

Science

Building Curiosity One Atom at a Time

Science surrounds us. It is everywhere in our daily lives - all day, every day! We want Science to inspire students to explore the world around them and recognise and understand this. We aim to excite and enrich with the practical applications of the subject, teaching students that doing science develops our ability to ask questions, collect information, organise and test our ideas, problem-solve and apply what we learn.

Science is a platform for building confidence, developing communication skills, and making sense of the world around us.

| Group | Autumn | | Spring | | Summer | |
|-------|----------------|------------------------|----------------------|----------------|-----------|--------------------------------------|
| B | Biomechanics | Respiration | Microbes | Photosynthesis | Health | Plants for food (bioaccumulation) |
| C | Periodic table | Acids | Reactivity | Materials | Rocks | Earth and human impact |
| P | Speed | Astronomy calculations | Pressure and moments | Heat transfers | Magnetism | Energy resources |

Science homework is an integral part of each students learning journey. Therefore the Science department will issue regular homework.

The homework set is designed to:

- consolidate learning
- allow further research on subjects
- develop and practise essential scientific skills
- provide extra challenge and support for students

At Key Stage 3 students will be set one piece of homework per week based on the skills and content that is currently being covered in lessons. They will also be set two pieces of recall homework per half term. These will allow students to reinforce the learning of topics that have been covered previously.

At Key Stage 4 students will be set two pieces of homework per week. One piece will be based on the current learning and the second homework will be a piece of recall work to consolidate previous topic and aid revision. Students studying separate sciences will receive three pieces of homework per week but of a shorter duration.

Homework is not expected to be completed in isolation and we actively encourage parents or any other person to help and support students while completing the tasks set. If a student is having difficulty completing homework they must bring this to the attention of their class teacher who will arrange a time suitable to go over any problem areas.

| Unit | Learning Objectives/Outcomes |
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| Biomechanics | <ul style="list-style-type: none"> • Explain how a physical property of parts of a skeleton relate to their functions • Explain antagonistic pairs • Explain why some organs contain muscle tissue (stomach / heart) |
| Periodic table | <ul style="list-style-type: none"> • Explain why symbols are used to represent elements • Link the physical properties to the position in the periodic table • Use observation and patterns to explain the arrangement of the periodic table |
| Speed | <ul style="list-style-type: none"> • Explain how forces affect the speed of an object • Use given equations to calculate speed • Analyse speed distance time graphs |
| Respiration | <ul style="list-style-type: none"> • Explain how the alveoli are adapted for efficient gas exchange • Apply knowledge gained to locate structures within an actual lung • Apply knowledge of inhalation and exhalation to explain the balloon in a jar lung model • Explain what happens during ventilation to why it hurts so much to breathe after very intense exercise • Explain why our bodies sometimes carry out anaerobic respiration |
| Acids | <ul style="list-style-type: none"> • Use a range of indicators and interpret the results • Explain how neutralisation occurs • Explain how to make specific salts through neutralisation |
| Astronomy calcs | <ul style="list-style-type: none"> • Explain the choices for particular units of measurement • Calculate weight on different planets using gravitational field strength • Explain how gravity varies for different masses and distances • Explain how space exploration and observations are affected by the size of the universe |

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| Microbes | <ul style="list-style-type: none"> • The importance of bacteria in the human digestive system. • Micro-organisms. • Fermentation. • The process of anaerobic respiration in humans and micro-organisms, including fermentation, and a word summary for anaerobic respiration. |
| Reactivity | <ul style="list-style-type: none"> • Explain the patterns formed when metals react with oxygen, water and acids • Use observations to construct a reactivity series of metals • Explain displacement reactions and how they occur • Write equations to show displacement reactions |
| Pressure and moments | <ul style="list-style-type: none"> • Simple machines give bigger force but at the expense of smaller movement (and vice versa): product force and displacement unchanged. • Moment as the turning effect of a force. • Force-extension linear relation; Hooke's Law as a special case. • Atmospheric pressure, decreases with increase of height as weight of air above decreases with height. • Pressure in liquids, increasing with depth; upthrust effects, floating and sinking. • Pressure measured by ratio of force over area – acting normal to any surface. |
| Photosynthesis | <ul style="list-style-type: none"> • Explain why a plant needs light, Carbon dioxide, water, chlorophyll • Write the word equation for photosynthesis • Explain how other organisms are dependent on photosynthesis • Explain how specialised plant cells are adapted for their function • Explain how gases move in and out of cells • Sketch and explain how the rate of photosynthesis is affected by changing conditions • Explain why glucose is not suitable for storage |
| Materials | <ul style="list-style-type: none"> • Explain why the properties of composites change • Analyse results on polymer strength • Explain the difference between natural and synthetic polymers • Explain the properties of materials (ceramics, composites, polymers) |
| Heat transfer | <ul style="list-style-type: none"> • Apply knowledge to calculate domestic fuel bills, fuel use and costs • Sketch diagrams to show convection currents in unfamiliar situations. • Compare and contrast the three ways that energy can be moved from one place to another by heating |
| Health | <ul style="list-style-type: none"> • Explain the functions of the key nutrients in a balanced diet • Explain the consequences of imbalances in the diet, including obesity, starvation and deficiency diseases • Explain the effect of recreational drugs on the body |

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| | <ul style="list-style-type: none"> • Explain the impact of exercise and asthma on the human gas exchange system |
| Rocks | <ul style="list-style-type: none"> • Explain the composition of each layer of the Earth • Explain, in detail, the stages involved in the formation of igneous, sedimentary and metamorphic rocks • Link the properties of igneous, sedimentary and metamorphic rocks to their formation and structure • Use a labelled diagram to explain the rock cycle • Explain the different ways that weathering may occur |
| Magnetism | <ul style="list-style-type: none"> • Explain why distance between magnets changes the force • Investigate the field lines around attracting and repelling magnets • Explain how the earth's magnetic field aids navigation • Explain how an electromagnet works. (link to earth's magnetic field) • Investigate factors that affect the strength of an electromagnet • Explain the choice of electromagnet or permanent magnet for a device. |
| Plants for food | <ul style="list-style-type: none"> • Explain the importance of insect pollination in food security • Explain how bioaccumulation works and the effects this has on organisms and their environment |
| Earth and human impact | <ul style="list-style-type: none"> • Explain how to extract a metal from a metal oxide (e.g. copper from copper oxide) • Explain why recycling some materials is particularly important • Explain the greenhouse effect • Explain methods to reduce carbon emissions |
| Energy resources | <ul style="list-style-type: none"> • Compare and contrast types of energy in a range of situations • Classify objects as being a store of energy, or not a store of energy • Classify energy transfers in terms of energy not being lost, only transferred from one form to another • Calculate the useful energy and the amount wasted, given values of input and output energy • Explain why height affects the size of GPE and EPE • Apply knowledge of energy transfers to make a prediction about height and effect on GPE and EPE • Analyse and compare results from investigation and information from food labels • Explain the difference between renewable and non-renewable energy resources • Apply scientific ideas to suggest solutions to the problem of sustainable electricity generation • Explain the advantages and disadvantages of different renewable energy sources |