

Year 9- Scientific skills

Intent

This unit will teach students a number of Science and Math skills they require going forward.

| Lesson | Title | Substantive | Disciplinary |
|--------|-----------------------------------|--|--------------|
| 1 | Variables | <ul style="list-style-type: none"> State what IV, DV and CVs are Identify IV, DV, CVs in an experiment | |
| 2 | Repeatability and reproducibility | <ul style="list-style-type: none"> Define the terms repeatability and reproducibility Identify if an experiment is reproducible and/or repeatable | |
| 3 | Accuracy and precision | <ul style="list-style-type: none"> Define the terms accurate and precise Identify if results are accurate and/or precise | |
| 4 | Resolution | <ul style="list-style-type: none"> Define the term resolution Read a scale on measuring devices Calculate the resolution of a measuring device | |
| 5 | Errors | <ul style="list-style-type: none"> Name some sources of error (random error-human reaction. Systematic error-zero error) Identify anomalies in sets of results | |
| 6 | Graphing | <ul style="list-style-type: none"> Label axes with units Plot a line graph Draw a straight LoBF | |
| 7 | Graphing – Curves | <ul style="list-style-type: none"> Draw a curved LoBF. | |
| 8 | Graphing – Gradients | <ul style="list-style-type: none"> Calculate the gradient of a graph Calculate the gradient of a graph with a range of gradients | |
| 9 | Graphing – describing trends | <ul style="list-style-type: none"> Evaluate trends and patterns from data in tables and graphs | |
| 10 | Angles | <ul style="list-style-type: none"> Know how to measure angles between two lines | |
| 11 | Equations | <ul style="list-style-type: none"> Know how to insert numbers into an equation Be able to manipulate equations to get a different variable | |
| 12 | Prefixes | <ul style="list-style-type: none"> State the size of prefixes (mili/centi/kilo/mega) | |

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|----|---------------|--|--|
| | | <ul style="list-style-type: none">• Be able to convert from and to prefixes | |
| 13 | Standard form | <ul style="list-style-type: none">• Know how to convert a standard form number into a normal number• Know how to convert a normal number into standard form | |
| 14 | Means | <ul style="list-style-type: none">• Be able to calculate a mean from a set of numbers | |
| 15 | Percentages | <ul style="list-style-type: none">• Be able to calculate a percentage from two numbers• Convert between a percentage and decimals• Calculate percentage difference | |

Year 9- Fundamentals for GCSE Biology

Intent

This unit has been designed as a bridge between the KS3 and KS4 programme of study. Revisiting topics covered in “Year 7 Biology” such as cell structure and the digestive system (enzymes) and advances the level of detail. These fundamental concepts are then advanced upon in Year 10 and 11 in topics such as Health and disease, photosynthesis and hormonal control.

Topics covered

Cell Biology

- cells as the basic structural unit of all organisms; adaptations of cells related to their functions; the main sub-cellular structures of eukaryotic and prokaryotic cells
- stem cells in animals and meristems in plants
- enzymes
- factors affecting the rate of enzymatic reactions
- the importance of cellular respiration; the processes of aerobic and anaerobic respiration
- carbohydrates, proteins, nucleic acids and lipids as key biological molecules.

Year 9- Fundamentals for GCSE Chemistry

Intent

This unit has been designed as a bridge between the KS3 and KS4 programme of study. Revisiting topics covered in year 7 and 8 such as “Atoms, elements and compounds” and “the periodic table” and advances the level of detail. These fundamental concepts are then advanced upon in Year 10 and 11 in topics such as chemical changes, energy changes and organic chemistry.

Topics covered

Atomic structure and the Periodic Table

- a simple model of the atom consisting of the nucleus and electrons, relative atomic mass, electronic charge and isotopes
- the number of particles in a given mass of a substance
- the modern Periodic Table, showing elements arranged in order of atomic number
- position of elements in the Periodic Table in relation to their atomic structure and arrangement of outer electrons
- properties and trends in properties of elements in the same group
- characteristic properties of metals and non-metals
- chemical reactivity of elements in relation to their position in the Periodic Table.

Structure, bonding and the properties of matter

- changes of state of matter in terms of particle kinetics, energy transfers and the relative strength of chemical bonds and intermolecular forces
- types of chemical bonding: ionic, covalent, and metallic
- bulk properties of materials related to bonding and intermolecular forces
- bonding of carbon leading to the vast array of natural and synthetic organic compounds that occur due to the ability of carbon to form families of similar compounds, chains and rings
- structures, bonding and properties of diamond, graphite, fullerenes and graphene.

Year 9- Fundamentals for GCSE Physics

Intent

This unit has been designed as a bridge between the KS3 and KS4 programme of study. Revisiting topics covered in “Year 7 Physics” such as energy and heat energy and advances the level of detail. These fundamental concepts are then advanced upon in Year 10 and 11 in topics such as electricity and waves.

Topics covered

Energy

- energy changes in a system involving heating, doing work using forces, or doing work using an electric current: calculating the stored energies and energy changes involved
- power as the rate of transfer of energy
- conservation of energy in a closed system, dissipation
- calculating energy efficiency for any energy transfers