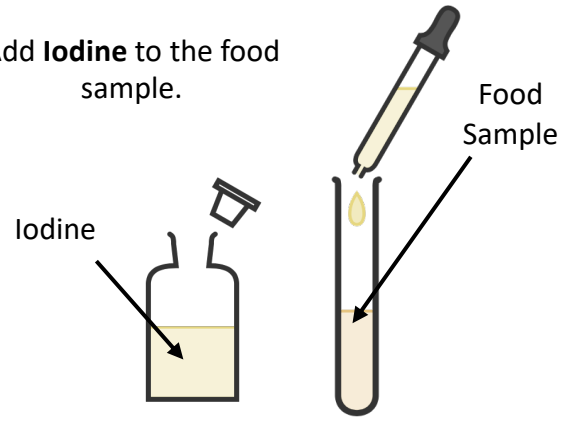


If there is glucose the sample turns red, brown, orange, yellow or green.

Starch

Description of Test For Nutrient

Add **Iodine** to the food sample.



Positive Result

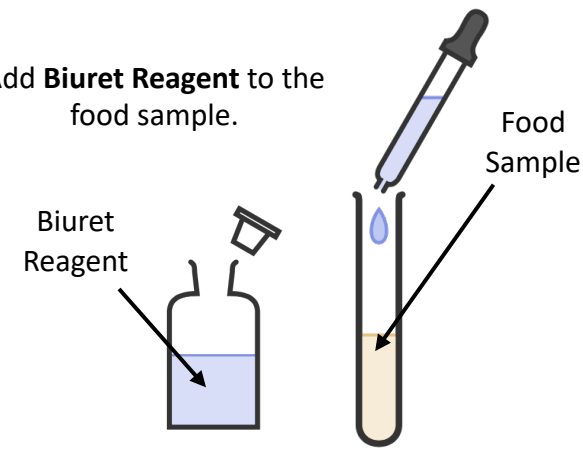
If there is no starch the sample doesn't change colour.

If there is starch the sample turns blue/black.

Protein

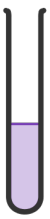
Description of Test For Nutrient

Add **Biuret Reagent** to the food sample.



Positive Result

If there is no protein the sample doesn't change colour.



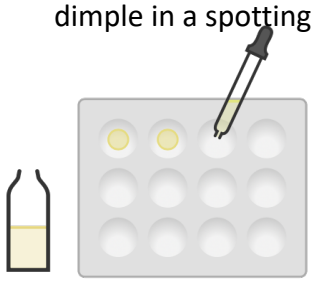
If there is protein the sample turns purple.

10 Minutes on....

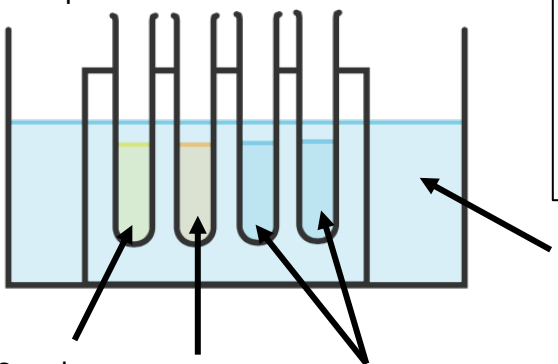
Enzymes RP

A method to investigate the effect that pH has on enzyme activity.

1.
Add a few drops of iodine solution to each dimple in a spotting tile.



2.
Add a fixed volume of starch, amylase and pH buffer solutions to a water bath at a set temperature. Leave for 5 minutes.



3.
Mix the starch solution and amylase solution together.

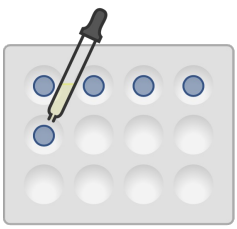
4.
Every 30 seconds add a few drops to the spotting tile. Repeat until the iodine does not turn blue/black.

5.
Repeat for different pH's or different temperatures.

Why Use a Water Bath?
All the solutions we use are put into a water bath to start so that everything has a chance to equilibrate and get to the same temperature

Problems of the Method
The results of this experiment are subjective because it is someone's opinion when they think the colour has started to change blue/black. To improve the experiment you would ideally want quantitative data (numbers measured by a piece of equipment) to make the results more accurate. One piece of equipment that could be used instead is a colorimeter which measures the amount of percentage of light that can pass through the solution.

Finding Exact pH/ Temperature
Once you have collected your results you should repeat your experiment in smaller intervals around the optimum pH/temperature that you found in your previous experiment.



10 Minutes on....

Heart and Blood Vessels

Key Term	Definition
Heart	An organ that pumps blood around the body in a double circulatory system.
Aorta	Large blood vessel that transports oxygen rich blood from the heart to body.
Vena Cava	Vein that returns deoxygenated blood back to the heart.
Pulmonary Artery	Transports deoxygenated blood from the heart to the lungs.
Pulmonary Vein	Transports oxygenated blood from the lungs to the heart.
Coronary Artery	Blood vessels that supply the heart muscles with oxygen and glucose.
Trachea	Major airway otherwise known as the windpipe.
Bronchi	Tube that connects between the trachea and the lungs.
Alveoli	Tiny air sacs in the lungs where gas is exchanged.
Pacemaker	Group of specialised cells that generates electrical impulses that pass through the heart muscle and make the heart contract.

What artificial pacemakers are used for.

Electrical devices used to correct irregularities in the heart rate

10 Minutes on....

Blood and Blood Vessels

Blood Vessel	Function	Adaptations
Arteries	Transport oxygenated blood away from the heart under high pressure.	Thick elastic walls to withstand pressure.
Veins	Transport deoxygenated blood towards the heart under low pressure.	Wide lumen, valves to prevent backflow.
Capillaries	Transports oxygen to cells and transports carbon dioxide away from cells.	Narrow so that red blood cells pass through one at a time, thin walls for a short diffusion pathway.

Key Term	Definition
Blood	A tissue consisting of plasma, in which the red blood cells, white blood cells and platelets are suspended.

Blood Component	Function
Red Blood Cells	Transport Oxygen
White Blood Cells	Phagocytosis, Produce Antibodies, Produce Antitoxins
Platelets	Blood Clotting
Plasma	Transport carbon dioxide, urea and hormones.

10 Minutes on....

Coronary Heart Disease

Treatment	Description	Advantages	Disadvantages
Statins	Drugs used to reduce blood cholesterol	Slows down the rate of the deposit of fatty material	Muscle aches and pains, muscle weakness.
Artificial Hearts	A device used to keep patients alive whilst waiting for a heart transplant, or to allow the heart to rest for recovery.	Allows a patient to get stronger and healthier so they can have a heart transplant.	Can cause blood clots and infection.
Heart Transplant	An operation to replace a damaged or faulty heart.	Better quality of life and will live longer.	Will need to take immunosuppressants for life.
Mechanical Valve	Can be used to replace faulty hear valves.	Durable	Can cause blood clots.

What coronary heart disease is.

In coronary heart disease layers of fatty material build up inside the coronary arteries, narrowing them. This reduces the flow of blood through the coronary arteries, resulting in a lack of oxygen for the heart muscle.

10 Minutes on....

Health Issues

Key Term	Definition
Health	A state of physical and metal well being.
Pathogen	A microbe that causes disease
Cancer	The result of changes in cells that lead to uncontrolled growth and division
Non-Communicable Disease	A noninfectious illness.
Communicable Disease	An infection that is infectious.

Factors which are major causes of ill health.

Diet, stress and life situations

Examples of diseases which may interact.

- Defects in the immune system mean that an individual is more likely to suffer from infectious diseases.
- Viruses living in cells can be the trigger for cancers.
- Immune reactions initially caused by a pathogen can trigger allergies such as skin rashes and asthma.
- Severe physical ill health can lead to depression and other mental illness.

10 Minutes on....

Lifestyle and Disease

Lifestyle Factor	The Effect It Has on Health
Diet	Can lead to cardiovascular disease and can cause obesity a risk factor of diabetes
Alcohol	Effects liver and brain function.
Smoking	Can lead to lung cancer and lung disease as well as cardiovascular disease.

Non-Communicable Disease	Risk Factors
Cardiovascular System	Diet, Smoking, Exercise
Type 2 Diabetes	Obesity
Cancer	Carcinogens

Why it is advised pregnant woman do not drink alcohol or smoke.

Alcohol taken in by a pregnant woman can affect the development of her unborn baby, it increases the chances of miscarriage and still birth. It can also cause organ damage of the baby and can lead to low birth weight. Alcohol can also cause foetal alcohol syndrome. The baby when born is smaller, has a smaller brain, may have distinct facial feature and will have long term learning and behavioural difficulties.

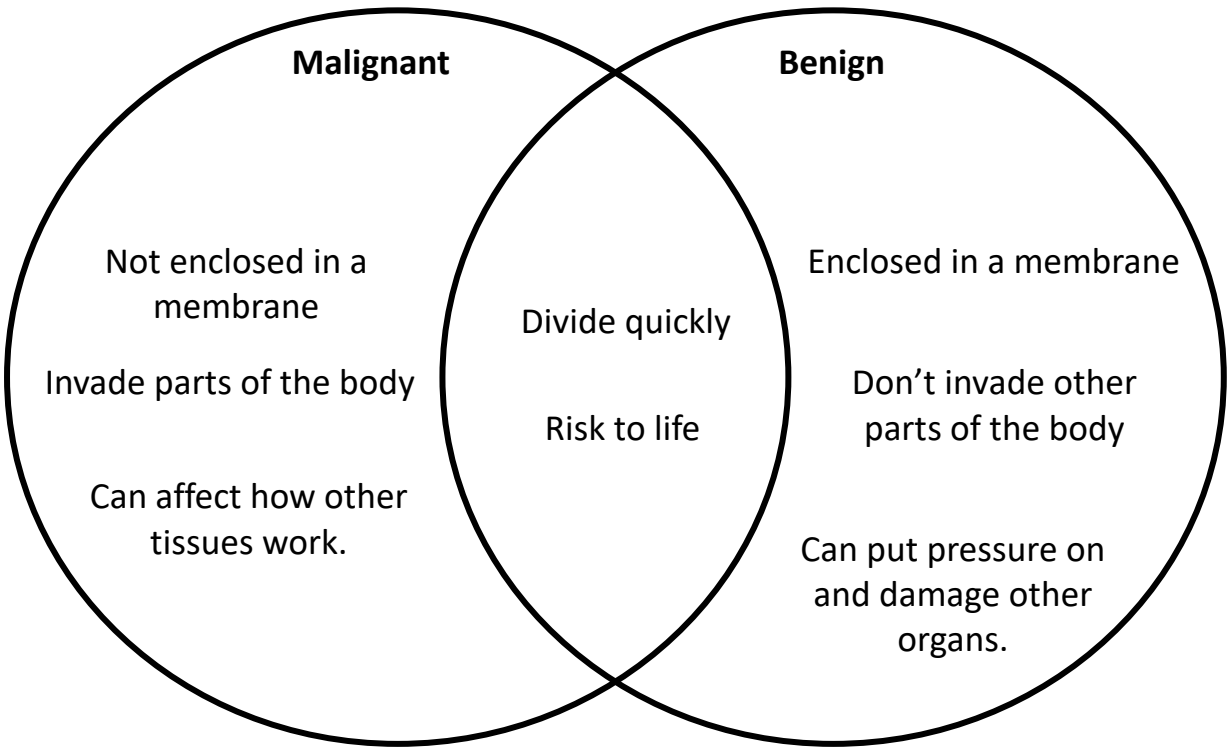
The cigarette smoke will contain carbon monoxide which occupies the mothers red blood cells. This reduces the amount of oxygen that the mothers blood contains. This means that the foetus receives less oxygen which reduces the rate of respiration in the foetus which causes the birth mass of the baby to be less.

10 Minutes on....

Cancer

Key Term	Definition
Cancer	The result of changes in cells that lead to uncontrolled growth and division
Benign Tumour	Growths of cells that are contained in one place, normally within a membrane.
Malignant Tumour	Growths of cells that are not contained in one place and are cancerous.

Comparing malignant and benign tumours.

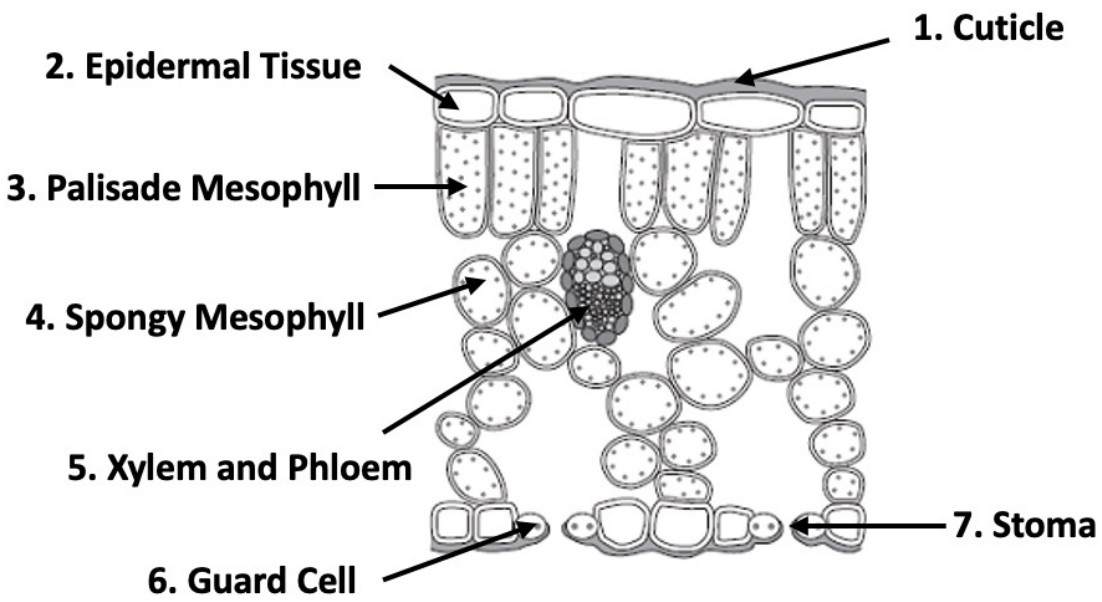


10 Minutes on....

Plant Tissues

Plant Tissue	Function
Epidermal	Covers the leaf. It has no chloroplasts so that light is able to pass through.
Palisade Mesophyll	Photosynthesis. The palisade cells have lots of chloroplasts for this.
Spongy Mesophyll	Gas exchange within the plant. It has air spaces for the rapid movement of gases
Xylem	Xylem transports water and dissolved minerals through a process called transpiration.
Phloem	The phloem transports sugars through a process called translocation.
Meristem Tissue	Undifferentiated plant cells.

Labelled diagram of the leaf

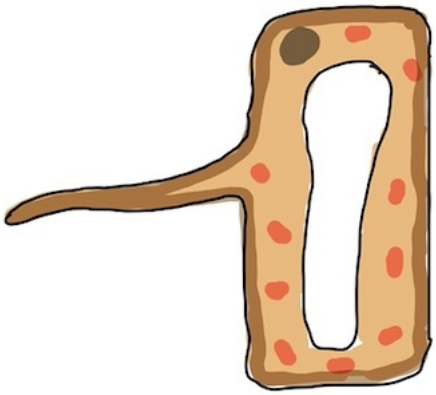


10 Minutes on....

Plant Organ Systems

Root Hair Cell

Diagram



Function

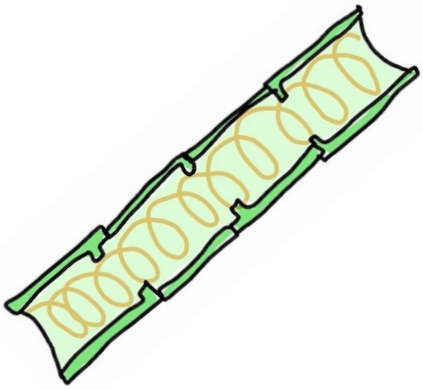
Absorb water and dissolved mineral ions.

Adaptations

Large surface area for increased absorption.
Lots of mitochondria to provide energy for active transport

Xylem

Diagram



Function

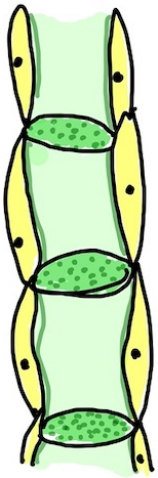
Transports water

Adaptations

Hollow tube to allow more water to travel through.
Spirals of lignin to make it strong to withstand the pressure of water moving through.

Phloem

Diagram



Function

Transports sugars

Adaptations

Have sieve plates to allow water carrying dissolved sugars to move freely.
Lose internal structure for more space.
Have companion cells to help keep them alive.

10 Minutes on....

Plant Organ Tissues

Process	Function
Transpiration	Movement of water from the roots up to the leaves of plants.
Translocation	Movement of sugars around a plant.

Factor	Effect on Rate of Transpiration
Changing Temperature	An increased temperature increases the rate as more water evaporates from the leaf.
Humidity	Water water evaporates more slowly when humidity is greater and so there is less transpiration.
Air Movement	Water water evaporates more rapidly when there is air movement and so there is more transpiration.
Light Intensity	Increased light intensity, increases photosynthesis. This means stoma are open and so there is a greater loss of water and so transpiration rate is higher.

How substances are transported around a plant.

The xylem and phloem are involved with transport around the plant. Xylem transports water and dissolved minerals through a process called transpiration. As water evaporates from the leaf, more water is pulled up through the xylem to replace it. The constant movement of water from the roots to the leaves is known as the transpiration stream. The phloem transports sugars through a process called translocation. Sugars are able to transported from the leaf where they are made to other areas of the plant where they can either be used or stored.

10 Minutes on....

Communicable Diseases

Key Term	Definition
Communicable Disease	An infectious disease caused by pathogens.
Virus	An infective nonliving pathogen that has a strand of nucleic acid in a protein coat.
Bacteria	A prokaryotic pathogen.
Protists	A eukaryotic organism that is not animal, plant or fungi.
Fungi	A spore producing organism.
Pathogen	A microbe that causes illness.

How bacteria make us feel ill.

Bacteria produce poisons that damage tissues and make us feel ill.

How viruses make us feel ill.

Viruses live and reproduce inside cells which causes damage.

10 Minutes on....

Viral Diseases

Disease	How It is Spread	Symptoms	Treatment	Prevention of Spread
Measles	Inhalation of Droplets from Sneezes and Coughs	Fever Red Skin Rash	Rest and painkillers	Vaccination
HIV	Sexual Contact Body Fluids Exchanged	Flu like illness at first Weakened Immune System	Antiretroviral Drugs	Barrier methods of contraception.
Tobacco Mosaic Virus	Contaminated tools.	Mosaic pattern of discolouration on the leaves.	Dispose of infected plants.	Disinfect tools

Why children are vaccinated for measles.

Vaccination protects individuals from the harmful effects from the disease. With more people having immunity it is spread much less in the community.

10 Minutes on....

Bacterial Diseases

Disease	How It is Spread	Symptoms	Treatment	Prevention of Spread
Salmonella	Bacteria ingested in food.	Fever Abdominal cramps Vomiting Diarrhoea	Drink fluids. Antibiotics in extreme cases.	Cook Food Properly Vaccination od chickens.
Gonorrhoea	Sexually	Pain urinating Thick green/yellow discharge	Antibiotics	Barrier methods of contraceptives

How food should be prepared to avoid food poisoning

To prevent salmonella poisoning:

- Hands should be washed
- Food preparation area clean
- Cook and store food at correct temperatures

10 Minutes on....

Fungal Diseases

Disease	How It is Spread	Symptoms	Treatment	Prevention of Spread
Rose Black Spot	Water Wind	Purple or black spots develop on leaves. Leaves turn yellow and drop off.	Fungicides	Removing infected leaves.

Why roses with rose black spot will have stunted growth.

The discoloration and loss of leaves reduces photosynthesis. This means that less glucose is made, for respiration, to release energy. Less glucose also means that less amino acids are made which then means that the plant makes less protein. Overall, this leads to reduced growth of the plant.

10 Minutes on....

Protist Diseases

Disease	How It is Spread	Symptoms	Treatment	Prevention of Spread
Malaria	Mosquito which acts as a vector.	Fever, Sweats, Chills, Headaches, Vomiting, Diarrhoea	Antimalarial drugs can be taken to treat the symptoms and prevent infection.	Prevent mosquitos from breeding for example by removing still bodies of water. Prevent mosquito bites, for example, by using repellents and nets.

How we can prevent people from being bitten by mosquitos.

Prevent people from being bitten: Use a mosquito net and mosquito repellent
Prevent mosquitoes from breeding: Remove and drain stagnant/still water where mosquitos breed, spray insecticides on areas of still water

10 Minutes on....

Human Defence Systems

Non-Specific Defence System	How It Defends the Body
Skin	Dead layer which is difficult to penetrate and so it acts as a barrier. It secretes antimicrobial chemicals which kill some microbes. Scabs form when the skin is cut to stop microbes from entering.
Nose	Hairs keep out dust and microbes.
Trachea and Bronchi	Has mucus which traps microbes Has cilia which move the mucus
Stomach	The hydrochloric acid lowers the pH in the stomach and kills bacteria.

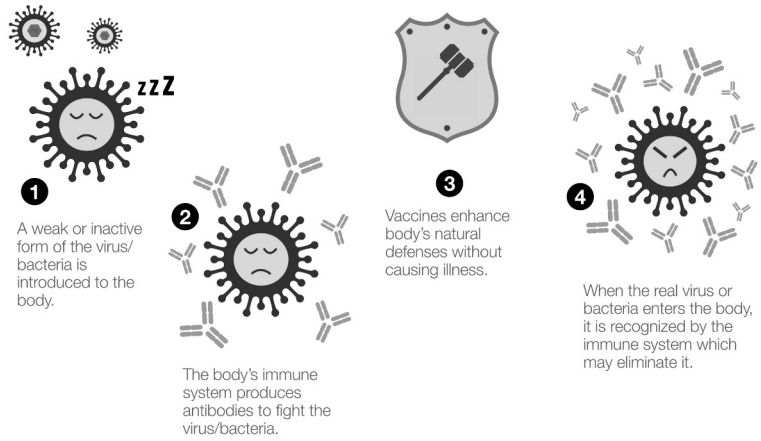
White Blood Cell Defence	How It Defends the Body
Phagocytosis	Phagocytosis is when the white blood cells engulf and ingest the pathogen to destroy it.
Antibody Production	Antibodies cause the pathogens to clump together making it easier for them to be destroyed during phagocytosis. Antibodies have a specific shape to the antigen (protein coat) on the microbe. This means that particular antibodies will only work for particular diseases.
Antitoxin Production	Antitoxins counteract the toxins that the pathogen makes.

10 Minutes on....

Vaccination

The process of vaccination

1. A small quantities of dead or weakened or inactive forms of a pathogen is put into the body usually by injection to stimulate an immune response
2. The white blood cells produce antibodies.
3. If the same pathogen re-enters the body the white blood cells respond quickly to produce the correct antibodies, preventing infection.



Why a large proportion of a population needs to be vaccinated

There is increased immunity (herd immunity) in the population and so fewer people who are able to catch and pass on the diseases, this lowers the R value. If not enough people are vaccinated then if someone does catch the disease they will most likely pass it on.

Advantages of Vaccination	Disadvantages of Vaccination
Protects the person vaccinated from the disease. Protects people who may be not vaccinated from the disease. Lowers the amount of the disease in the community. The likelihood of becoming seriously ill from the disease is reduced.	Possible side effects such as fatigue and headaches

10 Minutes on....

Antibiotics and Painkillers

Key Term	Definition
Antibiotic	A drug that kill infecting bacteria.
Painkiller	Medicine that treats the symptoms of a disease.

When antibiotics would be prescribed.

For bacterial infections.

Why painkillers are used and what they do.

Painkillers are used to make the patient feel more comfortable while they are ill as they can reduce inflammation and pain.

Why the overuse of antibiotics is a concern.

It is leading to the emergence of antibiotic resistant strains of bacteria.

Why antibiotics should not be prescribed for viral infections.

They are unable to kill the infecting virus which is within the cells.

10 Minutes on....

Development of Drugs

Key Term	Definition
Digitalis	A heart drug that originates from foxglove.
Aspirin	A painkiller that originates from willow.
Penicillin	An antibiotic produced by Penicillium mould, discovered by Alexander Fleming
Placebo	A substance with no therapeutic effect that is used as a control.

What new drugs are tested for.

To test for efficacy, dose and toxicity.

Stage	Description	Purpose
Pre-Clinical	Completed in labs on cells and or animals.	Test for toxicity.
Clinical Trials Phase 1	Given in low doses to a small group of healthy volunteers	Test for side effects.
Clinical Trial Phase 2	Tested with a larger group of individuals who the drug is designed to treat.	To test for efficacy and to find optimum dose
Clinical Trial Phase 3	Tested with an even larger group of individuals who the drug is designed to treat.	To find optimum dose.
Peer Review	Medical experts check the work of the trial and consider the design quality.	To avoid false claims.

10 Minutes on....

Monoclonal Antibodies

Key Term	Definition
Monoclonal Antibodies	Antibodies are specific to one binding site on one protein antigen and so are able to target a specific chemical or specific cells in the body.
Hybridoma Cell	A cell in which a lymphocyte is combined with a particular tumour cell.

How monoclonal antibodies are made.

1. Inject antigen into the mouse.
2. The mouse lymphocytes are stimulated to make a particular antibody.
3. The lymphocytes are combined with a particular kind of tumour cell to make a cell called a hybridoma cell.
4. The hybridoma divides and make the antibody.
5. Single hybridoma cells are isolated and are cloned to produce many identical cells that all produce the same antibody.
6. A large amount of the antibody can be collected and purified.

10 Minutes on....

Uses of Monoclonal Antibodies

Uses for monoclonal antibodies.

- For diagnosis such as in pregnancy tests
- In laboratories to measure the levels of hormones and other chemicals in blood, or to detect pathogens
- In research to locate or identify specific molecules in a cell or tissue by binding to them with a fluorescent dye
- To treat some diseases such as cancer

Why monoclonal antibodies are not used as widely as first hoped.

More side effects than expected.

Advantages of Using Monoclonal Antibodies	Disadvantages of Using Monoclonal Antibodies
Can be produced quickly. Have potential to treat diseases such as cancer and HIV.	Side effects Expensive to produce Some people disagree with using animals to make the monoclonal antibodies.

10 Minutes on....

Detecting Plant Diseases

How Plant Diseases Can be Detected	How Plant Diseases Can be Identified
Stunted Growth Discolouration Presence of Pests Spots on Leaves Areas of Decay Growths Malformed Stems or Leaves	Reference to gardening manual or website. Using testing kits with monoclonal antibodies. Taking infected plants to a lab to identify the pathogen.

Condition	Description	How It Affects Plant Growth
Tobacco Mosaic Virus	A mosaic pattern on discolouration on the leaves of plants.	The discoloration and loss of leaves reduces photosynthesis. This means that less glucose is made, for respiration, to release energy. Less glucose also means that less amino acids are made which then means that the plant makes less protein. Overall, this leads to reduced growth of the plant.
Black Spot	Purple or black spots develop on leaves of roses, which then turn yellow, and drop off early.	
Aphids	Aphids have a mouthpiece that pierces through the plant and into its phloem. It feeds off the the sugar within the phloem.	The plant has less sugar which stunts growth.
Nitrate Deficiency	Can be caused by pests or poor soil quality. It will cause the plant to look pale to yellowish green.	It stunts growth. The nitrates are needed for making proteins. If less proteins are made by the plant, there will be stunted growth.
Magnesium Deficiency	Common in soil that does not contain much organic content. Leaves will appear yellow.	The magnesium is needed to make chlorophyll. The deficiency will cause chlorosis. The plant will have less chlorophyll for photosynthesis, so will produce less glucose which will stunt growth.

10 Minutes on....

Plant Defence Responses

Physical Defences	How It Protects The Plant
Cellulose Cell Walls	A physical barrier between the cells and the microbes reducing the likelihood of infection.
Tough Waxy Cuticle	It is a strong barrier that microbes find difficult to penetrate and so reduces the likelihood of infection.
Layers of Dead Cells Around Stem	It forms a physical barrier between the plant and microbes reducing the likelihood of infection.

Chemical Defences	How It Protects The Plant
Antibacterial Chemicals	Kills bacteria on the plant and reduces the likelihood of a bacterial infection.
Poisons	Will stop herbivores eating it.

Mechanical Defences	How It Protects The Plant
Thorns and Hairs	These deter herbivores and prevent animals damaging it.
Leaves Which Drop Or Curl When Touched	This is to dislodge any insect that lands on it.
Mimicry	Will stop herbivores eating it.

10 Minutes on....

Photosynthesis

Word equation for photosynthesis.

Carbon Dioxide + Water → Glucose + Oxygen

Balanced symbol equation for photosynthesis.

$6CO_2 + 6H_2O \rightarrow C_6H_{12}O_6 + 6O_2$

How plants are adapted for photosynthesis,

Lots of chloroplasts and palisade cells. The chloroplasts are found in palisade cells within the leaf. They contain a green pigment called chlorophyll. It is this pigment that makes the plant appear green.

Leaves have a large surface area to capture as much light as possible from the sun.

Thin leaves to provide a short diffusion pathway for gases.

Has stomata for gases to diffuse through.

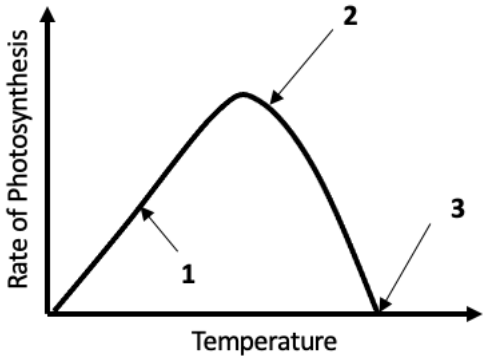
The process of photosynthesis.

Photosynthesis is as an endothermic reaction in which energy is transferred from the environment to the chloroplasts by light. The light provides the energy that it needed for the reaction.

10 Minutes on....

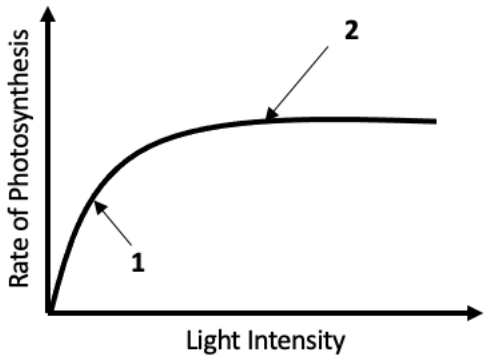
Rate of Photosynthesis

Temperature



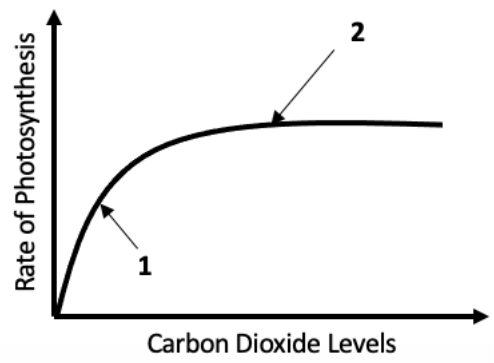
1. As temperature increases the rate of photosynthesis increases up to around 35-40°C. This is because as the temperature increases the reactant particles move faster which increases the rate of reaction.
2. Beyond the optimum temperature the rate of photosynthesis will decrease. This is because the enzymes involved with photosynthesis have been denatured.
3. At around 45°C photosynthesis will stop completely. This is because all of the enzymes have been denatured.

Light Intensity



1. As the light level is raised the rate of photosynthesis increases also up to a point.
2. Beyond this point, the rate of photosynthesis will increase no further. This is because either the temperature of carbon dioxide level have become a limiting factor and stopped the rate of photosynthesis increasing any more. To increase the rate of photosynthesis further you would need to increase the carbon dioxide levels or temperature.

Carbon Dioxide Concentration

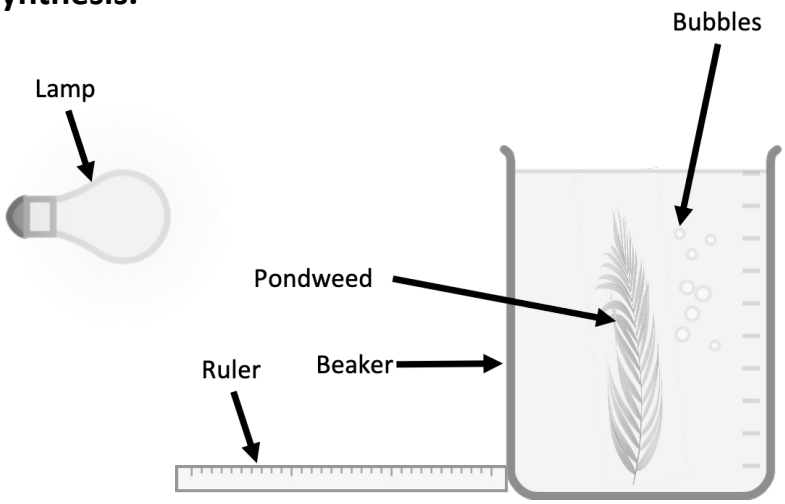


1. As the levels of carbon dioxide increases the rate of photosynthesis increase also up to a point.
2. Beyond this point, the rate of photosynthesis will increase no further. This is because either the temperature of light intensity have become a limiting factor and stopped the rate of photosynthesis increasing any more. To increase the rate of photosynthesis further you would need to increase the light intensity or temperature.

10 Minutes on....

Light Intensity RP

A method to investigate the effect that light intensity has on the rate of photosynthesis.



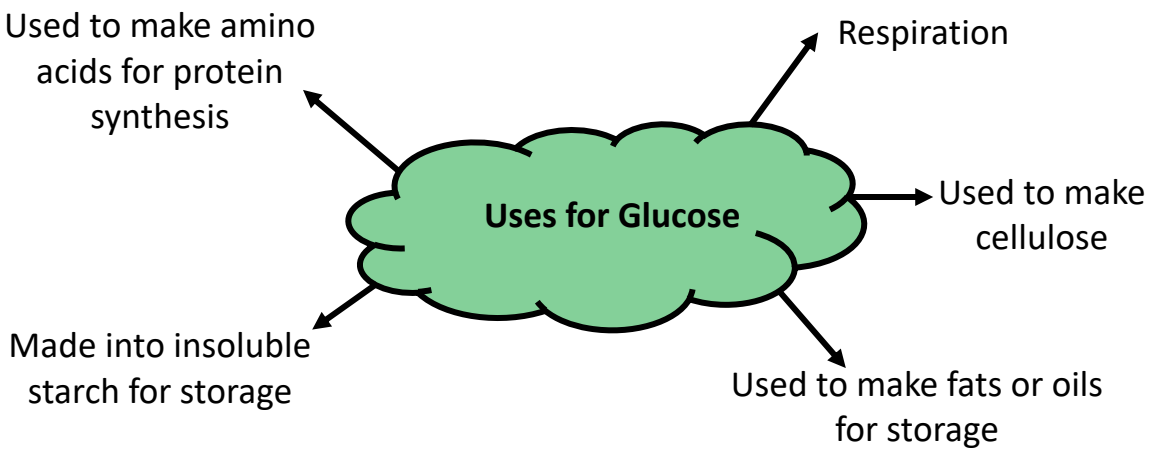
Method

1. Set up equipment as shown in the diagram with the pondweed in a beaker of water.
2. Place the beaker 10cm away from the light source.
3. Turn the light on and leave the pondweed for 5 minutes to acclimatise
4. Count the number of bubbles produced in a fixed period of time or measure how much gas is collected in a fixed period of time. This is the dependent variable.
5. Repeat to identify outliers and calculate averages.
6. Repeat for different distances 20,30,40 and 50cm.

Control Variable	How it will be controlled	How to Test as the Independent Variable
Size of pondweed	Use the same pondweed piece	n/a
Type of pondweed	Use the same pondweed piece	n/a
Colour of light	Use a white LED bulb	Use 5 different coloured bulbs or filters.
Temperature of water	LED bulb that does not get hot	Test 5 different temperatures of water using water baths.
Time for plant to equilibrate	Leave in the water for 5 minutes before testing	n/a
Carbon dioxide concentration	Add the same mass of sodium hydrogen carbonate to the water	Add 5 different masses of sodium hydrogen carbonate to 5 beakers.
Volume of water in beaker	Add the same volume of water to each beaker	n/a

10 Minutes on....

Uses of Glucose



Substance Being Tested for	Reagent Used	Description of Test	Positive Result
Starch	Iodine	Add a few drops either to the surface of a leaf or liquid extract from a plant.	The iodine will turn blue/black.
Glucose	Benedicts	Crush a leaf to extract the fluid. Add the Benedicts and heat.	The sample will turn red/ brown/ orange/ yellow/ green.
Protein	Biuret	Crush the plant to extract the fluid and add Biuret.	The sample will turn purple if protein is present.

10 Minutes on....

Respiration

Word equation for aerobic respiration.

Glucose + Oxygen → Carbon Dioxide + Water

Balanced symbol equation for aerobic respiration.

$C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O$

Word equation for anaerobic respiration in animals and plants.

Animals: Glucose → Lactic Acid
Plants: Glucose → Ethanol + Carbon Dioxide

Comparing anaerobic respiration and aerobic respiration in animals.

Both reactions are exothermic and involve the breakdown of glucose to release energy. However, in aerobic respiration this takes place with oxygen present while in anaerobic respiration it does not. Another difference between the two reactions is that aerobic respiration makes carbon dioxide and water while anaerobic respiration makes lactic acid.

Anerobic respiration also releases a lot less energy than aerobic. This is because the oxidation of glucose is incomplete.

Finally anaerobic respiration causes an oxygen debt to occur, while this does not happen with aerobic respiration.

Key Term	Definition
Fermentation	Anaerobic respiration in yeast cells. It is important for the manufacturing of bread and alcoholic drinks.

10 Minutes on....

Response To Exercise

Change That Occurs During Exercise	Why The Change Occurs
Increased Heart Rate	Increases the flow of blood to the muscles. This supplies more oxygen and glucose for respiration which releases more energy for muscle contraction.
Increased Breathing Rate	Increases the amount of oxygen that is in the blood. This supplies muscle cells with more oxygen for respiration which releases more energy for muscle contraction.
Increased Breath Volume	

When anaerobic respiration occurs during exercise.

Anaerobic respiration occurs in muscles when there is an insufficient supply of oxygen.

What happens when anaerobic respiration occurs during exercise.

During anaerobic respiration there is an insufficient supply of oxygen and so there is incomplete oxidation of glucose. Lactic acid is made, and this builds up creating an oxygen debt. The lactic acid is a toxin and causes the muscles to become fatigued and stop contracting efficiently.

Key Term	Definition
Oxygen Debt	The amount of extra oxygen the body needs after exercise to react with the accumulated lactic acid and remove it from cells.

10 Minutes on....

Metabolism

Key Term	Definition
Metabolism	All the chemical reactions that happen in a cell or the body.

Examples of metabolic reactions.

Examples of metabolic reactions include:

- Photosynthesis
- Respiration
- Making carbohydrates from sugars
- Making lipids from glycerol and 3 fatty acids
- Amino acids making proteins
- Breakdown of proteins to make urea

Substance	Why It Is Important In The Body
Sugars	Glucose is used to make starch, glycogen and cellulose. Glycogen is stored in the muscle and liver cells as a source of energy.
Amino Acids	Used to make proteins. These proteins can be used for growth and repair.
Fatty Acids and Glycerol	Used to make make lipids (fats). These lipids are then used as a store of energy.