

Year 7 Curriculum Intent for Science

At Dixons Cottingley we develop students to lead successful and happy lives and make a positive contribution to their community. Our curriculum in each year is designed to provide experiences, opportunities, knowledge and skills that enrich and challenge our students. We understand that the curriculum is key to determining the life chances and choices for our students and therefore we will not compromise on providing the very best. We achieve this in Science through the below:

By the end of Year 7 students at Dixons Cottingley studying Science will be exposed to the following:

- The fundamentals of biology, chemistry and physics outline in the Big Ideas of Science Education. We teach key ideas and build a strong core body of knowledge alongside ensuring that the students develop strong investigative skills.
- Students will develop a love for science and start to think like scientists by questioning and suggesting explanations for the science they see.
- An encouragement to link the science they learn to what they know about the world in which they live and ask questions about this.

By the end of Year 7 students at Dixons Cottingley studying Science will be taught the following skills:

- Carrying out investigations to test hypotheses
- Identifying and using a wide range of scientific equipment safely & accurately
- Identifying independent, dependent & control variables
- Taking accurate measurements and observations using a range of instruments
- Recording measurements/observations effectively in tables
- Recording data in bar charts and line graphs
- Creating their tables, bar charts and line graphs to record data
- Drawing lines of best fit on line graphs
- Identifying trends in data
- Predicting further patterns based on trends seen
- Identifying anomalous results and sources of error in an experiment
- Evaluation of an investigation identifying improvements that could be made
- Using their scientific knowledge to explain the results seen
- Analysis and synthesis of results from a number of experiments to produce a scientific conclusion
- Calculating the mean from a range of results
- Performing simple calculations
- Measuring angles

In order to truly appreciate the subject and create deep schema, Science has been sequenced with the following rationale:

- We have looked in detail at best evidence for science teaching and mapped out the sequence of units based on the evidence provided to avoid misconceptions. The lessons are sequenced so the fundamentals are taught first and subsequent knowledge is built on the strong base.
- All students are taught a skills unit at the start of Year 7 through investigative work rather than skills in isolation. This is to ensure that students have had an attempt to master the skills that they will need throughout the year in a realistic context. These skills are constantly revisited and thus embedded throughout the year.
- Biology, Chemistry and Physics are interleaved to allow the students to make links across all areas of science and see them as linked rather than discrete subjects thus facilitating a deeper understanding. Spacing of topics built in within the scheme of work at the appropriate stages although this is more limited at Y7 as we are concerned with the basic principles with interleaving more evident in Y8 and above. This has been done where there are opportunities for example in heredity cell structure and cell specialisation is interleaved in the topic before the structure and function of the sperm and egg is delivered.
- The lessons are planned to a high standard. There are various opportunities for AFL in order to identify and address misconceptions using MWB activities in addition to Q&A between teacher and student and student to student. Activities are included to address any misconceptions identified. The lessons and tasks are structured to manage cognitive load whilst still maintaining challenge. Wherever possible we use modelling to help students develop a deeper understanding of scientific concepts, for example, the students have to



create a 3D model of a cell during the Cells unit. The lessons encourage students to develop their thinking, question and investigate ideas for themselves.

- Practical work is a key priority in the KS3 scheme of work with all practical's included being compulsory. There are individual experiments to secure and embed knowledge of content and eight investigations through the year to allow constant repetition of planning, identifying variables, using a range of equipment effectively and safely, recording results in tables and graphs, creating tables and graphs, identifying anomalous results, analysing & synthesising results and evaluating results and methods. These investigations also secure and embed content knowledge
- We do not want lack of knowledge to be a barrier to application and recall of knowledge is a fundamental part of the end of topic assessments. In these assessments, 50% of the marks will be for pure recall. There are sanctions for falling below a pass mark which will link to the pupil's ability. A further 50% of the marks will be for application of the knowledge. Gaps in knowledge identified through this element of the test will be addressed through specific DIRT activities related to the ability of the student. Knowledge retrieval is also constantly assessed through the Do Now activities at the start of every lesson which will be monitored through MWB responses.

The Science curriculum at Cottingley has been influenced by:

- Best Evidence Science Teaching University of York Science Education Group
- EEF Improving Secondary Science Report
- Working with Big Ideas of Science Education
- AQA Science KS3 Syllabus
- ASE Science Skills age 11-14

The order in which they have been taught and the content in each unit has been determined by the following:

- MAT wide policy
- BEST evidence science teaching which provides a clear sequence for the order in which scientific ideas and concepts should be taught.

Our Science curriculum ensures that social disadvantage is addressed through:

- Exposing our students to content that provides a deeper understanding of the world around them. The construction of our science curriculum not only ensures that students are taught the relevant knowledge, but also provides them with the skills to interrogate the world around them. This innate ability to question the world and to analyse information gives all our students, but especially our disadvantaged students, a complement of skills that will benefit their long term learning. We believe that without the power to question and develop hypotheses using scientific methods, individuals are dependent on those that possess these attributes and are unable to challenge the world around them.
- Recognising the lack of cultural capital many of our students have. An example would be when Ecology is taught. Students have a very limited knowledge of the natural world and plants and animals within this. When this topic is taught pictures and videos of habitats, animals and plants are constantly used in order for students to visualise what they are being taught.
- At KS3 we need to run trips to enrich our students. Ideally this would involve a trip to the science museum in London, a fieldwork trip to the Yorkshire Dales, Big Bang Fair in Birmingham and a visit to the Manchester Museum for Science and Technology, Priority on these trips will be given to disadvantaged students
- Disadvantaged and SEN students need to have their books marked more frequently compared to their peers. This would allow for rapid identification of any misconceptions and errors. SEN and disadvantaged students are highlighted on staff intervention folders thereby ensuring these students are receiving the attention they need. SEN students follow the same curricular pathway as it is important that they are provided with access to the same scientific knowledge. In class this is supported through clearly differentiated teaching which will include access to seeing and conducting practical's.

Our belief is that homework is used for deliberate practice of what has been taught in lessons. We also use retrieval practice and spaced revision to support all students with committing knowledge to long term memory.

Opportunities to build an understanding of social, moral and ethical issues are developed alongside links to the wider world, including careers, through:

- The schemes of work ensure topical issues are covered to allow students to have an educated and informed opinion on global issues. In Y7 this includes renewable and non-renewable sources of energy balancing the advantages and disadvantages of each; air, water and land pollution, looking at the causes & the impact, and how this can be managed; biodiversity and the need to maintain this.
- A KS3 field trip to the Yorkshire Dales will provide an opportunity to see the theory they have learned in class in a real context



- We need to offer our KS3 students, after school Science clubs i.e. a STEM Club which allows further opportunity to use science to solve problems.

Further Information can be found in:

- Long term plans
- Knowledge navigator sheets
- Schemes of work
- Best Evidence Science Teaching University of York Science Education Group
- EEF Improving Secondary Science Report
- Working with Big Ideas of Science Education
- AQA Science KS3 Syllabus
- ASE Science Skills age 11-14