GRANVILLE ACADEMY

Curriculum Guide for Science

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The de Ferrers Trust

Curriculum Rational in Science

Curriculum and Assessment

Curriculum Intent

The intent of the Science curriculum at Granville is to give students, regardless of their background, the knowledge to understand the wonders of the world around them and the processes which dictate how it works. We aim to inspire the next generation to be curious individuals, to use science to not only question, but explain what is occurring, predict how things will behave, and analyse causes. We intend to promote a sense of awe and wonder to encourage students to explore and learn through their lives by embedding the current challenges we face into the curriculum, as well as linking lessons to their real world applications. By building pupil's domains of knowledge within Biology, Chemistry and Physics we aim to equip students with the requisite knowledge to understand the world around them, but also to prepare them for further study in the subject.

Our curriculum is designed to meet the needs of all students so they develop their knowledge, skills and abilities to ensure they have access to a broad and balanced education. We aim to ensure that all students leave the academy with an understanding of the world around them and the capacity to interpret scientific data to make informed decisions in their future. We intend to engage all students in exciting and relevant lessons to support all students including those with SEND in developing both their disciplinary and substantive knowledge within lessons. All students will access the full curriculum and will have scaffolded support through the use of teaching and learning strategies such as the Magnificent 7 where needed.

Furthermore, we do not aim to simplify the curriculum for any groups of students, nor lower expectations in what can be achieved, rather we make reasonable adjustments to remove barriers for students which enables all learners to maximise their potential and make progress. This is done through the use of individual learning plans (ILP's) and meeting the needs of all learners both in their learning within the classroom and in our assessments. We also understand that practical work within science can carry risks if not strategically planned out, we ensure that all students with SEND are catered for to ensure that the accelerated progress offered through practical work can be accessed by all learners. Throughout the curriculum we celebrate the work of a number of scientists from many different backgrounds, while evaluating issues from a scientific, social, economical and ethical viewpoint to support in upholding a culture of inclusivity

Specifically, within Science adaptations for SEND learners would include:

- Extensive use of modelling to allow for abstract ideas to be better understood
- Smaller group sizes at KS3 to ensure practical skills can be developed independently whilst ensuring the safety of students.
- Practical equipment being organised in pre-prepared trays for students to minimise their cognitive load.
- Increased think time to allow for processing and encourage responses.
- Chunking of instructions and deliberate recall to ensure understanding.
- Deliberate modelling of practical work to ensure instructions are understood.

Curriculum Implementation

Learning in Science is sequenced throughout the 5 year learning journey so that topics are built on periodically throughout pupil's learning journey through a spiral curriculum. This allows for learning to be linked to prior knowledge and built upon to develop pupil's domains of knowledge within each scientific discipline.

At KS3 the curriculum follows the AQA scheme of learning which also aligns with the GCSE qualification students will sit in Year 11. In Years 7 and 8 students build on the knowledge they gained at KS2 with the introduction of the building blocks of Biology and Chemistry via the cell and the atom.

Year 9 revisits much of the core knowledge required to transition to KS4 by building on what has been studied previously at KS3, for example in Biology the introduction of additional organelles, prokaryotes and eukaryotes. In Chemistry the introduction of electron configuration and its importance to reactivity and bonding. In Physics additional energy stores and pathways are introduced whilst the links between electrical quantities are investigated both qualitatively and quantitatively.

At KS4, students follow the AQA combined/separate science route for which the foundations have been laid at KS3. In Year 10 and 11 students will learn about narrower fields of science in more detail which build upon their prior knowledge, for example in Physics students will use their prior knowledge of the structure of the atom to investigate nuclear radiation, in Biology students begin to investigate the hormones involved in the reproductive system and in Chemistry students learn about the uses and methods of extracting organic materials from the earth.

The curriculum not only maps out how students will sequentially build upon their substantive knowledge, but also shows how their disciplinary knowledge will develop over the course of their 5 year journey. Students will begin by learning the fundamental principles of scientific investigation before developing their abilities to evaluate, improve and analyse investigations.

Science lessons also regularly include opportunities to develop their mathematical skills, which again are planned out sequentially and, where possible, align with the curriculum in maths. Through working closely with the maths department, we ensure that modelling of mathematical skills is consistent in both science and maths in terms of the methodology and terminology used.

Every lesson begins with a retrieval task which links prior learning to the upcoming lesson. This may be knowledge from a recent lesson or from a previous year.

The aims of this are:

• To improve students' long-term retention of key scientific concepts and knowledge to help improve fluency, transfer and reduce cognitive load.
• To help develop a culture of high expectations, exemplary behaviour and scientific rigour within every classroom.
• To allow class teachers to assess whether the required knowledge for the lesson is able to be appropriately retrieved by learners.

Where the questions included in the systematic retrieval practice are not deemed appropriate for the students at that time, staff are encouraged to adapt the questions which are included according to the needs of the class.

Lessons are aimed at imparting relevant scientific knowledge on students whether substantive, disciplinary or both. This is typically shared through direct instruction and targeted questioning. This knowledge is then assessed formatively before offering students an opportunity to apply their newly acquired knowledge or skill.

Applications of the knowledge/skill are modelled by the class teacher, before gradually stripping away support at an appropriate rate for the learners in the classroom, to allow for independent focused practice.

The end of the lesson uses a short formative assessment of the learning that has taken place in the classroom, which can be easily assessed by the class teacher to inform future planning.

Impact

Though formative assessment occurs in all lessons in one form or another, there are key points in the year where assessments are also used in a summative nature. These assessments are used to gather information on individual students' progress which can be shared with learners and parents alike, but also as a means of identifying areas of strength and weakness for individuals and classes.

Assessment in years 7-9

The curriculum for science is divided into three 'cycles'. Each cycle contains a discrete body of knowledge and, at the end of each cycle, knowledge is tested through three summative assessments.

These assessments will test the core substantive knowledge learned which is required to gain a further understanding of key concepts. Assessments build up synoptically to assess all learning that has taken place over the course of study, not just that which has been covered since the most recent assessment. This allows students the opportunity to demonstrate how they are building their domains of knowledge over time by linking topics together as they are learnt. The third assessment in each year will, therefore, assess all of the knowledge that has been taught in that particular year. In year 9 the first two assessments are a mixed paper and the third assessment is three separate Biology, Chemistry and Physics papers. There will be a foundation paper and higher paper for each assessment.

Assessment in Year 10 and 11.

In Year 10, the assessments as in KS3 will test all of the knowledge and skills that the students have developed in each subject. Each discipline of science will have their own assessment. The first assessment in year 10 will contain questions based on some of the work studied in year 9 and the topics studied up to that point in year 10. Assessment two is a Paper 1 mock exam for each of the three disciplines of science. Assessment three will primarily focus on the paper two topics studied up to that point.

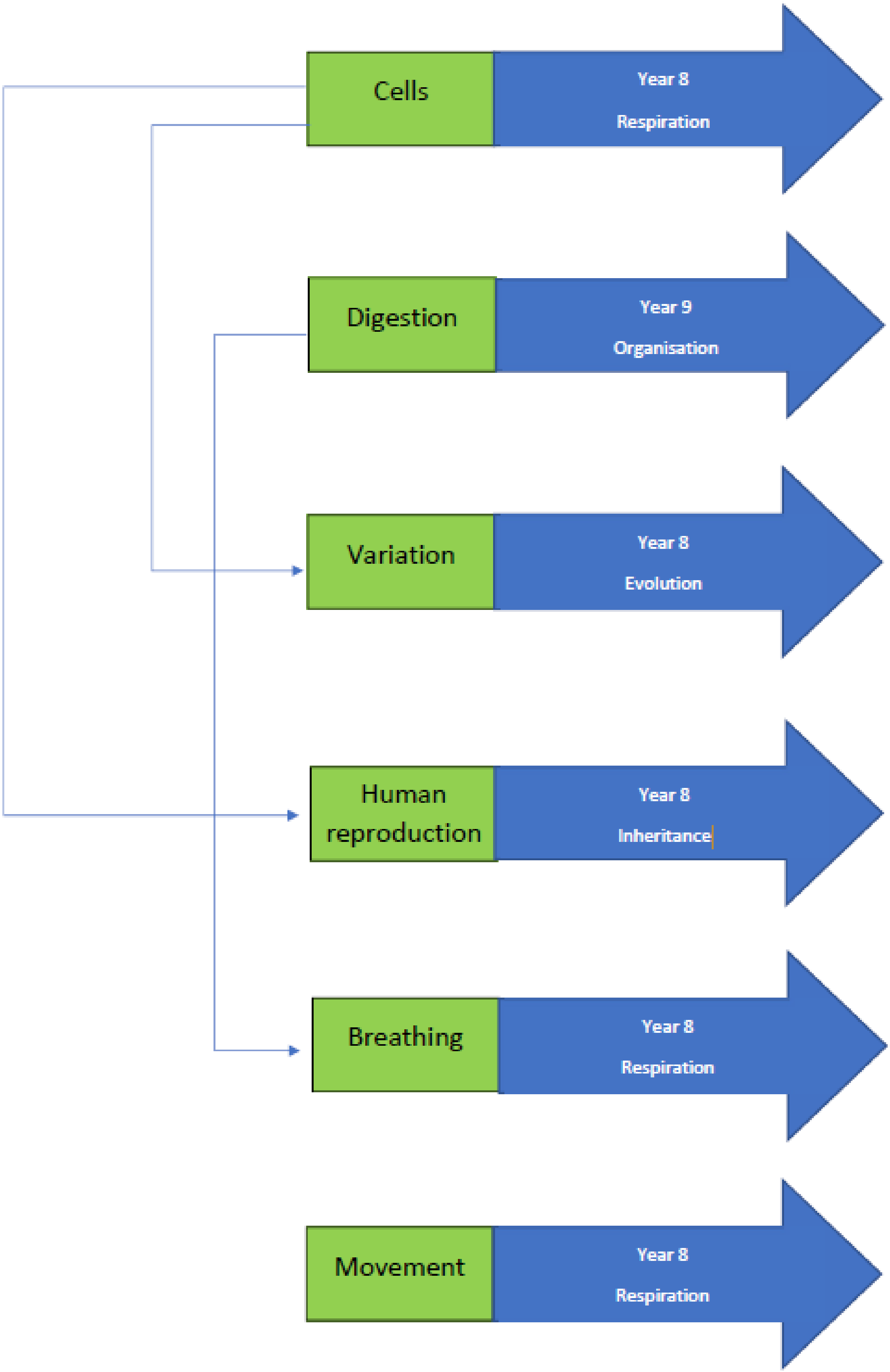
Assessments in Year 11 are based around mock exam questions with full papers being sat in December for assessment point 2 (AP2). Assessment point 1 (AP1) consists of a partial past paper made up of the correct constituent parts for AO1, AO2 and AO3 as well as mathematical skills and required practical elements. This assessment is blind to staff and students and added to the year 10 mock examination to add robustness in predictions.

These assessments are also used formatively to identify gaps in student's learning. This is done through the use of QLA's, whereby learner's strengths and weaknesses are identified. Once identified intervention then takes place, whether through the setting of content/skill specific homework or the reteaching of content. This is then followed up by a later assessment to identify the impact it has had.

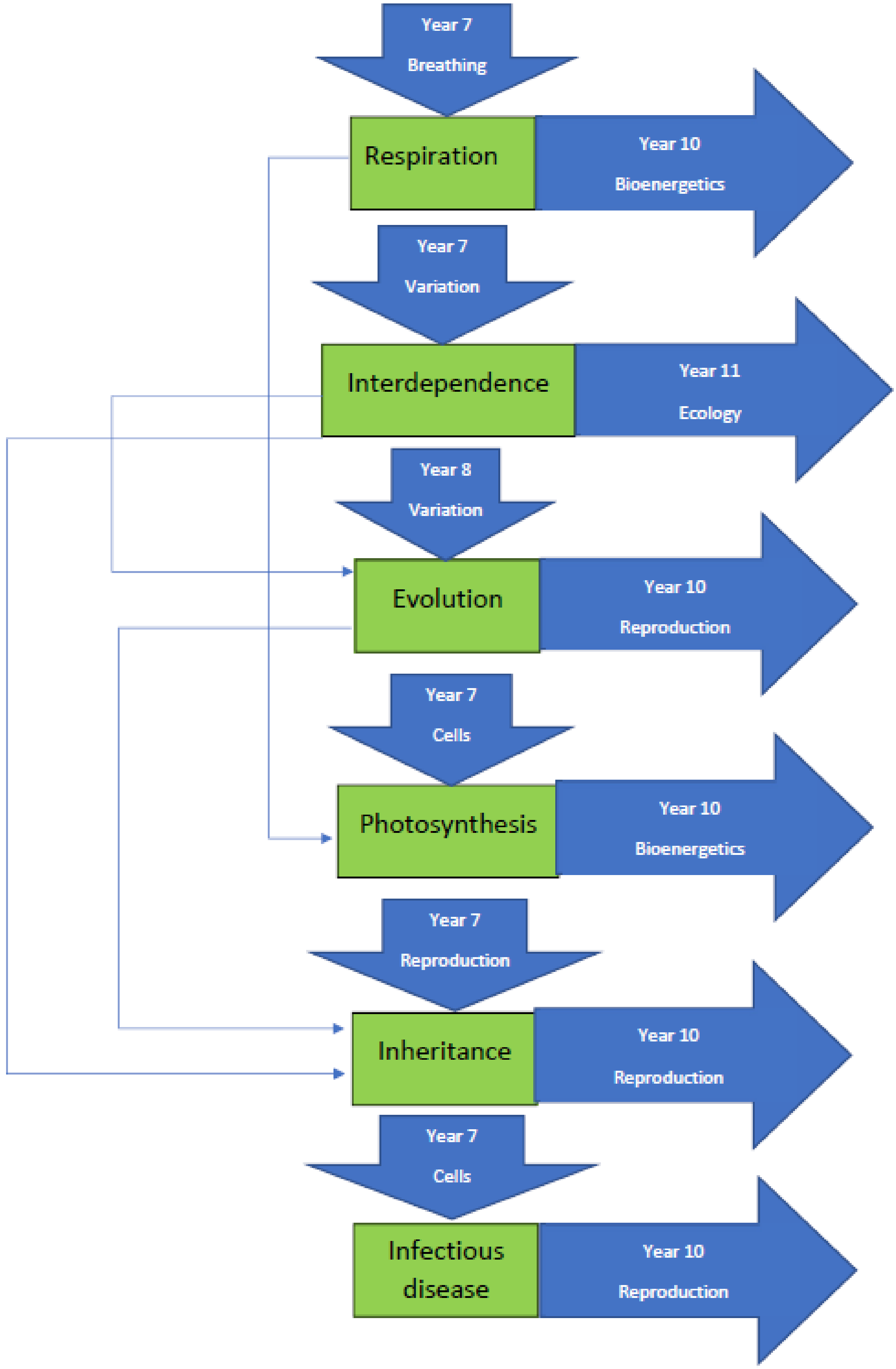
Formative assessment is carried out consistently in science lessons through the use of questioning, whiteboard use and the monitoring of students' work. Students should have at least one piece of work formatively assessed for every 6 hours of lesson time. Learners should use this feedback to improve upon their work and progress further toward the intended learning outcomes.

Curriculum Maps

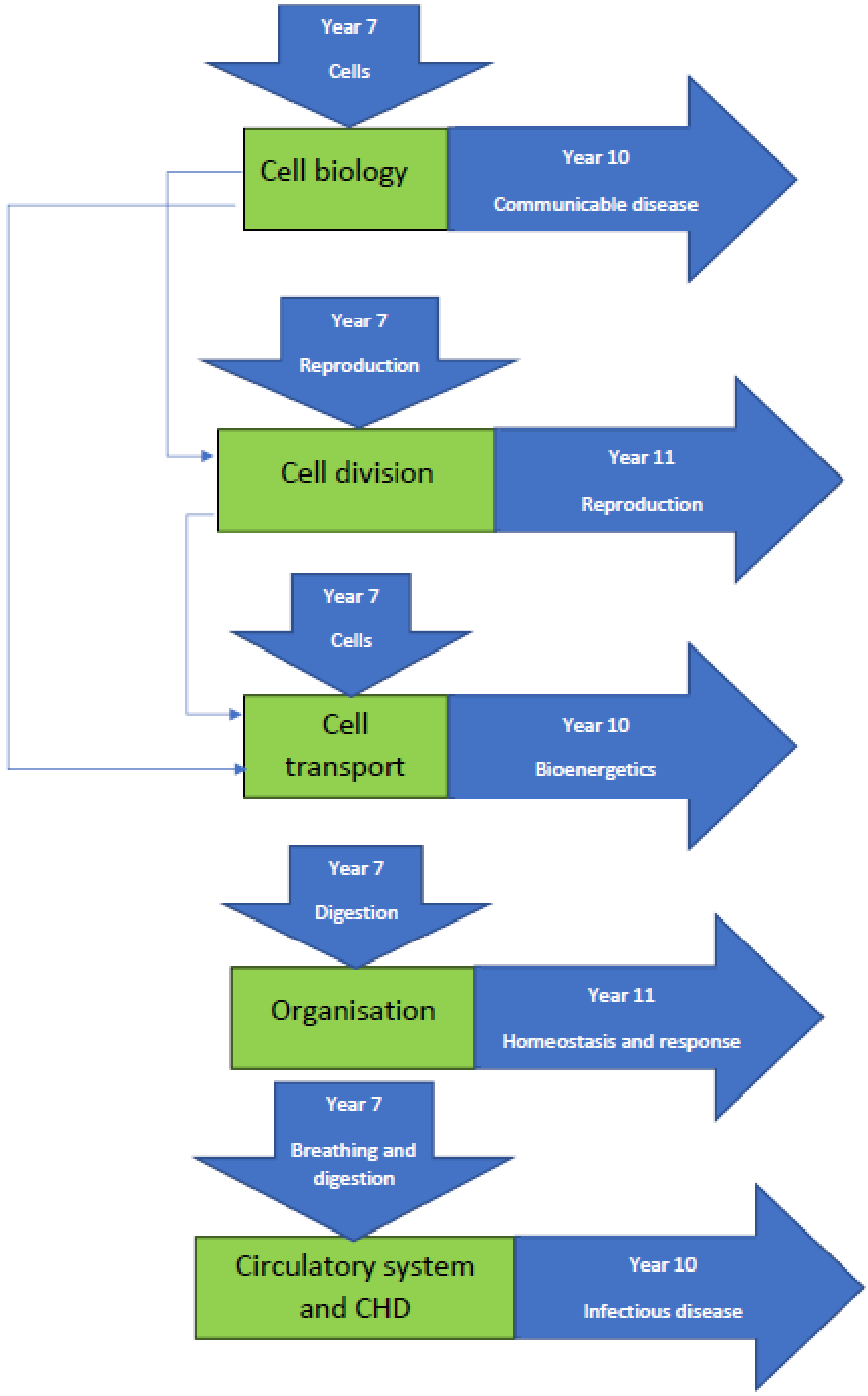
Biology – Year 7



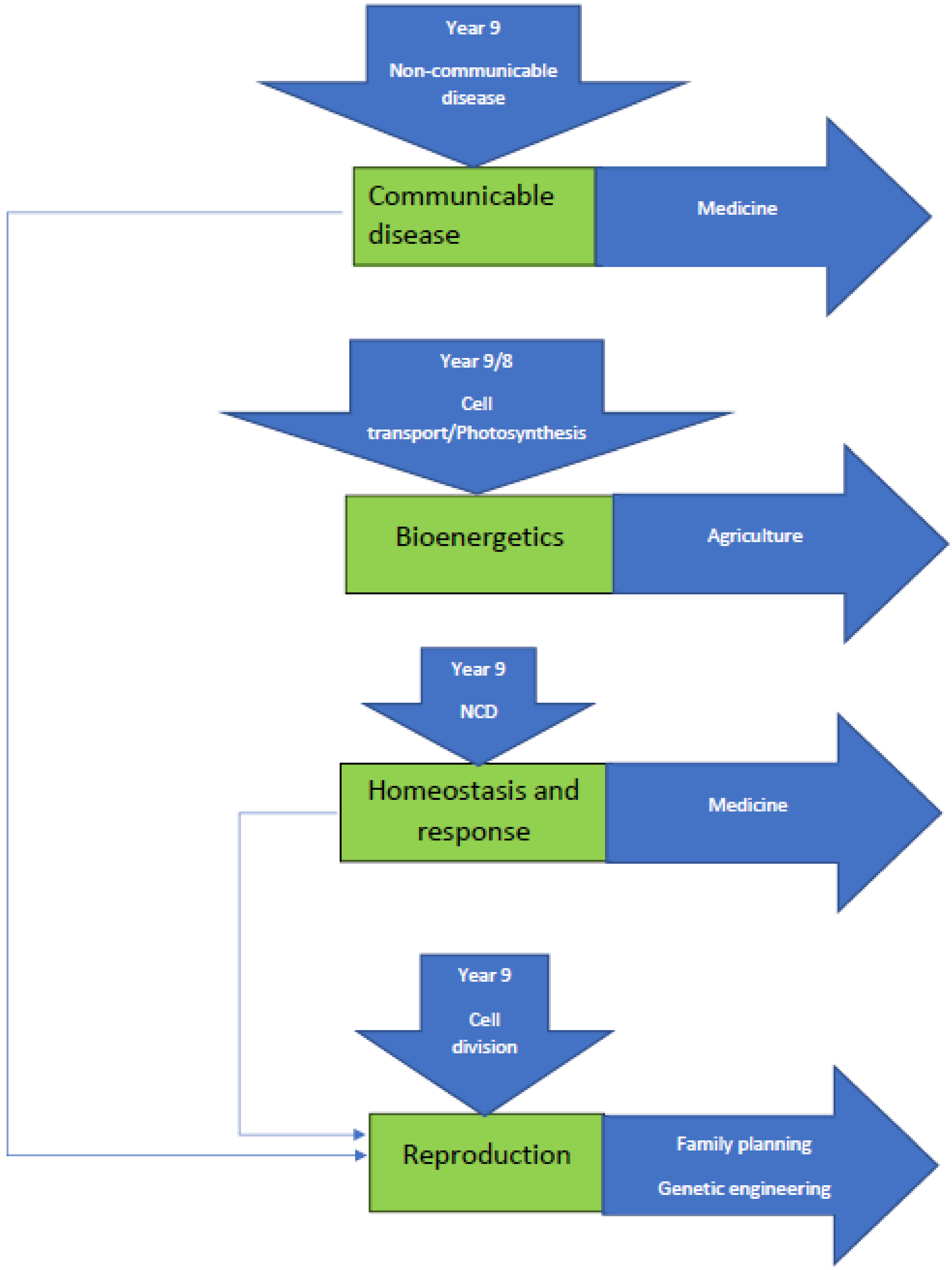
Biology – Year 8



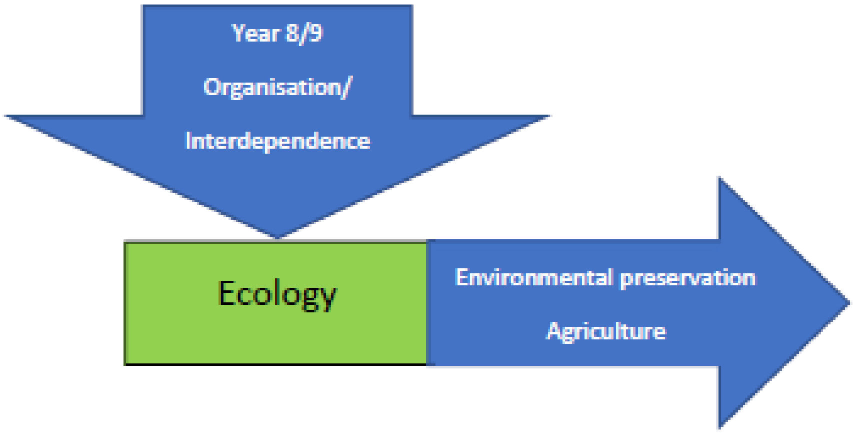
Biology – Year 9



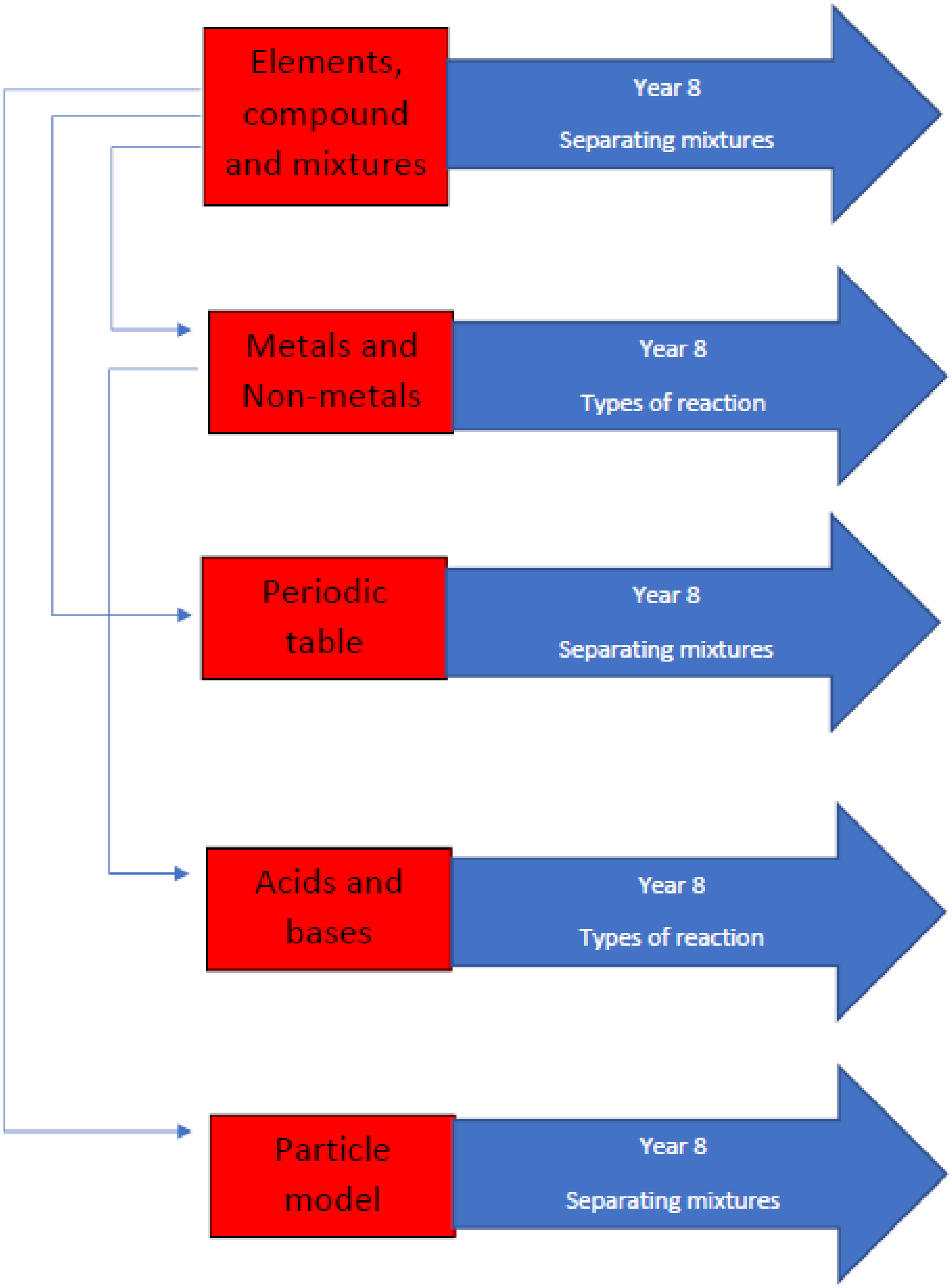
Biology – Year 10



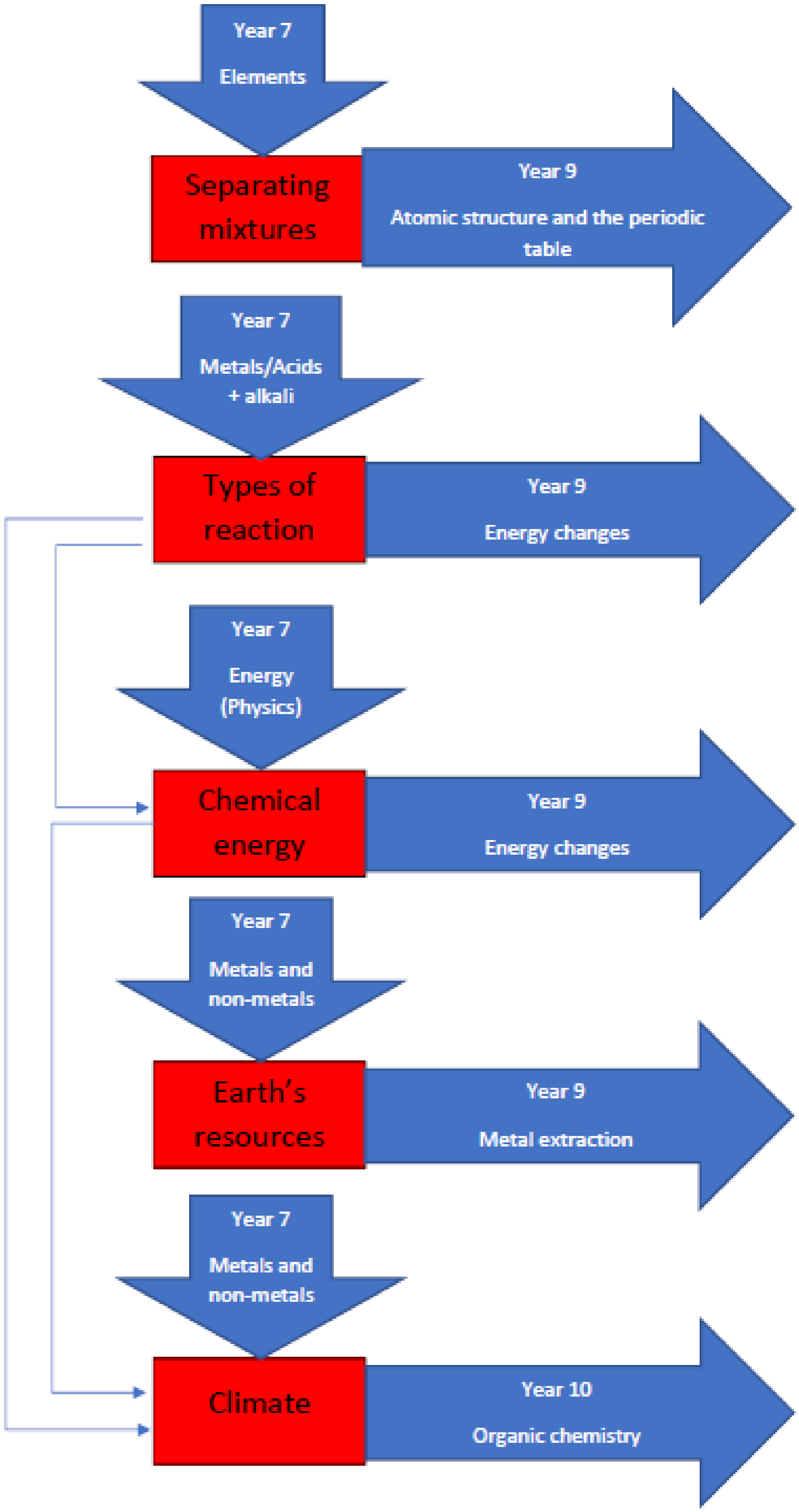
Biology – Year 11



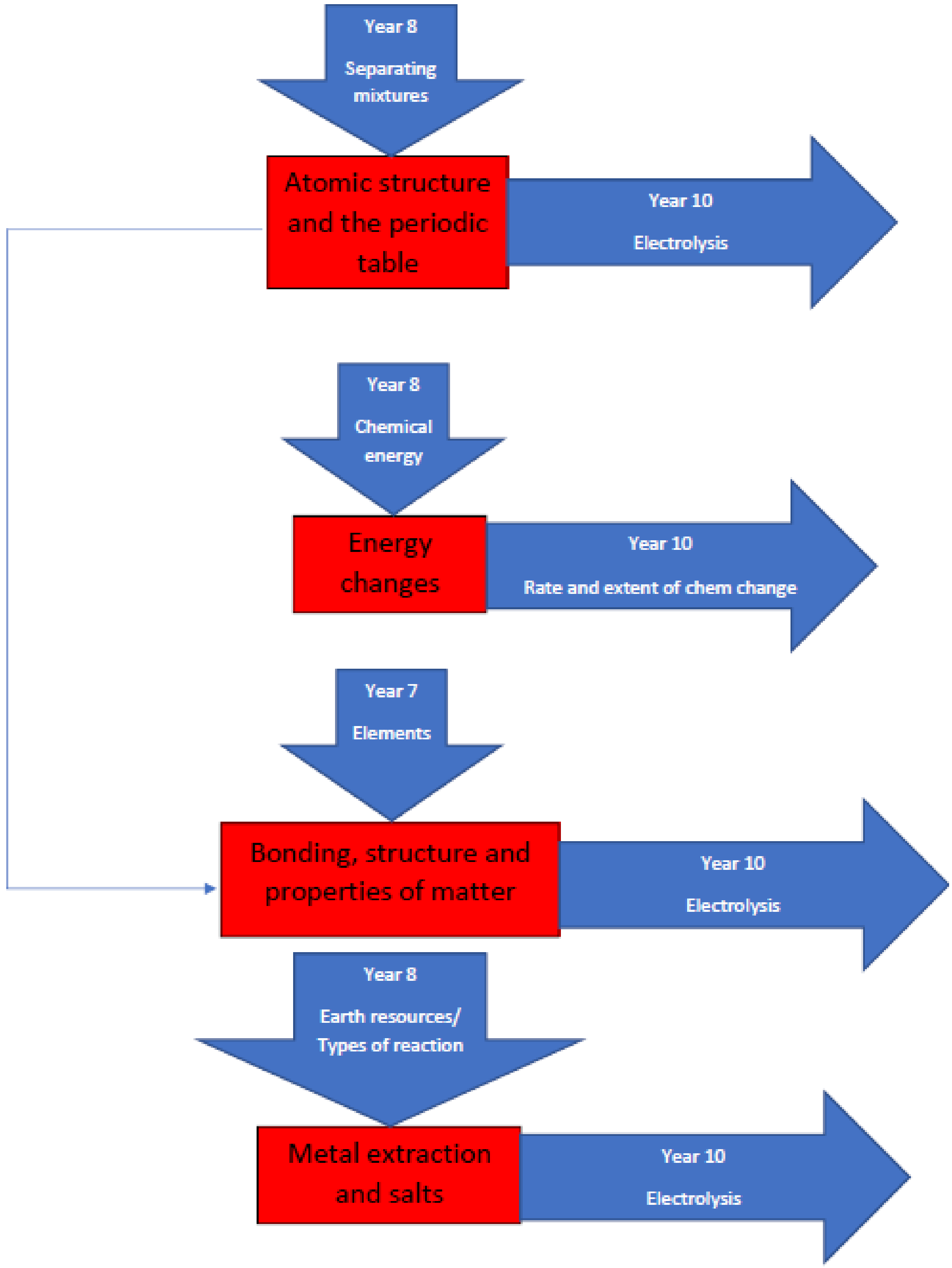
Chemistry – Year 7



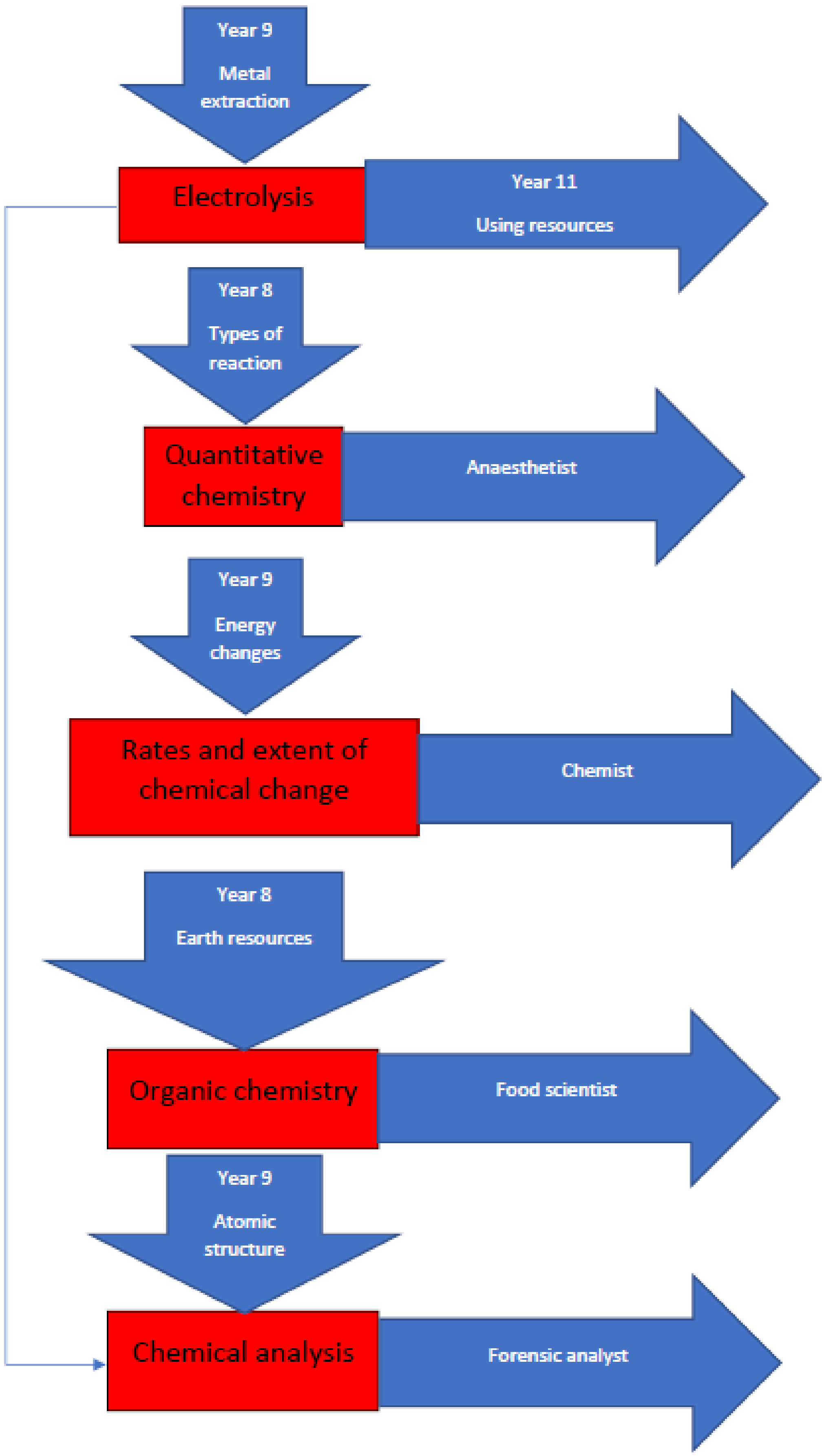
Chemistry - Year 8



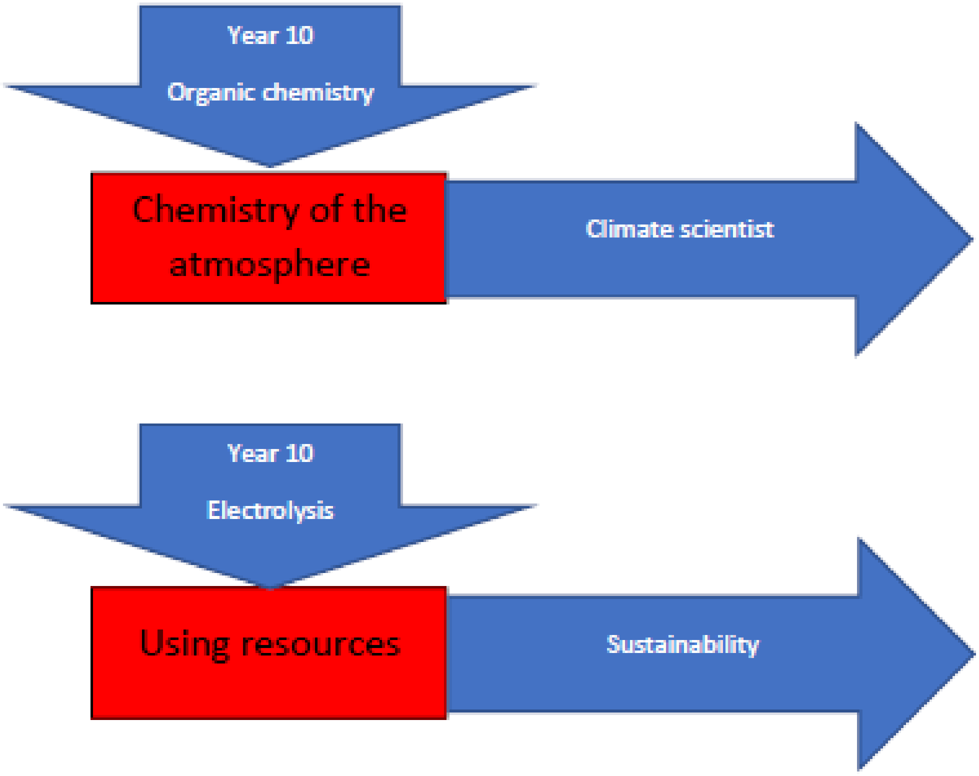
Year 9 – Chemistry



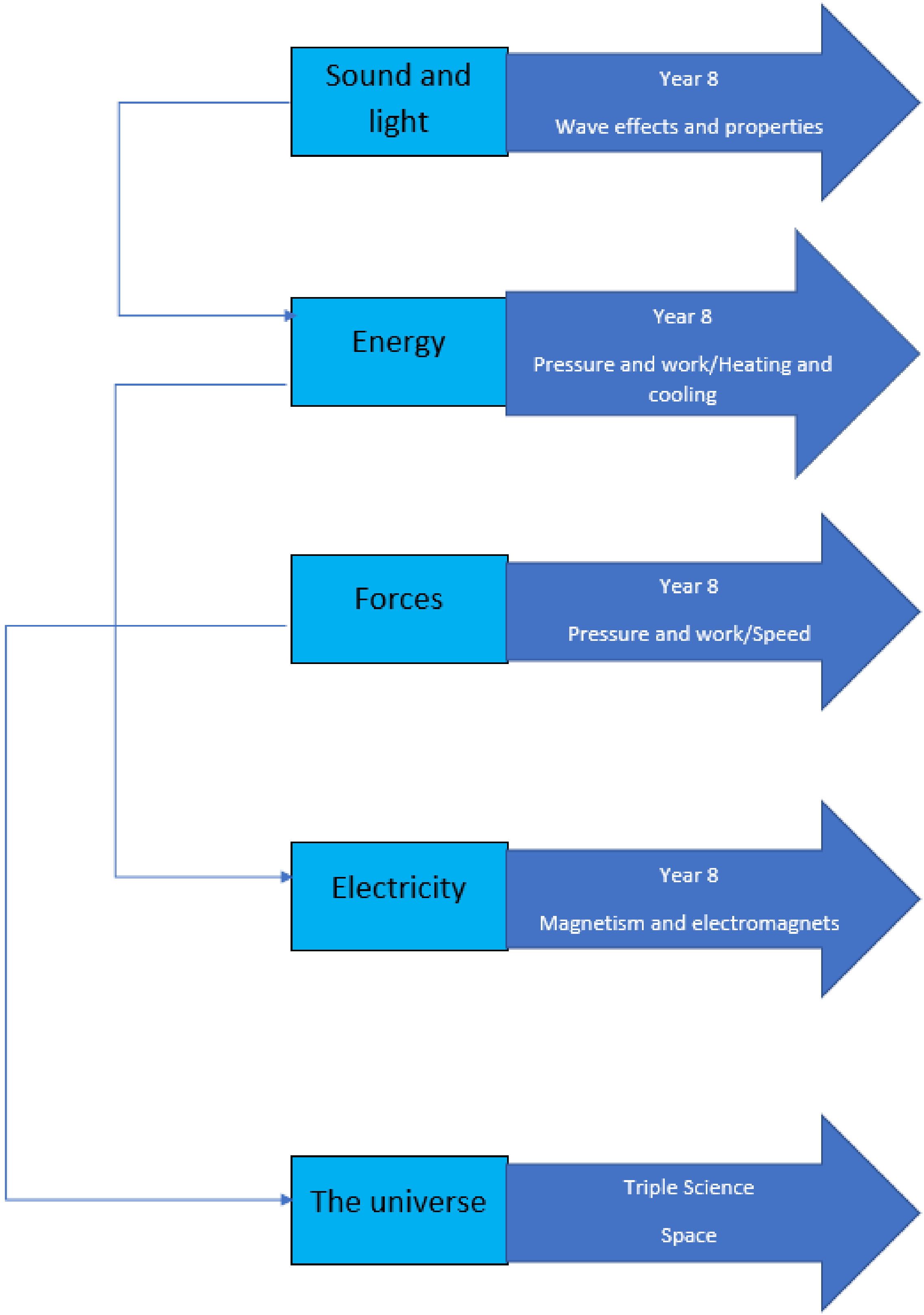
Year 10 – Chemistry



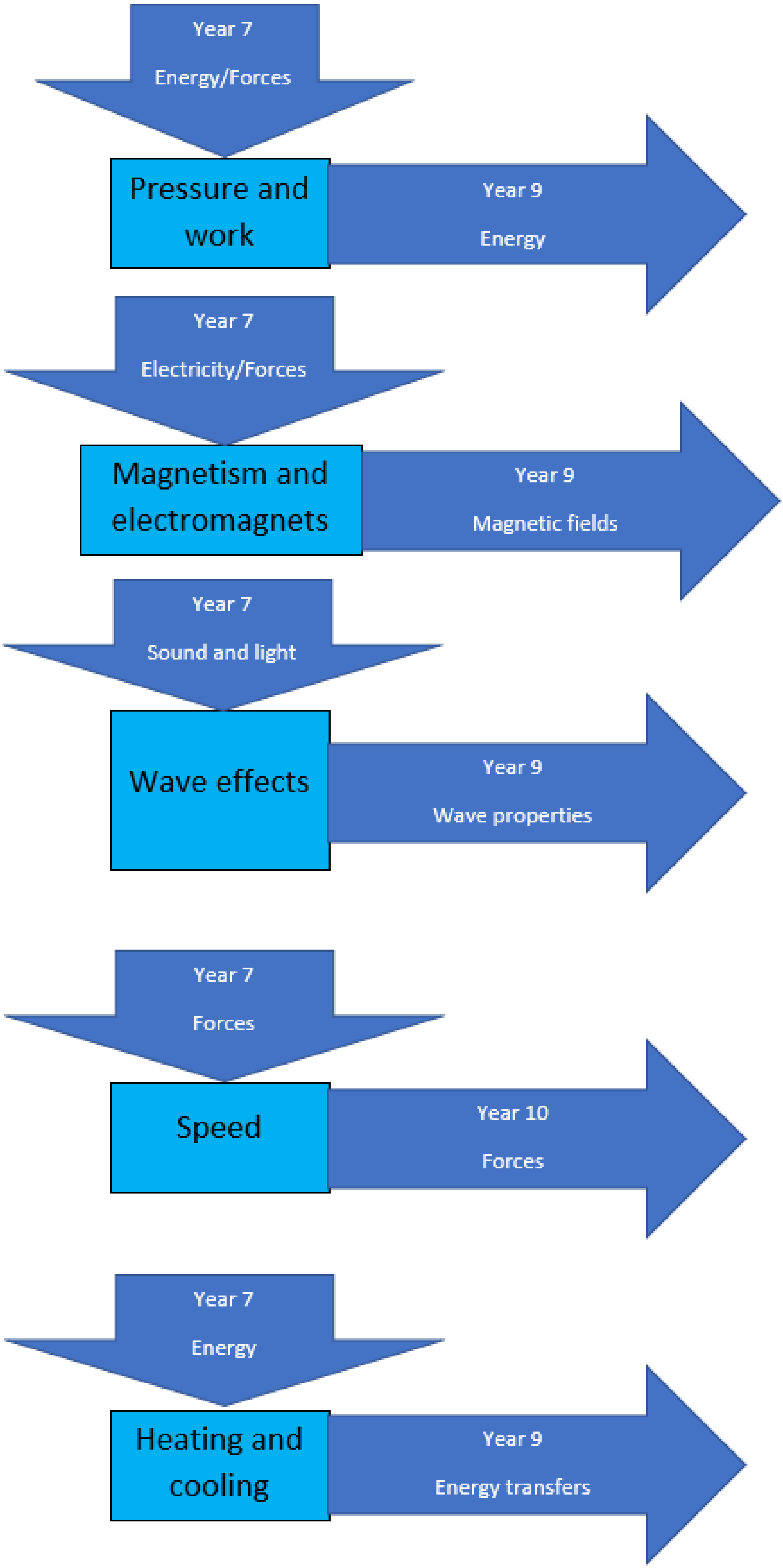
Chemistry – Year 11



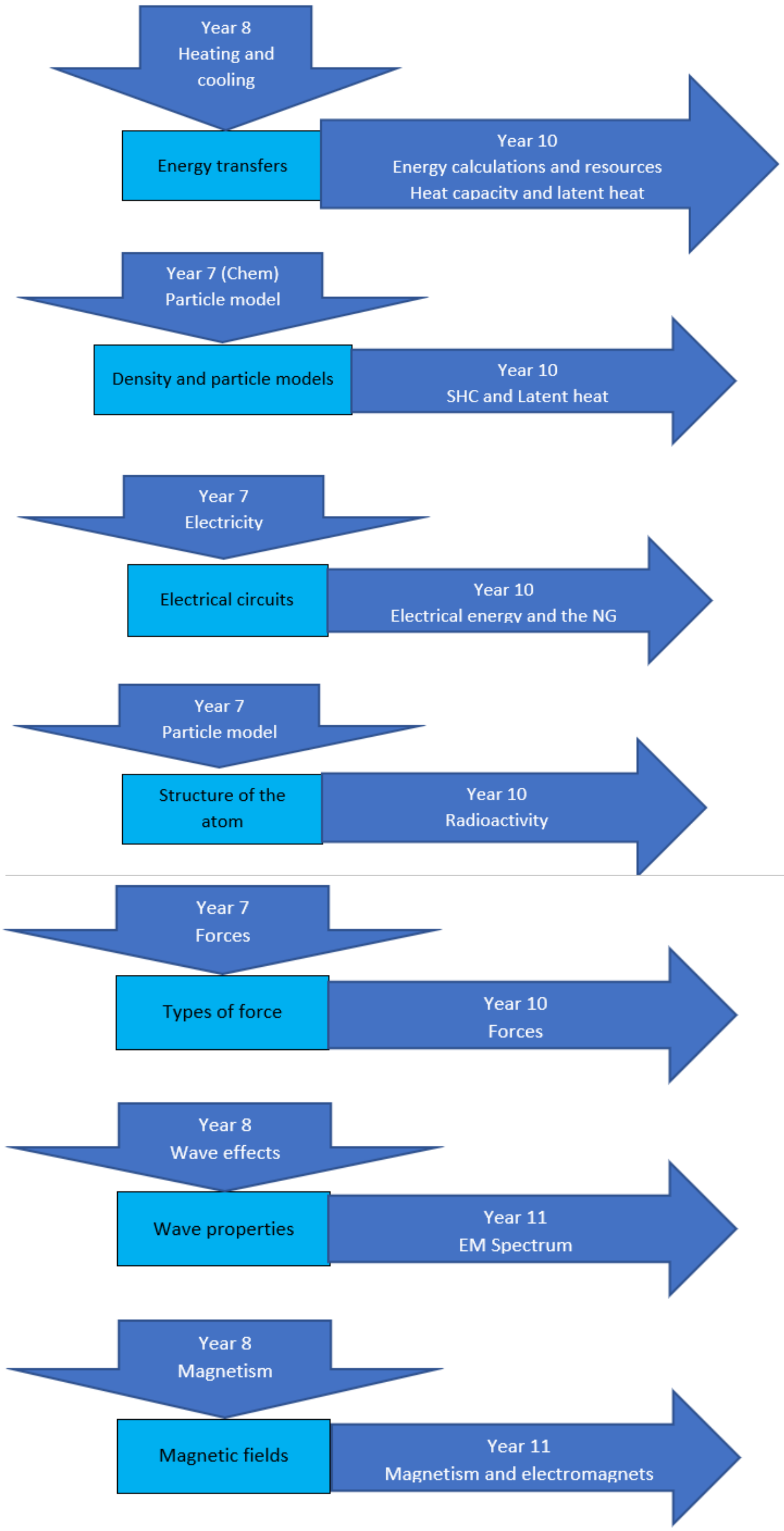
Year 7 – Physics



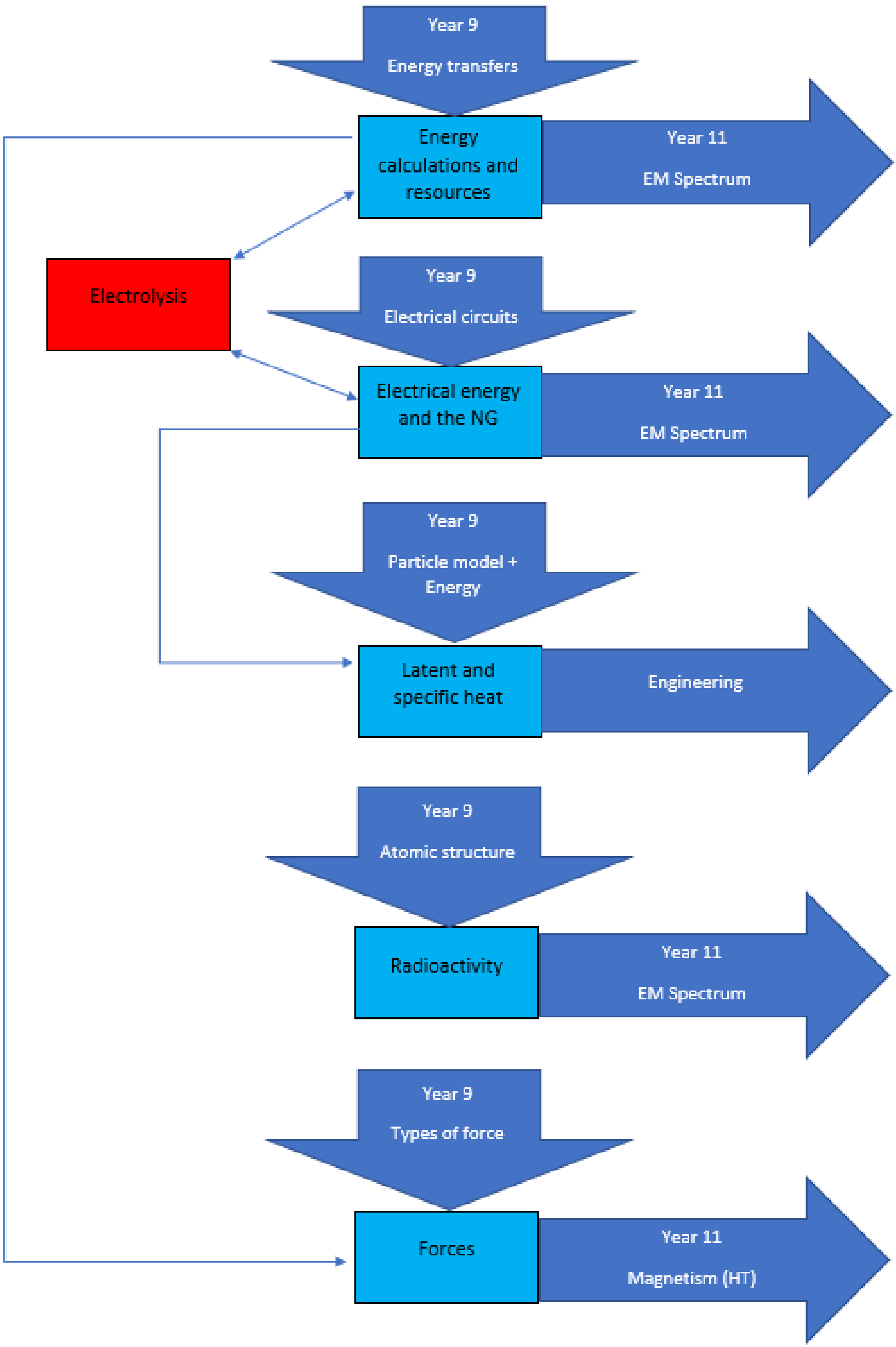
Year 8 – Physics



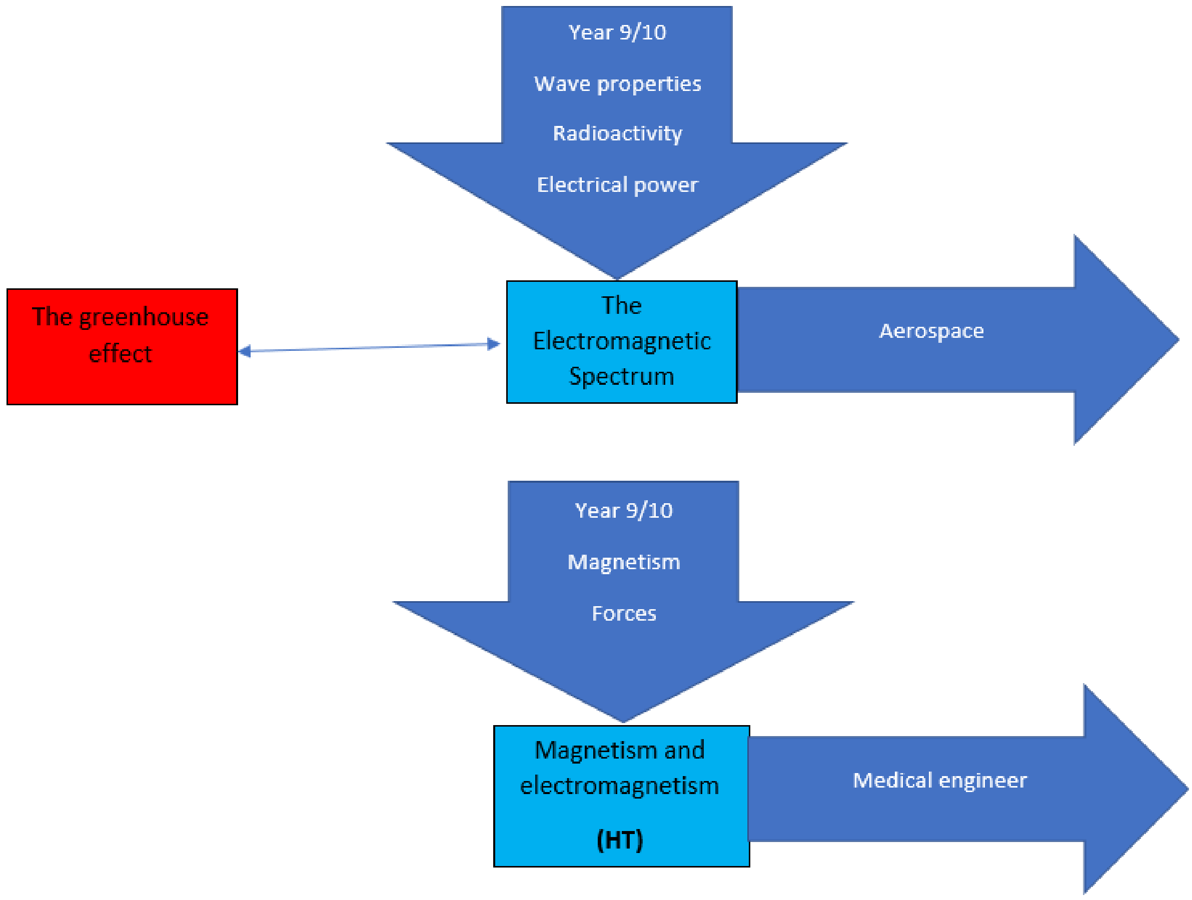
Year 9 – Physics



Year 10 – Physics



Year 11 – Physics



Cultural capital

	Experiences to enrich learning
Year 7	Space day
Year 8	Wonderdome mobile planetarium STEM club – CREST Discovery
Year 9	Big Bang Fair Space museum
Year 10	Big Bang Fair Careers fair
Year 11	Careers fair

Homework and independent learning

The Science faculty at Granville set homework on a weekly basis. All learners receive a piece of directed homework each week. Our homework key principles are for it to be accessible, purposeful and accountable. At KS3 this is on Sparx Science. Students complete a piece of tailored practice homework 1 hour each week, driven by the scheme of learning. The practice is both challenging to encourage deep thinking and, crucially, achievable.

Following assessments homework is individualised to allow learners to revisit the topics which they found to be more challenging. This allows students to fill in any gaps in their learning, before attempting a follow up assessment on this area to ensure that any gaps have been closed.

At KS4 long answer exam questions style homework is used alongside Sparx Science on an alternating basis each week 1 hour each week. This allows for extended writing opportunities to synthesise the knowledge and skills they have gained over a series of lessons as well as the consolidation of prior knowledge to reinforce what has been learned.

QLA's are produced for individual students following KS4 assessments which again allows students to gain a greater insight of their strengths and weaknesses within a discipline. Following on from this homework is often used as an intervention strategy to again look to close gaps in learner's knowledge and understanding.