

Unit and Year: Being a scientist Year 7

Purpose of Unit:

Identification of and selection of appropriate laboratory equipment for common laboratory tasks.

Identification of laboratory hazards and risks and appreciation of how to minimise risks.

To be able to safely light and use a Bunsen burner.

To be able to represent and use data graphically.

Key Learning/Knowledge:

Identify common laboratory equipment and be able to select appropriate equipment for particular tasks.

Identify potential laboratory hazards and how to behave in order to minimise any associated risks.

The safe set up and use of a Bunsen burner.

Drawing of graphs, correctly identifying dependent and independent variables and which axis to plot each variable on.



Key Skills:

- To draw, recognise and select appropriate laboratory equipment.
- Identify laboratory hazards associated with hazard symbols and minimise associated risks.
- To specifically be able to set up and use a Bunsen burner safely.
- To be able to draw line graphs following the rules for drawing a graph.



Independent variable - variable in an experiment that is changed.

Dependent variable - variable that changes as a result of changes in the independent variable.

Control variables - variables that must be kept the same during an experiment.

Links to prior knowledge/learning:

- To build upon any science practical work that students have done at key stage 2.

Unit and Year: Cells, Organs and Organ Systems YEAR 7

Purpose of Unit:

- To introduce students to the building blocks of living things moving through to look at the link from cells to organs and organ systems.

Key Learning/Knowledge:

- To describe the seven life processes.
- To describe the key parts of an animal cell and plant cell, and explain the importance of each part.
- To describe the key parts of the microscope and how each part works in order to view cells.
- To describe key features of specialised cells and suggest how these features help the cell function.
- To describe what the skeleton does
- To explain how the skeleton and muscles enable movement.

Key Skills:

- To be able to identify living organisms, based on the seven life processes.
- To be able to identify key parts of animal and plant cell, in order to be able to distinguish the two types.
- To be able to set up a cell slide and use a microscope to view the cells at a higher magnification.
- To identify key features of specialised cells and how these features are important in order for the cell to do its job.
- Formative task - to be able to use the success criteria grid in order to complete a formative task on cells and microscopes.
- To use a model to explain a process
- To follow a complex set of instructions

Key Vocabulary and meanings:

Cell - the basic building block of life

Nucleus - contains DNA and controls the cell

Cell membrane - lets substances in and out the cell

Cytoplasm - jelly-like substance where chemical reactions take place

Cell wall - provides protection and support for the cell

Chloroplast - contains a green chemical called chlorophyll, which absorbs light for photosynthesis

Vacuole - contains fluid

Mitochondria - where respiration takes place

Microscope - a device used to view very small objects, such as cells

Objective lenses - key part of a microscope used to magnify the image

Skeleton - allows movement, provides support and protection for vital organs and makes blood cells.

Tendon - A strong cord-like tissue which connects muscles to bones.

Ligament - connect bone to bone and help keep the joint together

Ball joint - made up of a round end of one bone that fits into a small cup-like area of another bone.

Links to prior knowledge/learning:

- Basic understanding of body systems will have been covered in primary school.

Unit and Year: Forces Year 7

Purpose of Unit:

- Describe what forces are with real life examples
- Use the idea of balanced and unbalanced forces to explain motion
- Describe the difference between mass and weight
- Identify types of forces including contact and non-contact
- Explain different examples of forces including stretching, turning and friction

Key Learning/Knowledge:

- Describe the different types of forces around us and use examples.
- Explain the difference between contact and non-contact forces with examples.
- Describe what happens when you have balanced forces and unbalanced forces.
- Explain what a resultant force is and show how it can be found from a force diagram.
- Describe how objects change speed due to forces acting on them.
- Use the force equation to calculate force when given mass and acceleration.
- Describe how forces are used in everyday life and are connected to certain jobs.
- Explain how pressure changes with force and area.
- Describe the relationship between force and extension (specifically of a spring).
- Briefly describe Hooke's law and how different materials react to being stretched.

Key Skills:

- Make predictions based on scientific understanding.
- Use appropriate techniques, apparatus and materials paying attention to health and safety.
- Present observations and data using appropriate methods including tables and graphs.
- Use observations, measurements and data to draw conclusions.
- Use equations to calculate answers from given values and/or data.

Key Vocabulary and meanings:

Force a push or pull on an object resulting from the object's interaction with another object

Contact force a force that requires two objects to be touching e.g. friction

Non-contact force a force that still happens even when objects aren't touching e.g. gravity

Friction a force that resists the sliding or rolling of one solid object over another

Balanced when all forces on an object cancel out, this means the object will keep doing what it was already doing

Unbalanced when all forces on an object do not cancel out and there are some left over, this means the object will change its speed and/or direction

Resultant force the total force of all the forces on an object added up, if there is a resultant force on an object then the forces on it are unbalanced

Mass the amount of matter in an object

Acceleration the rate that an object speeds up or slows down

Newtons what force is measured in

Pressure the force applied over a certain area

Moment a turning force

Weight the force of gravity on an object's mass

Hooke's Law when a material obeys Hooke's law its extension is proportional to the force on it

Extension how far an object has stretched

Links to prior knowledge/learning:

KS2 pupils have learned about examples of forces such as pushing and pulling

Unit and Year: Particles Year 7

Purpose of Unit:

- Recall the properties of solids, liquids and gases
- Use the idea of Conservation of Mass
- Classify substances as pure or mixtures
- Describe separation techniques
- Identify suitable separation techniques for different types of mixtures

Key Learning/Knowledge:

- Describe the properties of the different states of matter (solid, liquid and gas) in terms of the particle model
- Explain gas pressure in terms of the Particle Model
- Describe changes of state in terms of the particle model.
- Use the Particle Model to explain the conservation of material and of mass in melting, freezing, evaporation, sublimation, condensation, dissolving
- Explain the reversibility of melting, freezing, evaporation, condensation, dissolving
- Use the differences in arrangements, in motion and in closeness of particles when explaining changes of state, shape and density
- Use the Particle Model to explain the difference between pure and impure substances
- Describe diffusion in terms of the particle model
- Describe simple techniques for separating mixtures: filtration, evaporation, distillation and chromatography
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Key Skills:

- Make predictions based on scientific understanding
- Use appropriate techniques, apparatus and materials paying attention to health and safety
- Present observations and data using appropriate methods including tables and graphs
- Use observations, measurements and data to draw conclusions

Key Vocabulary and meanings:

Solid state of matter in which particles are held together in fixed positions

Liquid state of matter in which particles are free to move but have no gaps between them

Gas state of matter in fast moving particles spread out with large gaps between them

Melting changing state from a solid to a liquid

Evaporating changing state from a liquid to a gas

Condensing changing state from a gas to a liquid

Freezing changing state from a liquid to a solid

Solute a substance dissolved in a solvent

Solvent a liquid which is used to dissolve other substances

Solution a mixture of a substance dissolved in a liquid

Soluble a substance which will dissolve

Insoluble a substance which does not dissolve

Filtration a method used to separate an insoluble solid from a liquid or solution

Distillation a method of separating substances with different boiling points

Chromatography a method for dissolving dissolved substances from one another

Links to prior knowledge/learning:

KS2 requires that pupils understand that substances can exist in different physical states

Unit and Year: The Periodic Table Year 7

Purpose of Unit:

- To get an understanding of the periodic table, the information it contains and contextual knowledge of common elements. To look at the elements involved in common reactions.

Key Learning/Knowledge:

- To identify the properties of an element and to classify them.
- To identify the main elements found in the body and calculate their mass in our bodies.
- To identify the sub-atomic particles of an atom, their charges and their position.
- To understand that the periodic table is organised in order of increasing atomic mass, with elements sharing similar properties in the same group.
- How patterns of reactivity in group 1 can be predicted using the periodic table.
- To understand the reactivity of group 7, and to use this to predict the products of a displacement reaction.
- To discover how group 0 elements are used because of their lack of reactivity.
- To make a compound by combining two elements identifying the change in properties as a result.
- To identify substances as an element, a compound or a mixture.
- To use particle diagrams to illustrate the difference between an element, a compound and a mixture.
- To investigate conservation of mass in the reaction between magnesium and oxygen.
- To write word equations and symbol equations for common reactions.

Key Skills:

- To use relevant equipment to determine the reactivity of group 7.
- To use and manipulate percentages and decimals.
- To observe chemical and physical properties.
- To predict reactivities depending on groups and positioning.

Key Vocabulary and meanings:

Atom – The smallest particle of a chemical element that can exist.

Subatomic particle – The smaller parts that make up an atom.

Element – A substance made from one type of atom.

Atomic number – The number of protons in an atom.

Mass number – The total average number of protons and neutrons in the nucleus of an atom.

Proton – A subatomic particle, with a positive charge, found in the nucleus of an atom.

Neutron – A subatomic particle, with no charge, found in the nucleus of an atom.

Electron – A tiny, negatively charged subatomic particle that is found in the shells.

Nucleus – The tiny centre of an atom containing the protons and neutrons.

Electron shells – The energy levels outside the nucleus of an atom where electrons are found.

Periodic Table – A table of all of the known elements in order of increasing atomic number.

Period – A horizontal row across the Periodic Table.

Group – A vertical column of the periodic table.

Compound – Two or more elements bonded together. These cannot be separated physically.

Mixture – Two or more substances not bonded together. These can be separated physically.

Conservation of mass – Mass cannot be created or destroyed. Mass is not lost or gained during a chemical reaction.

Links to prior knowledge/learning:

Students should be able to identify and list **properties of materials** as well as identifying when a **chemical reaction** is taking place in KS2

Unit and Year: The Periodic Table Year 7

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- To discover how group 0 elements are used because of their lack of reactivity.
- To make a compound by combining two elements identifying the change in properties as a result.
- To identify substances as an element, a compound or a mixture.
- To use particle diagrams to illustrate the difference between an element, a compound and a mixture.
- To investigate conservation of mass in the reaction between magnesium and oxygen.
- To describe and explain the process of combustion.
- To write word equations and symbol equations for common reactions.

Key Skills:

- To use relevant equipment to determine the reactivity of group 7.
- To use and manipulate percentages and decimals.
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Unit and Year: Reproduction Year 7

Purpose of Unit:

- What are sexual and asexual reproduction?
- What are the reproductive organs of mammals?
- What are the reproductive organs of plants?
- How is genetic information passed from one generation to the next?
- How was the structure of DNA discovered?
- What are continuous and discontinuous variation?

Key Learning/Knowledge:

- Be able to describe the advantages and disadvantages of sexual and asexual reproduction.
- Relate flower structure to sexual reproduction in plants.
- Be able to explain the processes of Pollination, seed formation and dispersal.
- Be able to label the parts of the male and female mammalian reproductive systems and state their function.
- Be able to state body changes at puberty.
- Describe the sequence of events in the menstrual cycle.
- Explain what fertilisation is.
- Understand the process of pregnancy, including the effect of maternal health on the developing foetus.
- The relationship between DNA, chromosomes and genes?
- How the structure of DNA discovered.
- Explain what a species is.
- Describe how organisms vary and describe them as continuous or discontinuous variations.
- Collect data on variation and display this information in graphs.

Key Skills:

- Observation of plant reproductive organs and may include a flower dissection.
- Be able to identify the major organs of the male and female mammalian reproductive systems.
- Deduce possible characteristics of offspring of given parents.
- Measurement to be able to use a ruler with skill and precision.
- Be able to produce appropriate graphs of collected data.

Key Vocabulary and meanings:

Sexual - Type of reproduction that happens when the genetic material from two parents fuse, producing offspring that has half the genetic material of both parents.

Asexual - Type of reproduction that happens when there is only one parent, producing offspring that has are genetically identical to the parent.

Stamen - Male reproductive part of a flower. Produces pollen

Ovary - Female reproductive part of a flower and mammals.

Oviduct - Organ used to transport eggs to the uterus

Uterus - Organ where fertilised egg develops.

Testes - Where sperm are produced.

Puberty - Changes that happen to teenagers.

Menstrual cycle - The monthly cycle of changes in the ovaries and the lining of the uterus.

DNA - Deoxyribose Nucleic Acid is the molecule inside cells that contains the genetic information responsible for the development and function of an organism.

Continuous variation - a characteristic that has a range of values e.g. height or weight.

Discontinuous variation - characteristic that fits into groups eg. Blood group, gender.

Links to prior knowledge/learning:

KS2 requires that pupils understand how **reproduction** occurs

Unit and Year: Sound and Light Year 7

Purpose of Unit:

- Describe how sound is produced using vibrations of objects
- Explain why sound needs a medium to travel through and how it differs in speed between each medium
- Identify ways in which we use sound waves in everyday life
- Explain different phenomena of light including reflection/refraction/dispersion
- Identify how we use light waves in science for investigating far away objects in space

Key Learning/Knowledge:

- Identify the structures of the ear/eye and describe their functions
- Describe sound waves and explain why sound travels at different speeds in different mediums
- Compare sound wave diagrams using terms frequency and amplitude
- Define ultrasound and describe how we use them in everyday life
- Calculate the speed of sound
- Plan an investigation and analyse results
- Investigate light effects such as reflection and refraction
- Describe how light waves can be used to investigate astronomy
- Begin to describe the electromagnetic spectrum

Key Skills:

- Make predictions based on scientific understanding.
- Use appropriate techniques, apparatus and materials paying attention to health and safety.
- Present observations and data using appropriate methods including tables and graphs.
- Use observations, measurements and data to draw conclusions.
- Use equations to calculate answers from given values and/or data.

Key Vocabulary and meanings:

Medium push or pull

Amplitude the height of the top of a wave from its resting position,

Frequency the number vibrations of the wave in one second

Ultrasound Sound waves which we can't hear because they have a high frequency of more than 20, 000 Hz.

Medium any material that can transfer sound waves (solid, liquid and gas)

Echo A sound you hear after a sound wave reflects off something.

Diffuse Reflection Light waves bouncing off of a surface at many different angles

Specular Reflection Light waves bouncing off at the same angle they came in at

Refraction The bending of light when entering a more/less optically dense medium at an angle

Dispersion the splitting of white light into all the different colours of the rainbow

Telescope A device used for looking at distant objects, usually in space

Links to prior knowledge/learning:

KS2 - light and sound are covered extensively at KS2 - full breakdown can be found at <https://www.gov.uk/government/publications/national-curriculum-in-england-science-programmes-of-study/national-curriculum-in-england-science-programmes-of-study>