

| Subject               | Science                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                   | Year Group                                                                                                                      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| Scheme title          | Particle models of matter                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Quantitative chemistry                                                                                                                                                                                                            | Mixing and Changing Materials                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Chemical changes                                                                                                                                                                                                                                                                                                                                 | Atomic structure                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Health Matters                                                                                                                                                                                                                                                                                                                            | Energy changes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Forces                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Co-ordination and control                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Rates of reaction                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Electromagnetism                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |  |  |  |
| Purpose of scheme     | Students will learn the behaviour of solids, liquids and gases based on the properties and arrangement of particles in each state of matter. Students will develop an understanding of the links between changes of state, internal energy, thermal energy, specific heat and latent heat. Pupils will also determine how the particle model can be used to explain the density and pressure of a specific object or substance.                                                                                                                                                                                                        | Use quantitative analysis to determine the formulae of compounds, relative formula mass of compounds, moles, masses of reactants and concentrations of reactants.                                                                 | Pupils will learn about the organs involved in the digestive system and how they all work together. They will explore what enzymes are and the role that they play in digestion. They will investigate the factors that affect enzyme action. They will also look at how we feed for different food cultures in our food. Pupils will then explore how the digested food is transported around the body. They will learn the structure of the heart, blood vessels and circulatory system. Finally they will learn the causes and treatments of coronary heart disease. | Understanding a number of chemical changes, predicting the products formed and using the products for materials and processes.                                                                                                                                                                                                                   | Pupils will review the structure of the atom and identify how changes to atomic structure can lead to different forms of ionised radiation. Pupils will use nuclear equations to identify the formation of new elements due to radioactive decay. Pupils will also determine the half life of a radioactive substance using existing measurements of rates of activity. Students will also understand the difference between contamination and irradiation.                                                                                                                               | To understand the difference between communicable and non-communicable diseases and how they are transmitted. Pupils will then learn about the different types of pathogens and the ways in which they, and animals are designed to defend themselves. They will also learn how we develop new drugs to fight diseases.                   | Describing the energy changes involved in chemical reactions.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Students will be learning about the vector-scalar distinction as it applies to displacement, distance, velocity and speed. Pupils will learn about Newton's three laws and will establish links with the laws and the effects of forces and acceleration. Students will learn about the nature of forces and how forces apply to situations involving the motion of objects and systems. Students will learn about the relationship between distance, displacement and time and the subsequent relationship between speed, velocity and time. Students will develop an understanding of acceleration with reference to uniform acceleration and the motion of an object on a line. Students will also learn about the application of forces work done to the real-world scenario of braking in a vehicle. IT students will understand the concept of momentum and the conservation of momentum.                                                                                                                                                                                                                                                                                                                                                                                                                     | Pupils learn about the nervous and endocrine systems. All the parts and their role in responding to changes in the environment, homeostasis and reproduction.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Pupils will learn about the variables which can be manipulated in order to speed up or slow down a chemical reaction.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Pupils will learn about magnetism, with specific emphasis on electromagnetism. Students will learn how electromagnets can be used to create a motor effect. Pupils will develop an understanding of magnetic fields and Fleming's left hand rule.                                                                                                                                                                                                                                                                                                                                                                                                                                                          |  |  |  |
| Knowledge in sequence | This topic builds on a key understanding of the states of matter (chemistry year 7), matter and pressure (physics year 8). Pupils will also use the knowledge from the P1 topic in year 9 to apply their understanding of internal energy and thermal energy with reference to specific heat.                                                                                                                                                                                                                                                                                                                                          | The topic begins with balancing equations and calculating relative formula mass, building on the knowledge from C1. Pupils then begin to build on this further using different quantitative methods which increase in difficulty. | Pupils recap diffusion, osmosis and active transport from B2. They also build on knowledge from the 8 topic from digestion and nutrition. Pupils also look at how learning from non-communicable diseases which will be covered in more detail in B6.                                                                                                                                                                                                                                                                                                                   | Pupils build on their knowledge of chemical reactions and acids and alkalis from year 7, using knowledge from C1 and C2 to explain some chemical reactions.                                                                                                                                                                                      | Pupils build upon their understanding of the atom from chemistry, C1. They will recall the structure of the atom, the history of the development of the atomic model, how to interpret periodic tables and the definition of ions and isotopes. Disruption will be a new theoretical concept that students will not have previously identified. They will therefore have the understanding of this topic to be followed, with reference to the electromagnetic spectrum, and the B5 topic. Pupils will, with reference to nuclear fusion in stars and background radiation (Triple only). | Pupils build on knowledge from year 8 matter and acids and expand on exothermic and endothermic reactions and energy level diagrams. Pupils move onto comparing energy change calculations.                                                                                                                                               | Pupils will have encountered forces previously in year 7 and B in year 7, students will now learned about speed, distance time relationships, gravity, weight and contact/non-contact forces. In year 8, students will have looked at balanced and resultant forces, with an emphasis on vertical buoyancy and drag. A prior understanding of energy (P1, year 9) is also essential for this topic. In IT, students will have learned about pathways of energy transfer and work done - concepts which heavily link to forces. There is also a link with the biology lesson on reaction forces in B7. Knowledge of the forces topic can be required in P5 (electromagnetism and P6 (space). | Pupils should have encountered forces previously in year 7 and B in year 7, students will now learned about speed, distance time relationships, gravity, weight and contact/non-contact forces. In year 8, students will have looked at balanced and resultant forces, with an emphasis on vertical buoyancy and drag. A prior understanding of energy (P1, year 9) is also essential for this topic. In IT, students will have learned about pathways of energy transfer and work done - concepts which heavily link to forces. There is also a link with the biology lesson on reaction forces in B7. Knowledge of the forces topic can be required in P5 (electromagnetism and P6 (space).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Pupils build on knowledge from year 7 topic cells which introduced them to reproduction and menstrual cycle. They will learn about conservative methods and what possible health risks are available when people have fertility problems. They will then learn about the nervous system, including the parts and their function. Pupils will also learn about some of the organs in the endocrine system, the hormones that they release and the numerous different roles that they have.                                                                                                                                                                          | Pupils will finally define rates of reaction and learn about methods of measuring rates of reaction before explaining factors which affect particular rates of reaction.                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Pupils build upon KS3 knowledge of magnets and electromagnets from the electromagnetism topic. Pupils will need to have the existing understanding of forces from P5 and electricity from P2 to understand the motor effect. IT students will need to develop an understanding of electric motors.                                                                                                                                                                                                                                                                                                                                                                                                         |  |  |  |
| Skills                | Interpretation of models, construction and analysis of graphs, calculation, rearranging equations, critical thinking, variables, practical skills, using correct measurements to record data.                                                                                                                                                                                                                                                                                                                                                                                                                                          | Using apparatus to investigate mass loss, changing the subject of an equation.                                                                                                                                                    | Variables, using and manipulating equipment, writing a conclusion, interpreting data - graphs, carrying out a heart dissection.                                                                                                                                                                                                                                                                                                                                                                                                                                         | Produce a soluble salt, make order of magnitude calculations.                                                                                                                                                                                                                                                                                    | Interpreting graphs, calculations/use of data, use of periodic tables, critical thinking, interpretation of models.                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | using and manipulating equipment, writing a conclusion, interpreting data - graphs, making models to represent electric concepts.                                                                                                                                                                                                         | Drawing and interpreting graphs, calculating temperature change.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Practical skills, recording measurements, variables, drawing and interpreting graphs, rearranging equations, use of scales.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Variables, using and manipulating equipment, writing a conclusion, interpreting data - graphs.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Drawing and interpreting graphs, drawing a larger graph, drawing conclusions from data, measuring the volume of a gas.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Model interpretation, calculations, critical thinking.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |  |  |  |
| Key words             | States of matter, solid, liquid, gas, melting, freezing, condensation, evaporation, sublimation, internal energy, specific heat capacity, specific latent heat, density, pressure, particle model.                                                                                                                                                                                                                                                                                                                                                                                                                                     | Relative formula mass, moles, concentration, theoretical yield.                                                                                                                                                                   | Diffusion, osmosis, active transport, enzyme, substrate, active site, denaturation, gas exchange, capillary, vein, artery, coronary heart disease, plasma, platelets, circulatory system.                                                                                                                                                                                                                                                                                                                                                                               | Ox, reduction, electrolysis, oxidation, reduction, acid, alkali, neutralisation, soluble salt.                                                                                                                                                                                                                                                   | Radiation, radioactivity, activity, half-life, alpha, beta, gamma, decay, ionisation, contamination, ion, isotope.                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Pathogens, bacteria, virus, fungi, protist, malaria, disease, health, communicable, non-communicable, antibodies, lymphocyte, phagocytes, plasma, double blind test, vaccine, benign and malignant, vaccination, herd immunity.                                                                                                           | Exothermic, endothermic, energy level diagram, activation energy, overall energy change.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Scalar, vector, contact non-contact, gravity, resultant forces, work done, elasticity, displacement, velocity, distance time relationship, velocity time, acceleration, Newton's laws, braking/stopping, distance.                                                                                                                                                                                                                                                                                                                                                                                                                                                                 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                                                                                                                                                                                                                                                             | Rate, temperature, catalyst, theory, concentration, reversible reaction, equilibrium, closed system.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Magnetism, permanent magnet, induced magnet, electromagnet, solenoid, Fleming's left hand rule, motor effect, magnetic flux density, magnetic field, conductive, force, current.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |  |  |  |
| End point             | Students will be able to predict the behaviour of solids, liquids and gases based on the properties and arrangement of particles in each state of matter. Students will be able to describe the particle model as matter and understand how it can be used to explain the density and pressure of a substance. Students will also be able to calculate the density of an object using mass blocks and electronic balances. Students will be able to calculate the density of a regular solid, an irregular solid and a liquid. Students will be able to calculate specific latent heat and explain the changes in a latent heat graph. | Pupils are able to calculate relative formula mass, moles, concentration and are able to balance equations. Pupils are able to use moles to calculate the theoretical yield of a reaction.                                        | Pupils should be able to label all the parts of the digestive and circulatory systems and explain how each organ is adapted to its function. Pupils should be able to describe what enzymes are, how they work and the factors that affect them. They should be able to describe the difference between strong and weak acids. Students should be able to investigate osmosis, to test foods for certain food nutrients and how to investigate the factors that affect the rate of enzyme activity.                                                                     | Pupils are able to describe and explain some specific chemical changes and predict their products. Pupils should be able to identify acids and alkalis using universal indicator and describe the difference between strong and weak acids. Students should be able to write a method for and carry out the method for producing a soluble salt. | Pupils are able to explain the differences between alpha, beta, gamma radiation and can explain how alpha and beta particles are formed using nuclear equations. Pupils will be able to explain how the difference between isotopes, radiation, activity and half-life. Pupils will understand how radioactive materials can be measured. Pupils will be able to calculate half-life by interpreting graphs. Pupils can explain what is meant by contamination and irradiation.                                                                                                           | Pupils should be able to describe the difference between communicable and non-communicable diseases. They should be able to give examples of each and explain how they are transmitted. They should be able to explain what vaccines are and how they are tested. They should be able to explain how we develop new drugs and treatments. | Pupils are able to identify exothermic and endothermic reactions and explain the energy changes involved through energy level diagrams and calculations.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Students should be able to explain the vector-scalar distinction as it applies to displacement, distance, velocity and speed. Pupils should be able to calculate the weight of an object. Pupils should be able to use their understanding of velocity to calculate acceleration. Pupils should be able to calculate displacement using a velocity time graph. IT only. Students should use their understanding of Newton's three laws to explain the relationship between force and acceleration. Pupils should be able to explain the relationship between force, mass and acceleration and carry out a practical using pulleys and a light gate to investigate this. Students should be able to use their understanding of forces to explain the factors affecting the braking and stopping distance of a vehicle. Students should be able to state Newton's three laws and apply the laws to real-world scenarios. Pupils will also be able to apply their understanding of energy and work to the work done on an object and energy being transferred. Students will be able to calculate the extension of a spring and will conduct a practical to investigate the link between force and extension. IT students should be able to calculate and describe momentum and describe the conservation of momentum. | Pupils should be able to describe the parts of the nervous and endocrine systems. They should be able to explain what they do. They should be able to explain the reflex arc for general situations. They should be able to state what homeostasis is and explain how the body controls blood glucose, body temperature and other levels. They should also be able to explain what negative feedback is and give examples. They should be able to compare Type 1 and Type 2 diabetes and explain how the body responds to that for Type 1 and Type 2. They should be able to evaluate the use of different contraceptives and fertility treatments, including IVF. | Pupils are able to measure and calculate the rate of reaction and describe the effects of increasing the concentration of reactants. Students should be able to use Fleming's left hand rule to identify the direction of the force, magnetic field and current of an electromagnet, displaying the motor effect. Students should also be able to calculate the force of a conductor that carries a current in a magnetic field and is at a right angle to a magnetic field. IT students should be able to explain how the force on a conductor in a magnetic field causes the rotation of the coil in an electric motor. | Pupils should develop an understanding of magnets and electromagnets. Pupils should also be able to explain what an electromagnet is, how they can be made and how the strength of an electromagnet can be increased. Students should be able to use Fleming's left hand rule to identify the direction of the force, magnetic field and current of an electromagnet, displaying the motor effect. Students should also be able to calculate the force of a conductor that carries a current in a magnetic field and is at a right angle to a magnetic field. IT students should be able to explain how the force on a conductor in a magnetic field causes the rotation of the coil in an electric motor. |  |  |  |
| Assessment Methods    | Formative assessment and EOTT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Formative assessment and EOTT                                                                                                                                                                                                     | Formative assessment, exam questions and EOTT.                                                                                    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