

Science Curriculum Year 7 and Year 8

During Year 7 and Year 8 Students will study separate Sciences (Physics, Biology and Chemistry topics throughout the year). Alongside this, there shall be a real emphasis on embedding practical skills which assist Students in planning experiments, obtaining results, presenting data, analysing information and evaluating the experimental process.

Science Curriculum Overview Year 7

- 7.1 Be reactive: Acids and reactions (Chemistry).
- 7.2 Staying alive: Cells and reproduction (Biology).
- 7.3 Using energy: Energy resources (Physics).
- 7.4 What are things made of: Solutions and particles (Chemistry).
- 7.5 How things move: Forces, electricity and space (Physics).
- 7.6 Why are we different: Adaptation (Biology).

Science Curriculum Overview Year 8

- 8.1 Atoms, elements and compounds (Chemistry).
- 8.2 Respiration, health and fitness, food and digestion (Biology).
- 8.3 Chemical reactions (Chemistry).
- 8.4 Heating and the Earth (Physics).
- 8.5 Light, sound and magnetism (Physics).
- 8.6 Muscles and health (Biology).

- ✓ Ensure your child puts their very best effort into their Homework.
- ✓ Encourage them to ask for help if they are stuck.
- ✓ Check your child's planner to see if they have any Homework.
- ✓ Make sure your child revises well for their tests and end of year exams.

Assessment

All topics are assessed and Students need to revise thoroughly before each test so that they have the best opportunity for maximising their chance of exceeding their target grades. Some experiments will also be assessed and the pupil graded according to the Assessment for Learning Focus which is being used. Students will know in advance if the experimental write up is being marked as just Homework or if it is being graded a level.

All Students will sit an end of year exam which will be used as their final progress indicator.



Together As One
Exceeding Expectations

Year 7 Science Curriculum Objectives TKAW
Autumn 1 (1/2 termly delivery)

understand that scientific methods and theories develop as earlier explanations are modified to take account of new evidence and ideas, together with the importance of publishing results and peer review
pay attention to objectivity and concern for accuracy, precision, repeatability and reproducibility
understand that scientific methods and theories develop as earlier explanations are modified to take account of new evidence and ideas, together with the importance of publishing results and peer review
evaluate risks
ask questions and develop a line of enquiry based on observations of the real world, alongside prior knowledge and experience
make predictions using scientific knowledge and understanding
select, plan and carry out the most appropriate types of scientific enquiries to test predictions, including identifying independent, dependent and control variables, where appropriate
use appropriate techniques, apparatus, and materials during fieldwork and laboratory work, paying attention to health and safety
make and record observations and measurements using a range of methods for different investigations; and evaluate the reliability of methods and suggest possible improvements
present observations and data using appropriate methods, including tables and graphs
interpret observations and data, including identifying patterns and using observations, measurements and data to draw conclusions
present reasoned explanations, including explaining data in relation to predictions and hypotheses
evaluate data, showing awareness of potential sources of random and systematic error
undertake basic data analysis including simple statistical techniques
defining acids and alkalis in terms of neutralisation reactions
the pH scale for measuring acidity/alkalinity; and indicators
the chemical properties of metal and non-metal oxides with respect to acidity

Year 7 Science Curriculum Objectives TKAW
Autumn 2 (1/2 termly delivery)

fuels and energy resources

comparing energy values of different foods (from labels) (kJ)

other processes that involve energy transfer: changing motion, dropping an object, completing an electrical circuit, stretching a spring, metabolism of food, burning fuels

use and derive simple equations and carry out appropriate calculations

cells as the fundamental unit of living organisms, including how to observe, interpret and record cell structure using a light microscope

the functions of the cell wall, cell membrane, cytoplasm, nucleus, vacuole, mitochondria and chloroplasts

the similarities and differences between plant and animal cells

identify further questions arising from their results

fuels and energy resources

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cells as the fundamental unit of living organisms, including how to observe, interpret and record cell structure using a light microscope

Year 7 Science Curriculum Objectives TKAW
Spring 1 (1/2 termly delivery)

the hierarchical organisation of multicellular organisms: from cells to tissues to organs to systems to organisms

the interdependence of organisms in an ecosystem, including food webs and insect pollinated crops

the reactants in, and products of, photosynthesis, and a word summary for photosynthesis

reproduction in humans (as an example of a mammal), including the structure and function of the male and female reproductive systems, menstrual cycle (without details of hormones), gametes, fertilisation, gestation and birth, to include the effect of maternal lifestyle on the foetus through the placenta

reproduction in plants, including flower structure, wind and insect pollination, fertilisation, seed and fruit formation and dispersal, including quantitative investigation of some dispersal mechanisms

electric current, measured in amperes, in circuits, series and parallel circuits, currents add where branches meet and current as flow of charge

potential difference, measured in volts, battery and bulb ratings; resistance, measured in ohms, as the ratio of potential difference (p.d.) to current

plants making carbohydrates in their leaves by photosynthesis and gaining mineral nutrients and water from the soil via their roots

a word summary for aerobic respiration

the importance of plant reproduction through insect pollination in human food security

Year 7 Science Curriculum Objectives TKAW
Spring 2 (1/2 termly delivery)

the difference between chemical and physical changes

using physical processes and mechanisms, rather than energy, to explain the intermediate steps that bring about such changes

similarities and differences, including density differences, between solids, liquids and gases

the differences in arrangements, in motion and in closeness of particles explaining changes of state, shape and density, the anomaly of ice-water transition

changes of state in terms of the particle model

mixtures, including dissolving

simple techniques for separating mixtures: filtration, evaporation, distillation and chromatography

conservation of material and of mass, and reversibility, in melting, freezing, evaporation, sublimation, condensation, dissolving

atoms and molecules as particles

Year 7 Science Curriculum Objectives TKAW
Summer 1 (1/2 termly delivery)

the representation of a journey on a distance-time graph
forces as pushes or pulls, arising from the interaction between two objects
using force arrows in diagrams, adding forces in one dimension, balanced and unbalanced forces
forces: associated with deforming objects; stretching and squashing – springs; with rubbing and friction between surfaces, with pushing things out of the way; resistance to motion of air and water
forces measured in newtons, measurements of stretch or compression as force is changed
non-contact forces: gravity forces acting at a distance on Earth and in space, forces between magnets and forces due to static electricity
change depending on direction of force and its size
gravity force, weight = mass x gravitational field strength (g), on Earth $g=10 \text{ N/kg}$, different on other planets and stars; gravity forces between Earth and Moon, and between Earth and Sun (qualitative only)
our Sun as a star, other stars in our galaxy, other galaxies
the seasons and the Earth's tilt, day length at different times of year, in different hemispheres
changes with temperature in motion and spacing of particles
speed and the quantitative relationship between average speed, distance and time (speed = distance \div time)
relative motion: trains and cars passing one another
force-extension linear relation; Hooke's Law as a special case
forces being needed to cause objects to stop or start moving, or to change their speed or direction of motion (qualitative only)
the light year as a unit of astronomical distance
pressure in liquids, increasing with depth; upthrust effects, floating and sinking
opposing forces and equilibrium: weight held by stretched spring or supported on a compressed surface
pressure measured by ratio of force over area – acting normal to any surface

Year 8 Science Curriculum Objectives TKAW
Autumn 1 (1/2 termly delivery)

differences between atoms, elements and compounds

chemical symbols and formulae for elements and compounds

the concept of a pure substance

conservation of mass changes of state and chemical reactions

the varying physical and chemical properties of different elements

the Periodic Table: periods and groups; metals and non-metals

how patterns in reactions can be predicted with reference to the Periodic Table

the properties of metals and non-metals

the order of metals and carbon in the reactivity series

diffusion in terms of the particle model

a simple (Dalton) atomic model

Year 8 Science Curriculum Objectives TKAW
Autumn 2 (1/2 termly delivery)

the impact of exercise, asthma and smoking on the human gas exchange system

the role of diffusion in the movement of materials in and between cells

aerobic and anaerobic respiration in living organisms, including the breakdown of organic molecules to enable all the other chemical processes necessary for life

the process of anaerobic respiration in humans and micro-organisms, including fermentation, and a word summary for anaerobic respiration

the differences between aerobic and anaerobic respiration in terms of the reactants, the products formed and the implications for the organism

the effects of recreational drugs (including substance misuse) on behaviour, health and life processes

the structure and functions of the gas exchange system in humans, including adaptations to function

the mechanism of breathing to move air in and out of the lungs, using a pressure model to explain the movement of gases, including simple measurements of lung volume

Year 8 Science Curriculum Objectives TKAW
Spring 1 (1/2 termly delivery)

Earth as a source of limited resources and the efficacy of recycling

internal energy stored in materials

Brownian motion in gases

energy changes on changes of state (qualitative)

energy as a quantity that can be quantified and calculated; the total energy has the same value before and after a change

combustion, thermal decomposition, oxidation and displacement reactions

the properties of the different states of matter (solid, liquid and gas) in terms of the particle model, including gas pressure

the composition of the Earth

the structure of the Earth

the rock cycle and the formation of igneous, sedimentary and metamorphic rocks

the composition of the atmosphere

heating and thermal equilibrium: temperature difference between two objects leading to energy transfer from the hotter to the cooler one, through contact (conduction) or radiation; such transfers tending to reduce the temperature difference: use of insulators

comparing the starting with the final conditions of a system and describing increases and decreases in the amounts of energy associated with movements, temperatures, changes in positions in a field, in elastic distortions and in chemical compositions

Year 8 Science Curriculum Objectives TKAW
Spring 2 (1/2 termly delivery)

the production of carbon dioxide by human activity and the impact on climate

diffusion in liquids and gases driven by differences in concentration

exothermic and endothermic chemical reactions (qualitative)

the principles underpinning the Mendeleev Periodic Table

the identification of pure substances

chemical reactions as the rearrangement of atoms

representing chemical reactions using formulae and using equations

reactions of acids with metals to produce a salt plus hydrogen

reactions of acids with alkalis to produce a salt plus water

the production of carbon dioxide by human activity and the impact on climate

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Year 8 Science Curriculum Objectives TKAW
Summer 1 (1/2 termly delivery)

waves on water as undulations which travel through water with transverse motion; these waves can be reflected, and add or cancel – superposition

frequencies of sound waves, measured in hertz (Hz); echoes, reflection and absorption of sound

sound needs a medium to travel, the speed of sound in air, in water, in solids

sound produced by vibrations of objects, in loud speakers, detected by their effects on microphone diaphragm and the ear drum; sound waves are longitudinal

auditory range of humans and animals

the similarities and differences between light waves and waves in matter

light waves travelling through a vacuum; speed of light

the transmission of light through materials: absorption, diffuse scattering and specular reflection at a surface

use of ray model to explain imaging in mirrors, the pinhole camera, the refraction of light and action of convex lens in focusing (qualitative); the human eye

light transferring energy from source to absorber leading to chemical and electrical effects; photo-sensitive material in the retina and in cameras

colours and the different frequencies of light, white light and prisms (qualitative only); differential colour effects in absorption and diffuse reflection

magnetic poles, attraction and repulsion

magnetic fields by plotting with compass, representation by field lines

Earth's magnetism, compass and navigation

the magnetic effect of a current, electromagnets, D.C. motors (principles only)

Year 8 Science Curriculum Objectives TKAW
Summer 2 (1/2 termly delivery)

content of a healthy human diet: carbohydrates, lipids (fats and oils), proteins, vitamins, minerals, dietary fibre and water, and why each is needed

calculations of energy requirements in a healthy daily diet

the consequences of imbalances in the diet, including obesity, starvation and deficiency diseases

the tissues and organs of the human digestive system, including adaptations to function and how the digestive system digests food (enzymes simply as biological catalysts)

the importance of bacteria in the human digestive system

the dependence of almost all life on Earth on the ability of photosynthetic organisms, such as plants and algae, to use sunlight in photosynthesis to build organic molecules that are an essential energy store and to maintain levels of oxygen and carbon dioxide in the atmosphere

the adaptations of leaves for photosynthesis

the structure and functions of the human skeleton, to include support, protection, movement and making blood cells

biomechanics – the interaction between skeleton and muscles, including the measurement of force exerted by different muscles

the function of muscles and examples of antagonistic muscles

the structural adaptations of some unicellular organisms