

## I should already know:

Structures of plant and animal cells.

Types of cell.

Functions of organelles.

## I will learn:

Describe the function of each sub-cellular structure.

Define the terms "resolution" and "magnification".

Describe the differences between prokaryotic and eukaryotic cells.

Describe the difference between differentiation and division.

Explain how different factors affect diffusion.

Explain examples of osmosis happening in real life.

Explain why active transport requires energy.

Describe the process of mitosis and the cell cycle.

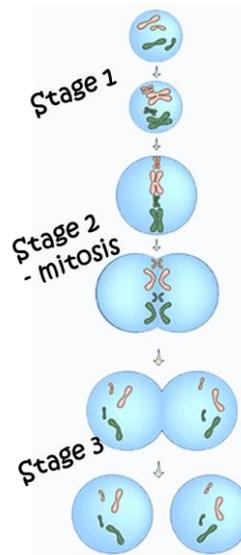
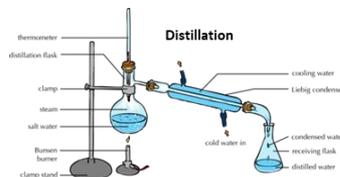
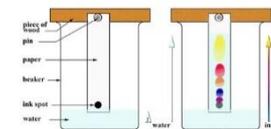
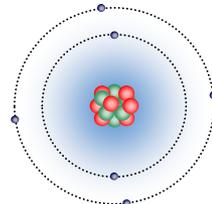
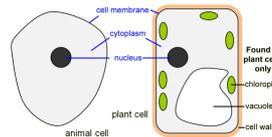
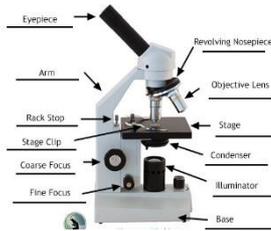
Understand the life cycle of a cell and the applications of stem cells.

## This will help in the future:

Careers in Biology such as cell biologist, medicine, researcher.

## Key Words

Cells	All living things are made up of cells
Eukaryotic	A complex cell e.g. plant and animal cells
Prokaryotic	A small, simple cell e.g. bacteria cells
Nucleus	Contains genetic information so controls the activities of the cell
Cytoplasm	Gel-like substance where most chemical reactions take place
Cell membrane	Controls what goes into and out of the cell
Mitochondria	Where respiration happens
Ribosomes	Where proteins are made
Cell wall	Gives strength and support to plant and bacteria cells
Vacuole	Found in plant cells, contains cell sap to give strength to the cell
Chloroplasts	Found in plant cells, contains chlorophyll for photosynthesis
Respiration	The chemical reaction which releases energy from glucose
Photosynthesis	Plants use light energy to convert carbon dioxide and water into glucose and oxygen
Plasmids	Circular DNA found in bacteria
Microscope	Allows us to see things we can't see with the naked eye
Magnification	Magnification = image size/real size
Differentiation	The process by which a cell becomes specialised for its job
Stem cell	An undifferentiated cell which can differentiate into many different types of cell
Specialised cells	A cell which performs a specific function e.g. nerve cell, sperm cell, muscle cell
Chromosomes	Long, coiled molecule of DNA found in the nucleus
Mitosis	Type of cell division where two identical daughter cells are produced from one parent cell



## Greater Depth Challenge

Is mitosis the only form of cell division?

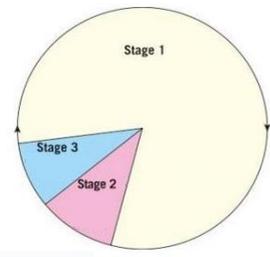
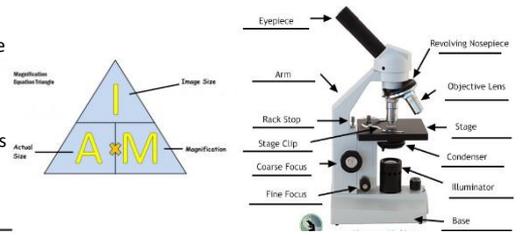
Would you use stem cells?

How do cells make protein?

## Further Reading

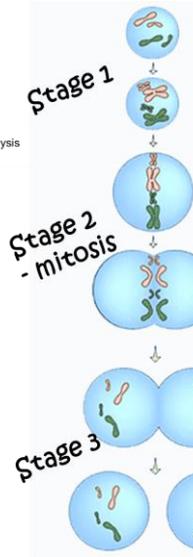
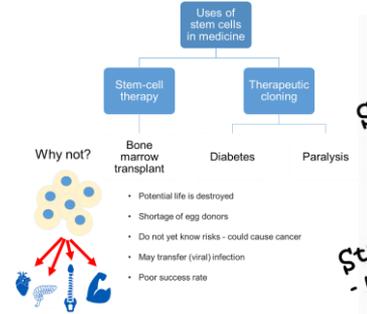
BBC Bitesize, Educake.

Total Magnification = magnification of the eye piece lens x magnification of the objective lens.  
 e.g. If the eye piece lens magnification is x10 and the objective lens is x15. What is the total magnification?



**Eukaryotic vs. Prokaryotic**

<b>Eukaryotic</b> Eukaryotic cells are found in humans. They are also found in plants, animals, fungi and insects.	<b>Prokaryotic</b> Prokaryotic cells do not have a nucleus. They are less complex than eukaryotic cells.
<b>Nucleus</b> Eukaryotic cells have nuclei and other membrane bound organelles.	<b>No Nucleus</b> Prokaryotic cells do not have a nucleus. They also do not have any membrane bound organelles.
<b>DNA of Eukaryotic cells</b> Eukaryotic cells have linear strands of DNA.	<b>DNA of Prokaryotic cells</b> Prokaryotic cells have smaller, circular DNA. DNA for prokaryotic cells is held in a nucleoid.



**Stage 1: Preparation**  
 The longest stage where the cell **grows, increases the number of structures and replicates its DNA** (forming two copies of each chromosome ready for division)

**Stage 2: Mitosis**  
**M: meet in the middle**  
**A: apart at the sides**  
**T: two nuclei**

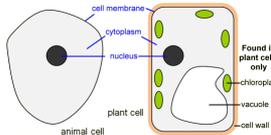
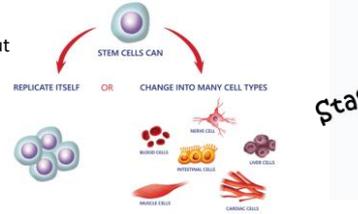
**Stage 3: Cytokinesis**  
 The **cytoplasm and cell membranes divide** to form two identical daughter cells.

Stem cells are specialised cells as they can either self replicate or change (differentiate) into any type of cell.

Embryonic stem cells can form any type of cell but can be rejected.

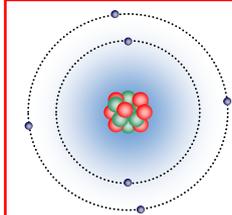
Cells from your own body can only become a restricted amount of cells.

	<b>SPERM CELL</b>	Long tail for swimming Head for getting into the female cell
	<b>EGG CELL</b>	Large Contains lots of cytoplasm
	<b>NERVE CELL</b>	Long connections at each end Can carry electrical signals
	<b>RED BLOOD CELL</b>	Large surface area Contains haemoglobin, which joins with oxygen
	<b>ROOT HAIR CELL</b>	Large surface area
	<b>LEAF PALISADE CELL</b>	Large surface area Lots of chloroplasts
	<b>XYLEM CELL</b>	Hollow so it conducts water Strong cell walls



**Extra parts of plant cell:**  
**Cell wall:** strengthens the cell.  
**Chloroplasts:** contain chlorophyll which absorbs light energy for photosynthesis  
**Vacuole:** filled with cell sap to help keep the cell turgid

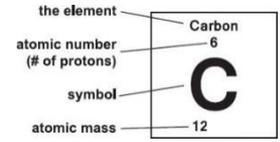
Functions which animal and plant cells have **in common:**  
**Nucleus:** contains genetic material, which controls the cells activities.  
**Cytoplasm:** most chemical processes take place here  
**Cell membrane:** controls the movement of substances in and out of the cell  
**Mitochondria:** where most energy is released by respiration  
**Ribosomes:** proteins are made here.



Particle	Charge	Mass (in atomic units)
Proton	1+	1
Neutron	0	1
Electron	1-	Very small

**A<sub>r</sub> = relative atomic mass**

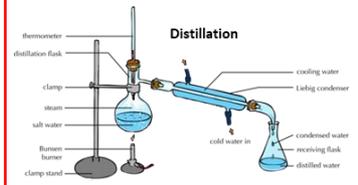
The mass of one atom of an element.  
 Found on the periodic table (the bigger number).



**M<sub>r</sub> = relative formula mass**

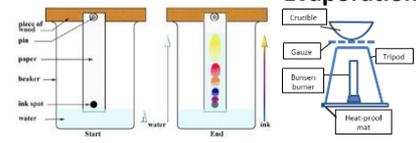
The sum of all the atomic masses of each element in a molecule.

Element	Diagram	Configuration	Electrons	Periodic table group
Fluorine, F		2.7	Fluorine atoms have nine electrons. Two of these are in the first shell. The remaining seven are in the second shell.	Group 7
Neon, Ne		2.8	Neon atoms have ten electrons. Two of these are in the first shell. The remaining eight electrons are in the second shell. Because its outer shell is full, neon is stable and unreactive.	Group 0
Sodium, Na		2.8.1	Sodium atoms have 11 electrons. Two of these are in the first shell, eight are in the second shell and one is in the third shell.	Group 1
Calcium, Ca		2.8.8.2	Calcium atoms have 20 electrons. Two of these are in the first shell, eight in the second shell, another eight in the third shell, and two in the fourth shell.	Group 2

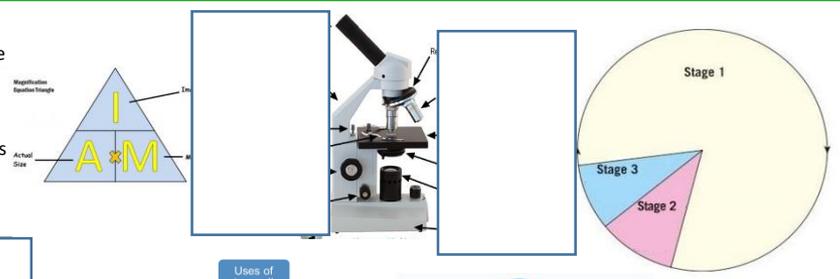


Distillation is the process of separating the components or substances from a liquid mixture by using selective boiling and condensation.

**Chromatography**  
 is used to separate mixtures and help identify substances.

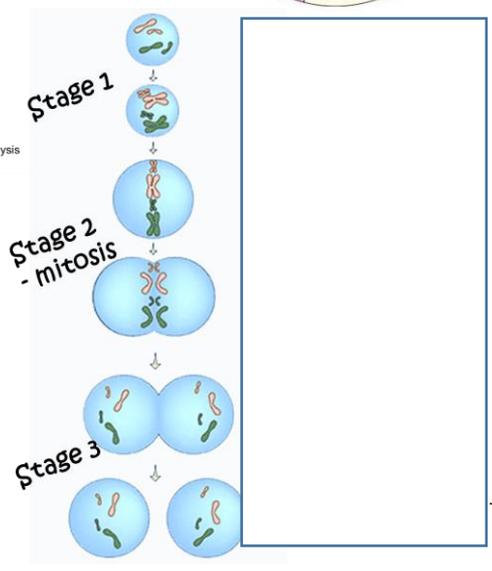
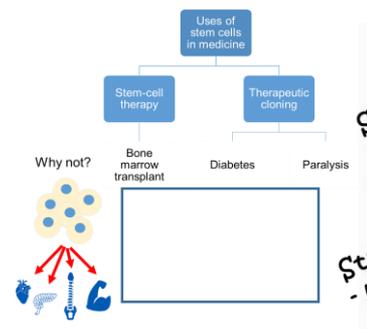


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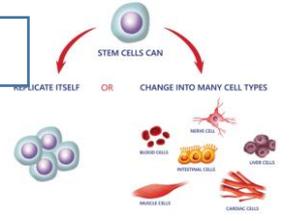
**Eukaryotic vs. Prokaryotic**

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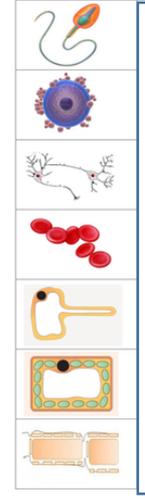


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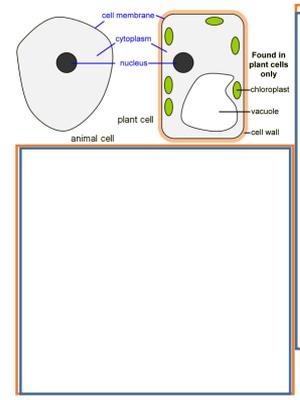
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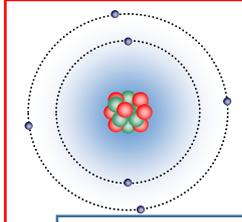
Cells from your own body can only become a restricted amount of cells.



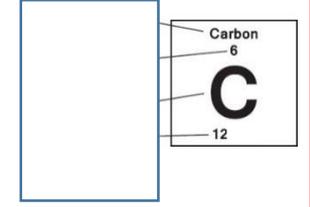
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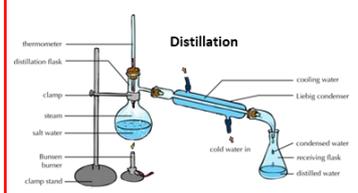


Particle	Charge	Mass (in atomic units)
Proton		
Neutron		
Electron		

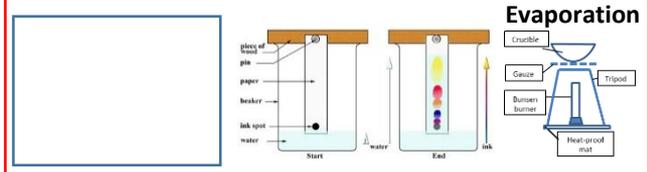


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Element	Diagram	Configuration	Electrons	Periodic table group
Fluorine, F				
Neon, Ne				
Sodium, Na				
Calcium, Ca				



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**Evaporation**

**Scientific equipment**

	<b>Name</b> Bunsen burner	<b>Use</b> Heating by burning a gas		<b>Name</b> Stopwatch	<b>Use</b> To measure time
				Tongs	To hold hot things (not test tubes)
	Conical flask	To measure volume of liquids		Thermometer	To measure temperature
	Beaker	To hold, pour and heat liquids		Safety Goggles	To protect your eyes
	Measuring cylinder	To measure precise volume of liquid		Tripod	To hold a beaker above a Bunsen burner
	Evaporating basin	To heat and evaporate liquids		Gauze	Used to support a beaker

**Risk assessment**

Hazard / Chemical	Risks	Control measures	Emergency measures

**Hazard** – something that has the potential to cause harm to a person, property or environment.

**Risk** – is the chance or probability of the hazard causing harm or damage to people, property or the environment.

**Control measures** – minimises the risk of the hazard causing harm.

**Drawing equipment**

When drawing scientific equipment it must be drawn in 2D and not 3D.

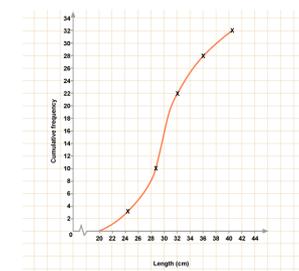
Equipment diagrams should be drawn as part of the method for the experiment.

	Test tube	
	Beaker	
	Conical flask	
	Round bottom flask	
	Measuring cylinder	
	Tripod	
	Gauze mat	
	Bunsen burner	
	Evaporating dish	
	Filter funnel (with filter paper)	

**Hazard symbols**

			
Flammable	Corrosive	Toxic	Explosive
			
Harmful to environment	Serious health hazard	Oxidising	Harmful

**Graphs**

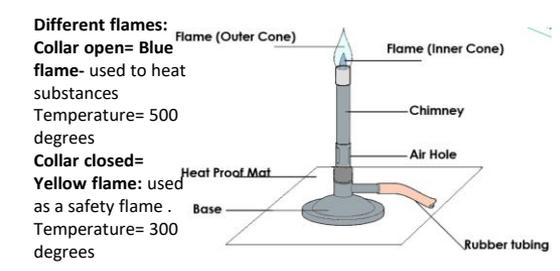


- Rules for a graph**
- Title
  - Size
  - Appropriate scale
  - Labelled axis
  - Plot points accurately
  - Line of best fit

When describing graphs make sure you...

- Identifying if it's an increasing or decreasing trend.
- Support your chosen trend with evidence from the graph.
- Give a reason or opinion for the observed trend.

**Bunsen burner**



**Calculation**

**F**ormula  
**N**umbers  
**A**nswer  
**U**nit

- Write the formula you are using.
- Substitute in the known numbers.
- Calculate the answer.
- Add units if appropriate.