SKEGNESS ACADEMY



Name …… Set ……

Year 9 Knowledge Organiser Term 1 and 2

Assessment dates:

Practical Assessment 1 October 2027 Your practical assessment will be to outline the method to investigate the process of osmosis.

End of Term Written Assessment December 2027 This will look at all the topics you have completed this term.

Important Dates This Term

Pasteur Day 28th September
Curie Day 7th November

Topics Covered this term

Growth and Differentiation – You will learn about how new cells are made for growth and repair, know the difference between eukaryotic and prokaryotic cells. Recap the use of microscopes to observe cells and describe the processes of diffusion and osmosis.

The Periodic Table– You will learn about the history of the periodic table and why its development was so pivotal to chemistry. You will use the periodic table to derive and draw the electron configuration of atoms and calculate the numbers of protons and neutrons. You will use the periodic table to find out trend in boiling points and reactivity for different groups.

Acceleration – You will learn how to calculate the acceleration of a moving object. You will develop your understanding of Newtons 1st 2nd and 3rd Law

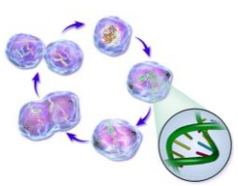
Homework

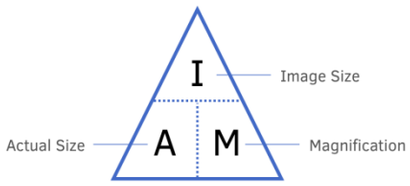
Home Learning is seen to make an important contribution to pupils' progress at school and can ensure that teaching time is used to maximum effect. You will be set homework every Wednesday on GCSEpod the QR code will take you there. The expectation is that your homework will take you 10 minutes per week. Consolidating and revisiting the weeks learning

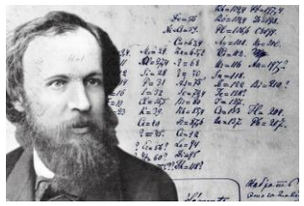
gcsepod an access company

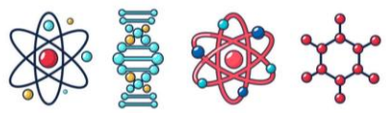
'Putting Every Student on the Path to a Happy, Successful and Fulfilling Life'

Year 9 Science: Term 1
Growth and Differentiation, The Periodic Table



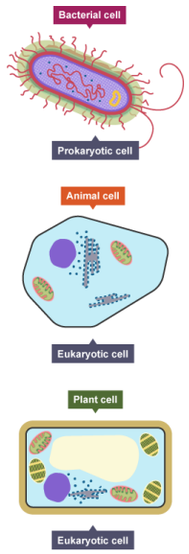






Week 1

Big Picture: Growth and Differentiation



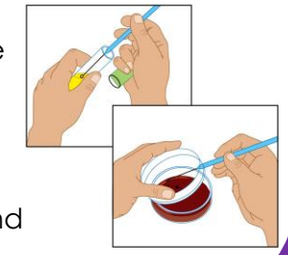
Plant and animal cells are **eukaryotic cells** have membrane-bound organelles (part of a cell that carries out a specific function) and have genetic material contained in the nucleus. All eukaryotic cells have a nucleus, mitochondria, ribosomes, cytoplasm and a cell membrane. Plant cells also have a cell wall, vacuole and chloroplasts. **Mitochondria** are the site of aerobic respiration which releases energy for cellular processes. **Ribosomes** are the site of protein synthesis.
Prokaryotic cells do not contain membrane-bound organelles and are smaller than eukaryotic cells. Instead of a nucleus, they have loops of DNA or rings called plasmids.

Week 2

Big Picture: Growth and Differentiation

Microscopy is using microscopes to view samples that cannot be seen with the naked eye. Light microscopes allow us to see the largest organelles, including the nucleus, cell membrane, cell wall. Electron microscopes have a greater magnification and resolution than light microscopes. They are much more expensive than light microscopes but have a higher **resolution** and **magnification**.

Petri dishes are used to produce cultures of bacteria and other micro-organisms. **Aseptic techniques** must be used to prepare cultures to prevent contamination of the culture and the growth of harmful bacteria.



Week 3

Big Picture: Growth and Differentiation

Diffusion is the spreading out of particles, of a gas or liquid, resulting in net movement from an area of high concentration to low concentration. The rate of diffusion is increased by an increase in temperature, an increase in the difference in concentrations (concentration gradient), a greater surface area. Large, multicellular organisms have adaptations to increases the surface area to volume ratio to allow for efficient exchange of substances. **Osmosis** is the diffusion of water from a dilute solution to a concentrated solution through a partially permeable membrane that lets particular substances pass through it, either into or out of the cell. **Active transport** moves substances from a more dilute solution to a more concentrated solution, requiring energy from respiration and works against the concentration gradient. Active transport is used in root hair cells to absorb mineral ions from the soil that are essential for plant growth.

Week 4

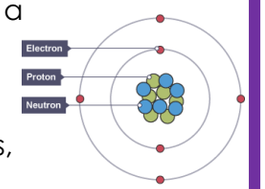
Big Picture: Growth and Differentiation

Both eukaryotic and prokaryotic cells undergo cell division by dividing into two. The eukaryotic **cell cycle** contains a growth phase where the cell grows to double sub-cellular structures (such ribosomes and cell membrane) and DNA, then the cell splits into two during mitosis. **Cancer** is caused by uncontrolled cell division which creates a tumour. Malignant tumours are formed of cancer cells that invade other tissues and spread around the body. A risk factor is a gene or lifestyle choice that can increase the likelihood of a person developing a disease e.g. poor diet, smoking, UV exposure. **Stem cells** are cells that are capable of **differentiating** into other types of cell to make them specialised for a function. Embryonic stem cells can differentiate into all human cell types but adult bone marrow contains stem cells that can only differentiate into different blood cells.

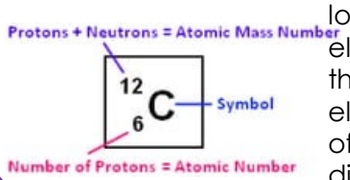
Week 5 & 6

Big Picture: The Periodic Table

Atoms are very small and are made of a positively charged nucleus, containing protons and neutrons, surrounded by negatively charged electrons. The electrons are arranged in energy levels, which are different distances from the nucleus.



Atoms have no overall electrical charge because the number of electrons is equal to the number of protons in the nucleus.



Atoms form positive ions if they lose one or more outer electrons and negative ions if they gain one or more outer electrons. Isotopes are atoms of the same element that have different numbers of neutrons.

Key words:

Active Transport - The movement of molecules from a dilute to a more concentrated solution against a concentration gradient using energy from respiration.

Diffusion - The movement of particles from a high concentration to a low concentration

Mitochondria - A membrane bound structure in a cell that is the site of aerobic respiration.

Alkali Metals - An element in group 1 of the periodic table.

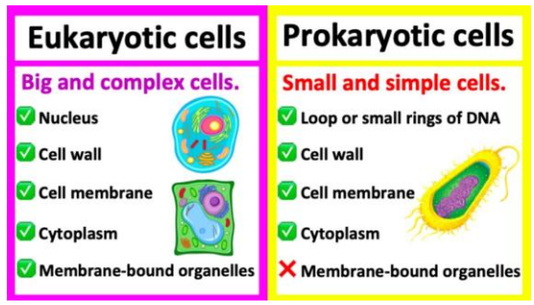
Isotopes - Atoms of the same element with mass numbers due to different numbers of neutrons in the nucleus.

Periodic Table - A table of all the known elements arranged in order of atomic number so that elements with similar properties are in columns, known as groups.

Year 9 Science: Term 1
Growth and Differentiation, The Periodic Table

Week 1

Questions	Answers
Name two types of cell	Prokaryotic and Eukaryotic
Where does respiration happen?	Aerobic respiration happens in the mitochondria
Why does a plant cell need walls?	Plant cells have walls to give it a definite shape?
Describe the function of the cell membrane	The cell membrane controls what goes in and out of the cell
What is an organelle?	Organelles are parts of a cell.

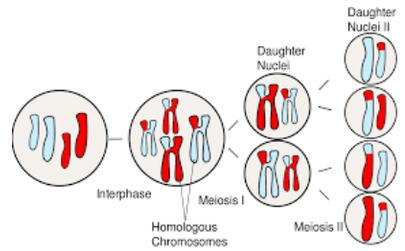


Week 2

Questions	Answers
Define resolution	The ability to see detail.
Name two types of microscopes	Electron microscope and light microscope.
Why is aseptic technique important?	So you do not contaminate your sample and produce dangerous bacteria.
Why do we need microscopes?	To allow us to see what small things are made from.
Which lens do you start with on a microscope?	The lowest power lens to give the greatest field of vision.

Week 3

Questions	Answers
Define diffusion	It is the movement of particles from an area of high to low concentration.
Why is diffusion a passive process.	Diffusion is passive as it does not require energy?
Why does active transport need energy?	Because the particles are going against the concentration gradient.
Which process moves oxygen from the alveoli into the blood	Diffusion is the process which moves oxygen from the alveoli into the blood.
Describe osmoisis	It is the movement of water from an area of high to low concentration across a semi permeable membrane.



Week 4

Questions	Answers
Why are stem cells useful	Stem cells can become any type of cell.
Why do we need to cell cycle?	To make new cells for growth and repair.
What are risk factors?	Something which increases your chance of something occurring.
Define differentiation?	When a stem cells becomes speclialised.
What is cancer?	Cancer is when cells in your body replicate uncontrollably.

Week 5 & 6

Questions	Answers
Why do atoms have an overall charge of zero?	They have an equal number of positive and negative charges.
Why did Mendeleev leave gaps	He predicted the properties of undiscovered elements and left gaps for them.
Define ion	An ion is an atom which has lost or gained electrons.
What is the charge of a metal ion?	Metal ions are always positive.
What makes an isotope	Different number of neutrons.

Key words:

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Year 9 Science: Term 2
The Periodic Table, Acceleration

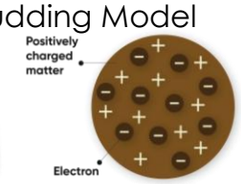
Week 1

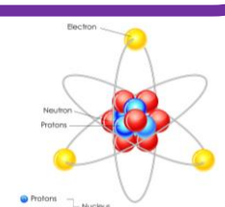
Big Picture: The Periodic Table

Scientific models and theories are developed over time, with new experimental evidence used to change or replace previous ones.
Before the discovery of the electron, Democritus called them the '**smallest piece**' of matter. John Dalton stated that matter is made of tiny particles called **atoms** and suggested they could combine to form **compounds** he also started putting them in a table. The discovery of the **electron** by JJ Thomson led to the **plum pudding model** where the atom is a ball of positive charge with negative electrons embedded in it. Rutherford proved that the mass was at the centre of the atom which gave us the **nuclear model.** Bohr adapted the nuclear model showing that electrons orbit the nucleus which led to Chadwick's experimental work which proved the existence of **neutrons.** These discoveries and experiments led to the model we use today.

Plum Pudding Model



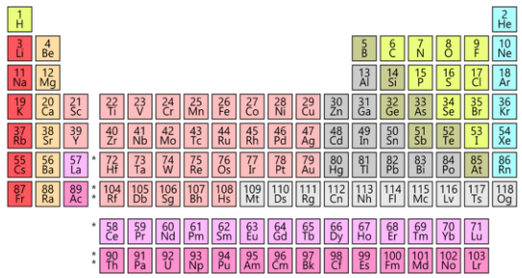


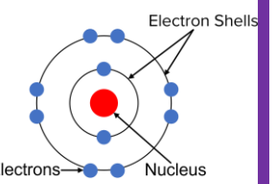


Week 2

Big Picture: The Periodic Table

Elements are arranged in the Periodic Table in order of increasing **atomic (proton) number**
Elements with similar properties are in the same **column**, known as a **group**
Rows in the Periodic Table are called **periods**





Elements in the same group have the **same number of electrons in their outer shell**, which gives them similar chemical properties

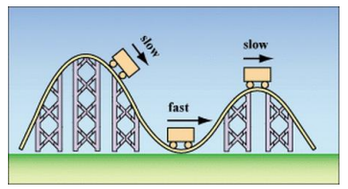
Week 3

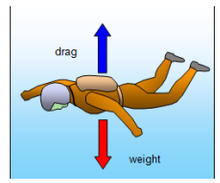
Big Picture: The Periodic Table

Alkali metals: Group 1 elements that are good conductors and are very reactive, they react vigorously with water producing hydrogen gas and are more reactive down the group
Noble Gases: Group 0/8 have low melting and boiling points and are unreactive as they have a full outer shell of electrons
Halogens: Group 7 elements that have low melting points and reactive (less reactive down the group).
Transition metals: The transition metals are in the central part of the periodic table Compared to other metals, transition metals have higher melting points and densities and are stronger and harder.









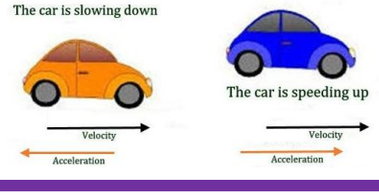
Week 4

Big Picture: Acceleration

Acceleration is the rate in change of velocity per second
It is calculated using the equation:

$$acceleration = \frac{Change\ in\ Velocity}{Time}$$

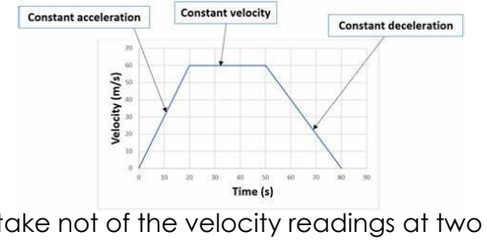
To find change in velocity you subtract the initial velocity from the final velocity. When you are slowing down this is known as deceleration and is calculated using the same equation



Week 5

Big Picture: Acceleration

You can use a velocity time graph to describe the acceleration of an object at different points. A common misconception is that when the line is horizontal the object is stationary. It actually means the object is moving with a constant velocity. This is because it the Y Axis is velocity (speed in a direction).



If you take not of the velocity readings at two points on the line you can work out acceleration. Another common misconception here is to take reading from two different line types for example including the diagonal line and horizontal line in the calculation it is either one or the other never both.

Key words:

Alkali Metals - An element in group 1 of the periodic table.

Isotopes - Atoms of the same element with mass numbers due to different numbers of neutrons in the nucleus.

Periodic Table - A table of all the known elements arranged in order of atomic number so that elements with similar properties are in columns, known as groups.

Contact Forces - Is a force that acts when objects are physically touching each other.

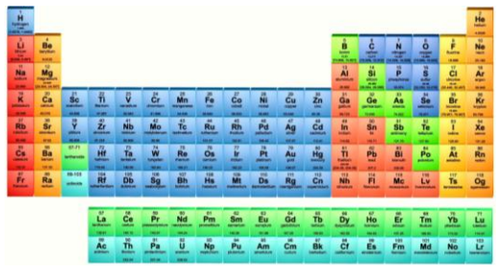
Non Contact Force - A force which acts on an object over a distance.

Weight - The force that acts on a mass due to gravity.

Year 9 Science: Term 2
The Periodic Table, Acceleration

Week 1

Questions	Answers
Name the subatomic particles that are found in the nucleus	Protons and neutrons
State what lead to changes in the scientific model being changed.	Experimental evidence
Describe the plum pudding model.	The atom is a ball of positive charge with negative electrons embedded in it.
State the name of the model that replaced the plum pudding model.	The nuclear model
State the relative charges of the subatomic particles.	Protons = Positive Neutrons = Neutral charge Electrons = Negative

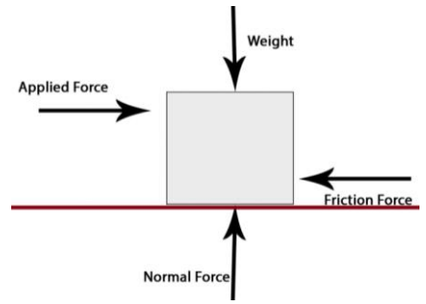


Week 2

Questions	Answers
Describe how elements in the modern periodic table are arranged.	Atomic/proton number
State the name given to a row in the periodic table.	Period
State the name given to a column in the periodic table.	Group
Describe how elements in a group of the periodic table are similar.	Elements have the same number of electrons in the outer shell
Suggest why scientists gradually accepted Mendeleev's Periodic Table.	The missing elements were later discovered and filled the gaps as they had similar properties to other elements in their groups.

Week 3

Questions	Answers
Where are metals found in the periodic table?	On the left hand side of the Periodic Table
Describe the pattern of reactivity as you go down Group 7	Reactivity decreases as you go down Group 7
State three physical properties of the transition metals	High melting point, high density, shiny and good conductors of electricity
Which alkali metal is the least reactive?	Lithium
What state is chlorine at room temperature?	Gas



Week 4

Questions	Answers
Define acceleration	Acceleration is the change in velocity per second
If an object starts at rest and 20 seconds later is at 10m/s what is the acceleration	Acceleration = Change in velocity/time Acceleration = 10-0 / 20 Acceleration = 0.5m/s^2
Rearrange the equation for time	$Time = \frac{Change\ in\ Velocity}{Acceleration}$
If an object is moving at 15 m/s and accelerates to 25m/s in 10 seconds what is the acceleration	Acceleration = Change in velocity/time Acceleration = 25-15 / 20 Acceleration = 0.5m/s^2

Week 5

Questions	Answers
Why is a velocity time graph useful?	A velocity time graph allows us to show the acceleration of an object at different points
Susie say that when the line is horizontal the object is accelerating rapidly	Susie is wrong because a horizontal line means there is no acceleration at all
How does a velocity time graph show deceleration	When the line is diagonally downwards
What does a steep gradient mean?	The object is accelerating rapidly
What type of graph must be used for a velocity time graph?	Line graph must always be used as it is quantitative data.

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Weight - The force that acts on a mass due to gravity.

Where can science take you?

Every topic you do every term links to many different career pathways.

If you want to know more about the careers your learning is linked to look at some of the possible careers this terms learning links to. Scan the QR codes for more information.

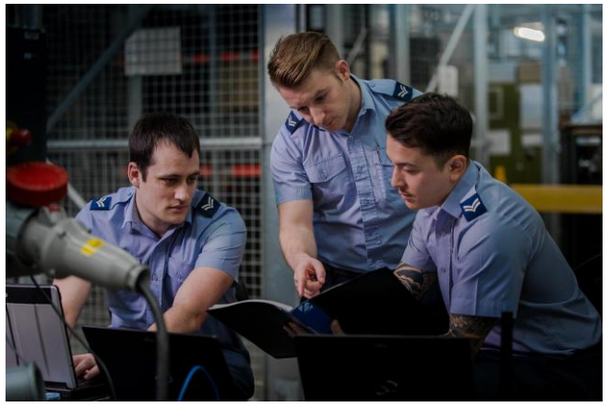
Topic – Growth and Differentiation

Fitness Instructor– This career can involve assessing people's fitness and create personal exercise programmes, demonstrate activities, exercise machines and weights. Helping people exercise safely and give advice on having a healthy lifestyle and leading group exercise classes



Topic – The Periodic Table

Intelligence Analyst **-** collect and analyse national and international data using specialist software you will build a picture of activities in a specific area and monitor the behaviour of individuals and groups then present information to managers and other agencies.



Topic Acceleration

Motorsport Engineer– set up vehicles to handle track and weather conditions. Analyse performance data during races, like engine speed and aerodynamics. Fine tune vehicles and send technical instructions to the driver or rider. Carry out 'after-tests' at the end of races to look for signs of damage



'Putting Every Student on the Path to a Happy, Successful and Fulfilling Life'

Year 9 Science Learning Journey

Science Mastery

Separate Science (OPTION)
3 GCSEs in biology, chemistry, physics
(6 x exams 1hr 45mins)

Combined Science (Trilogy)
2 GCSEs in combined science
(6 x exams 1hr 15mins)

P3.4 Home Electricity

B3.2 Human Interaction

P3.3 Sound and Waves

STEAM Careers
Where can doing well in science lead?....
Radiologist, musician, sound engineer, pilot, architect, civil engineer, mechanical engineer, welder, ambulance technician, dental nurse, accountant, florist, chef, electrician, plumber, photographer, pharmacist…..
The possibilities are endless!!!

B3.3 Genetics

C3.3 Using Resources

Student Development Opportunities in KS3 Science:

STEM Club, help out at Open Evening and special events, Science Week, Competitions

P3.2 Heating

C3.2 Introduction to Quantitative Chemistry

P3.1 Acceleration

Assessment:
Each term you will complete an End of Term Assessment
At the end of Year 9 you will complete an End of Year Assessment

C3.1 The Periodic Table

B3.1 Growth and Differentiation

9

welcome

Online Learning During KS3:

- GCSE Pod is a school subscription, free to access for students: GCSEPod
- Seneca Learning for revision and consolidation materials
- https://senecalearning.com/en-GB/blog/free-key-stage-3-science-revision/
- BBC Bitesize is a collection of revision materials, quizzes and tests that pupils find accessible
- https://www.bbc.com/bitesize/levels/z98jmp3
- Education Quizzes that can be played individually
- https://www.educationquizzes.com/ks3/