



## Curriculum Guide for Science

1. Curriculum Rationale
  - Intent
  - Implementation
  - Impact
2. Curriculum Maps
3. Cultural Capital
4. Homework and independent learning



The de Ferrers Trust

## **Curriculum Rationale 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.

#### **Curriculum Implementation**

Learning in Science is sequenced throughout the 5 year learning journey so that topics are built on periodically throughout student'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 begin 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 require 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.

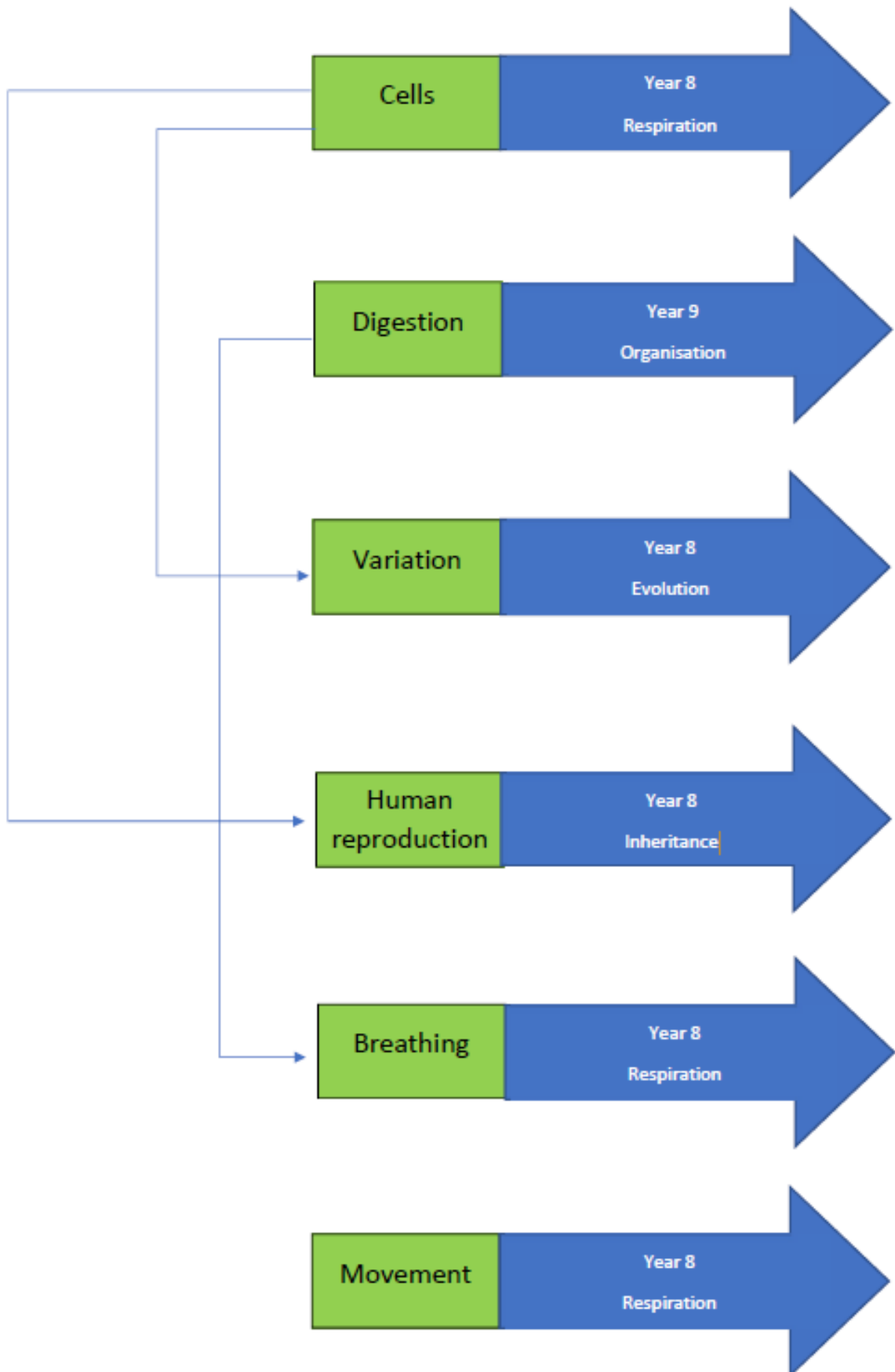
Assessments in Year 11 are mock exams. Assessment 1 is a paper 1 mock exam and assessment two will be mock exams of both paper 1 and paper 2

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.

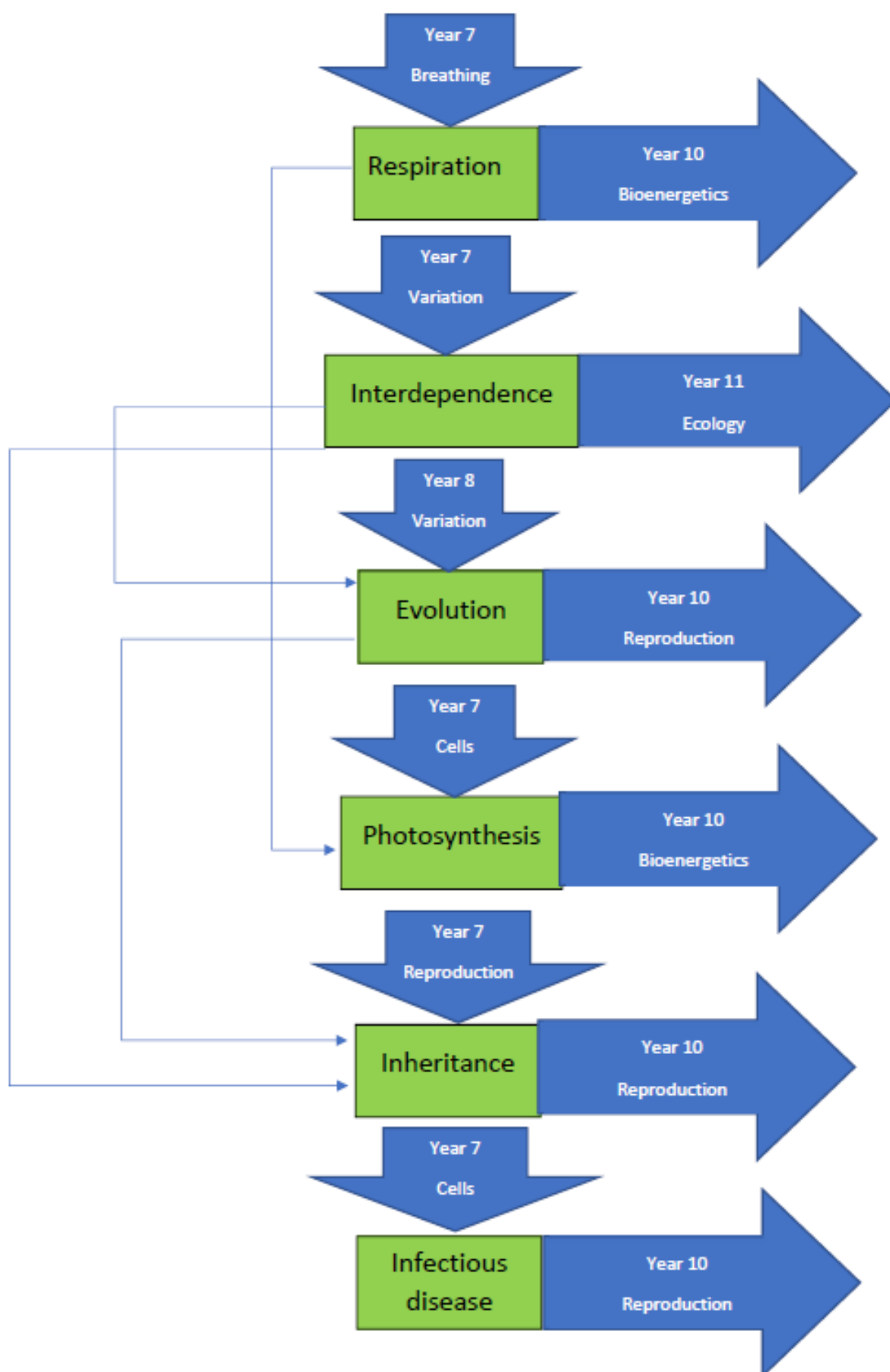
Formative assessment is carried out consistently in science lessons through the use of questioning, whiteboard use and the monitoring of students work. Students should have at least one piece of work formatively assessed for every 6 hours of lesson time. Learners should use this feedback to improve upon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

# Curriculum Maps

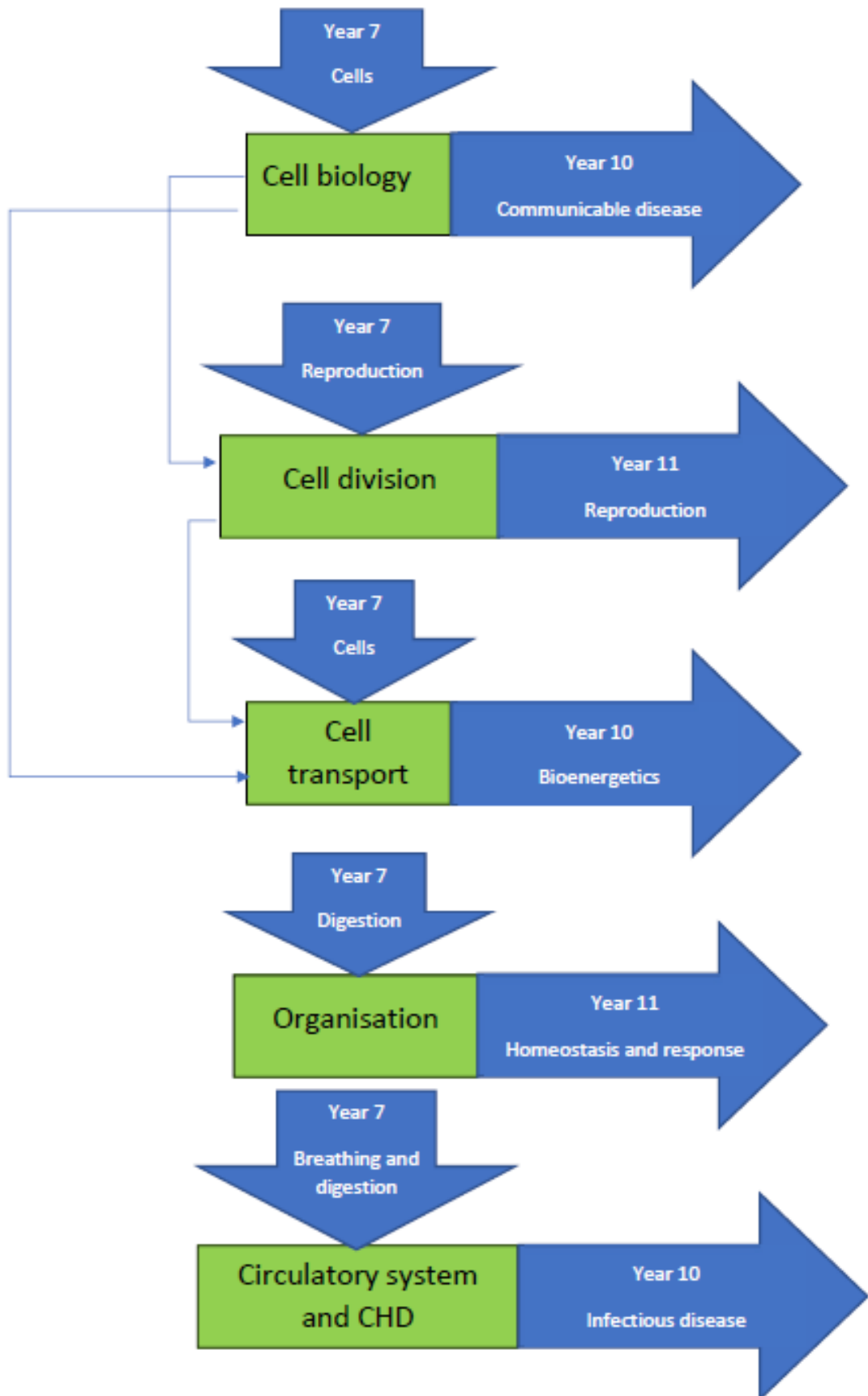
## Biology – Year 7



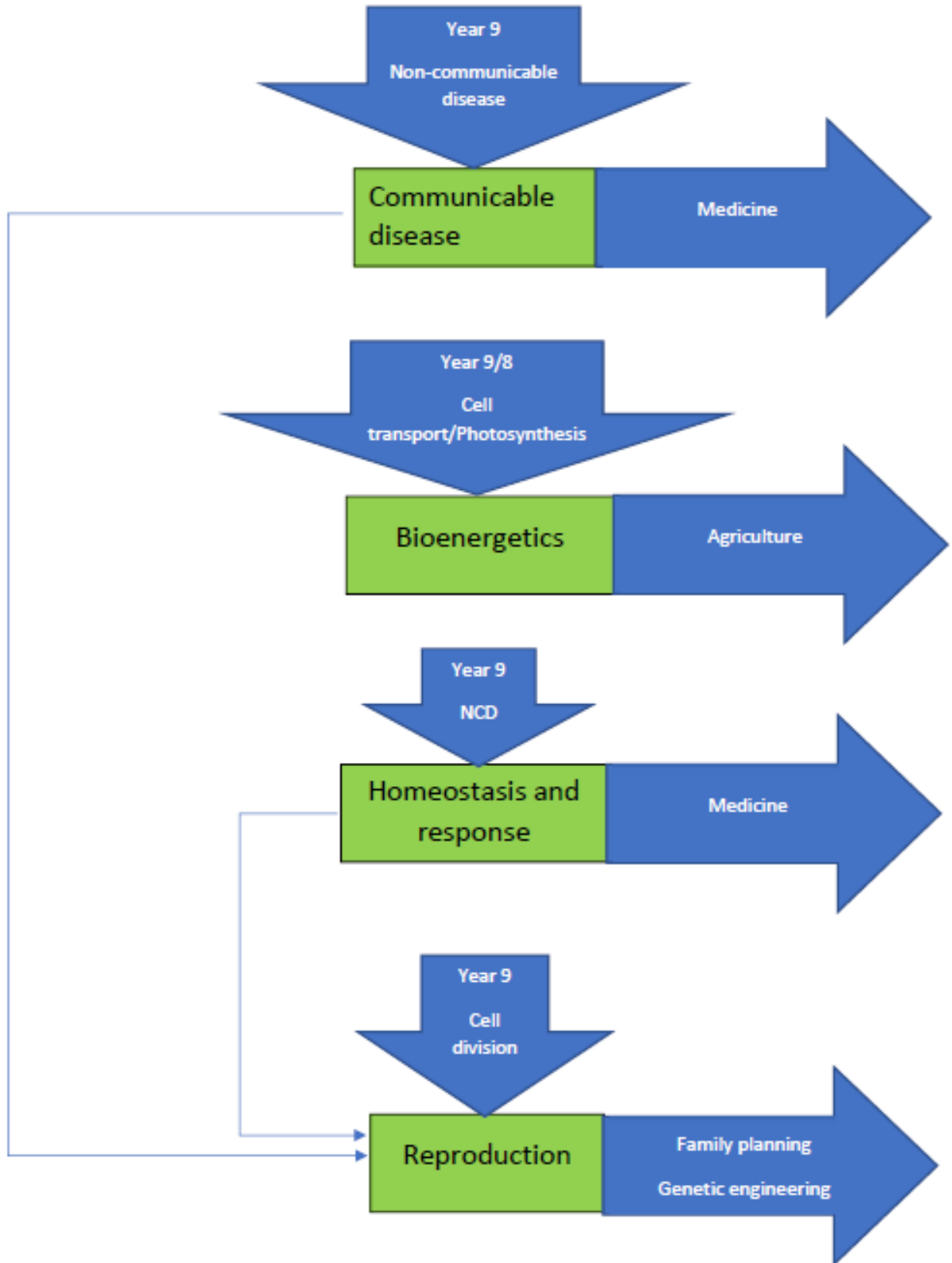
## Biology – Year 8



**Biology – Year 9**

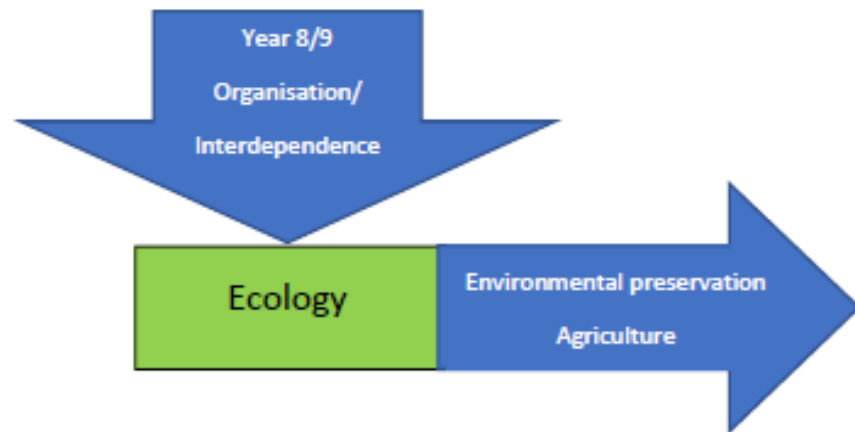


**Biology – Year 10**

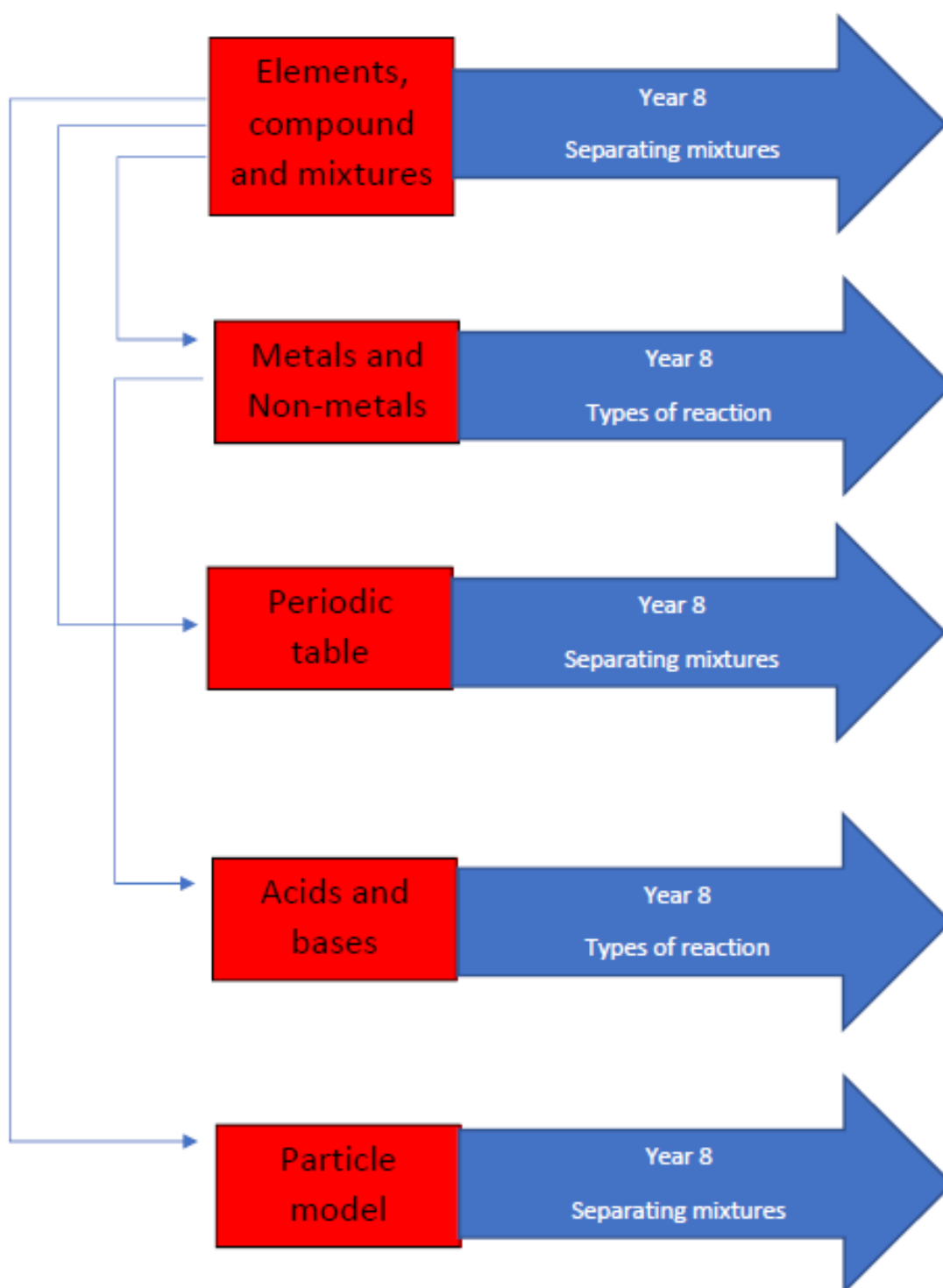




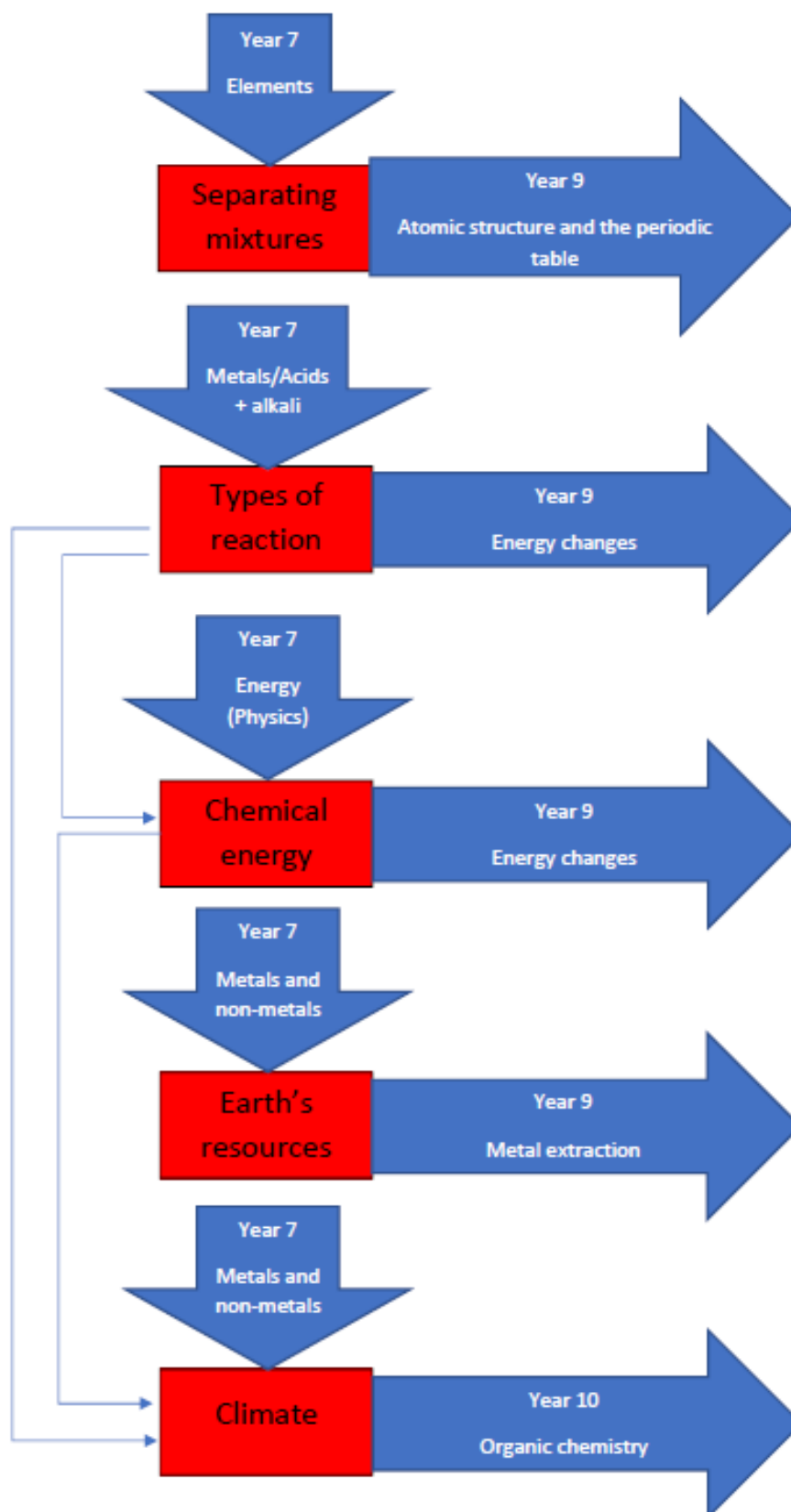
## Biology – Year 11



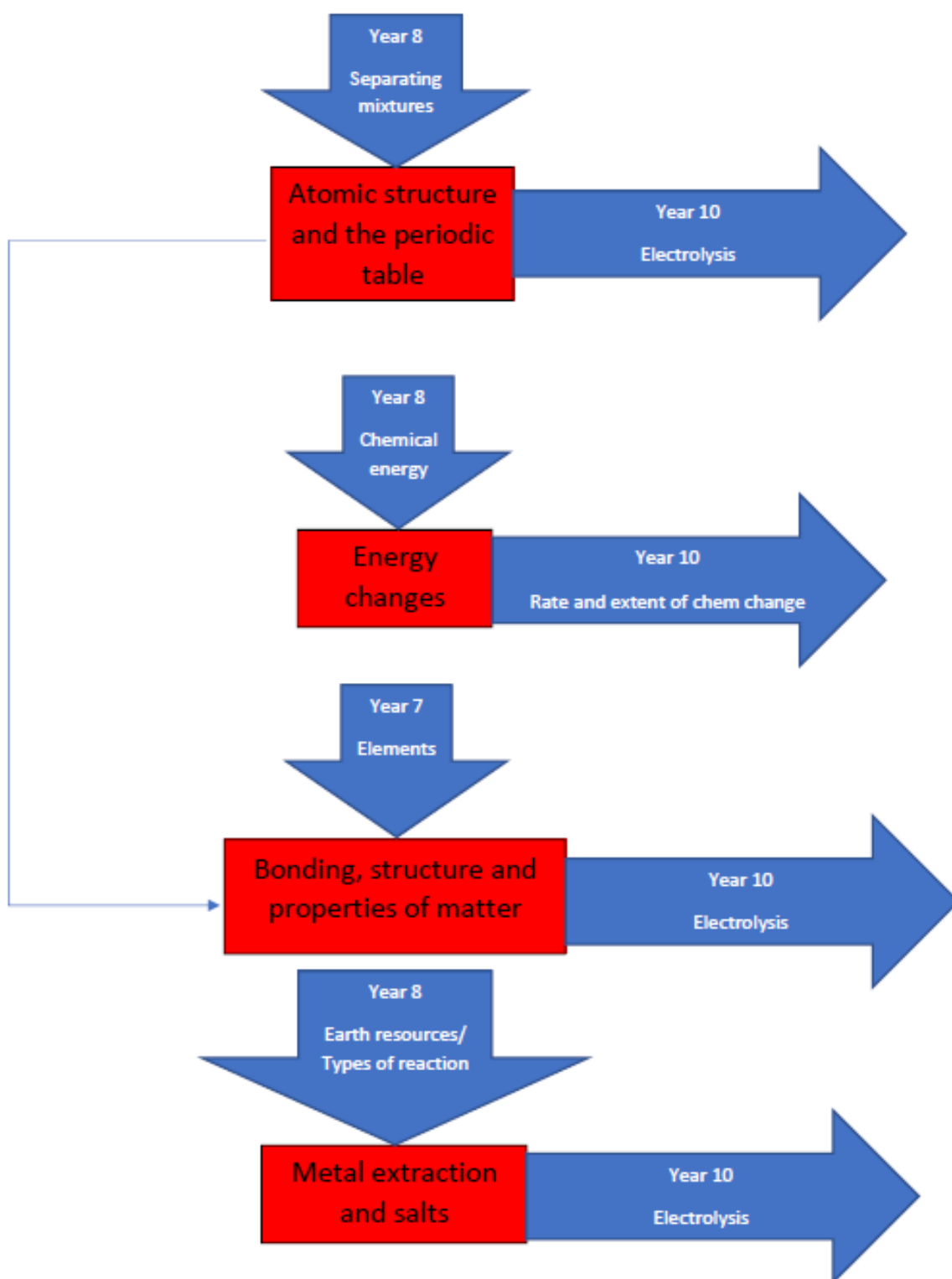
## Chemistry – Year 7



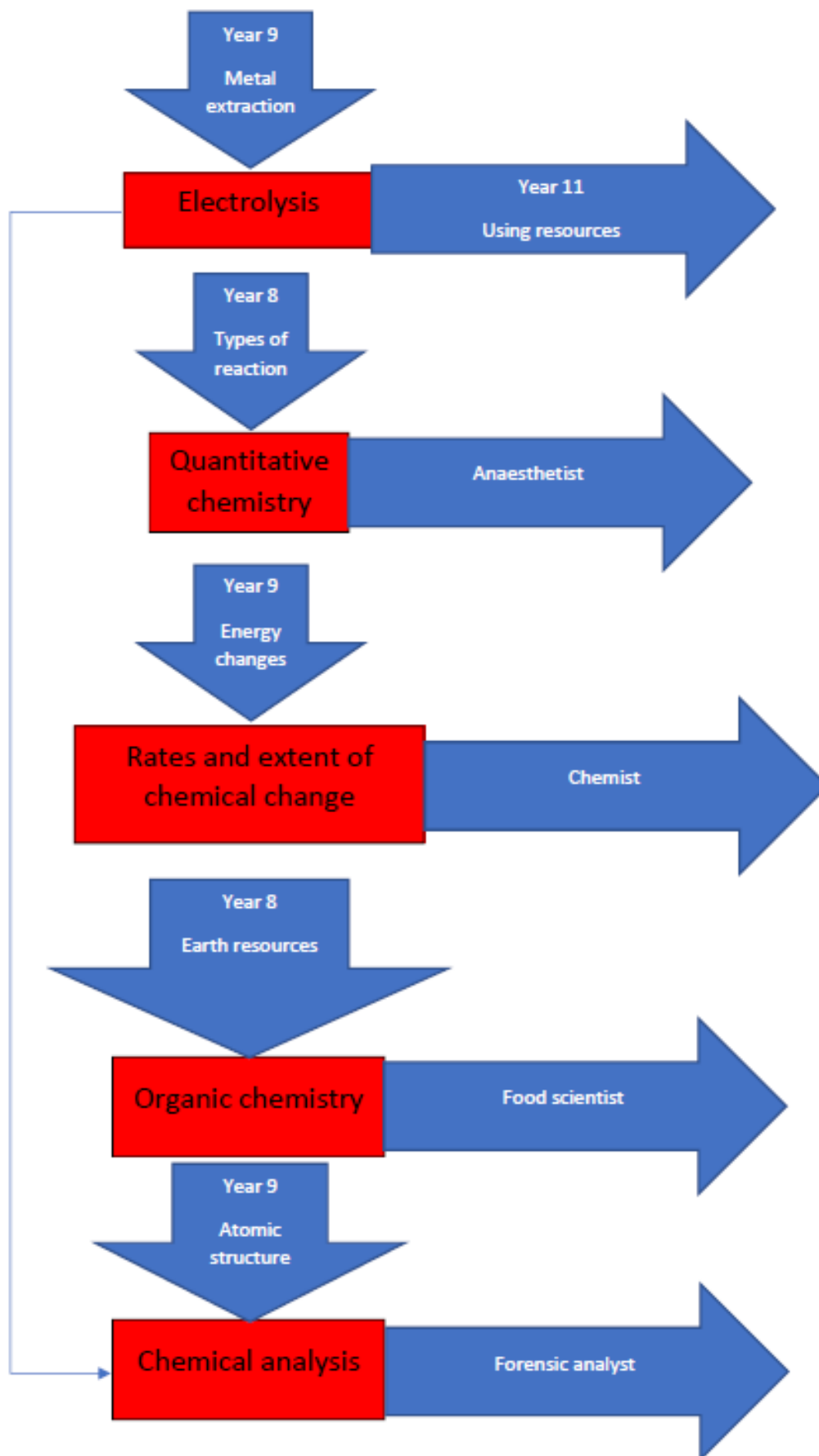
## Chemistry - Year 8



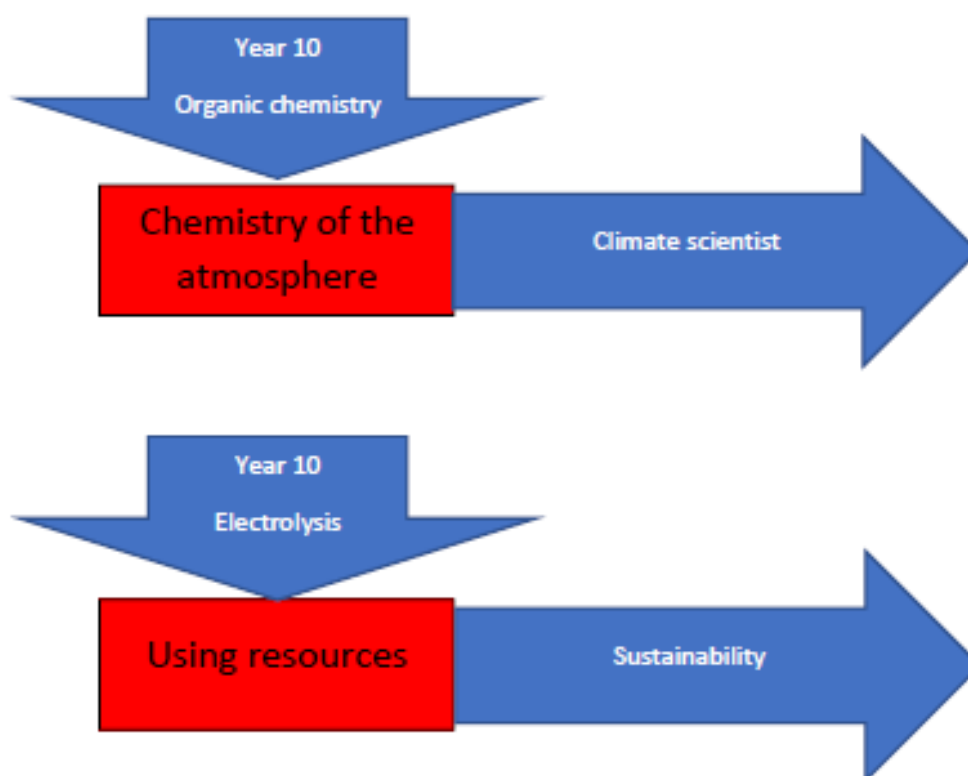
## Year 9 – Chemistry



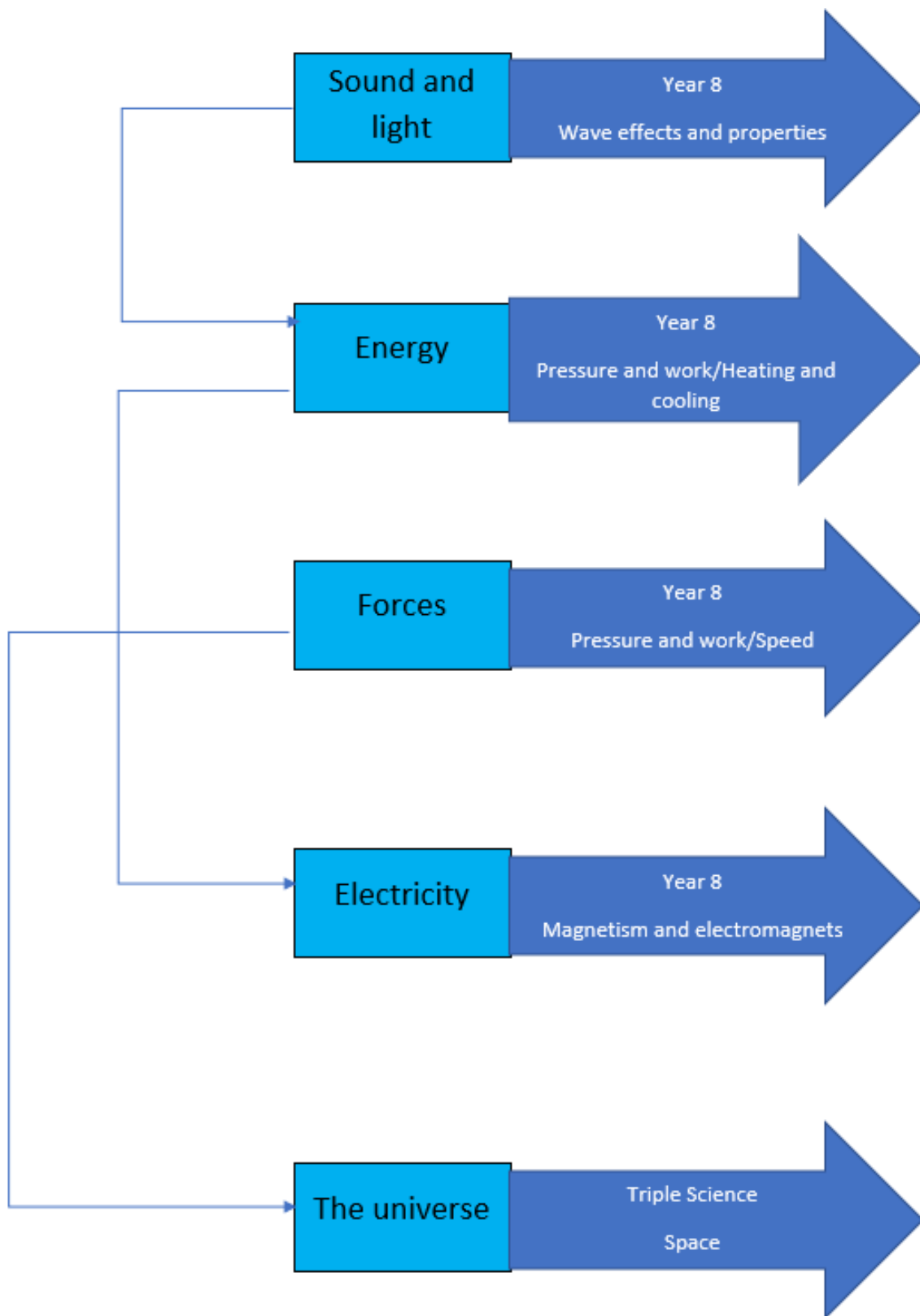
## Year 10 – Chemistry



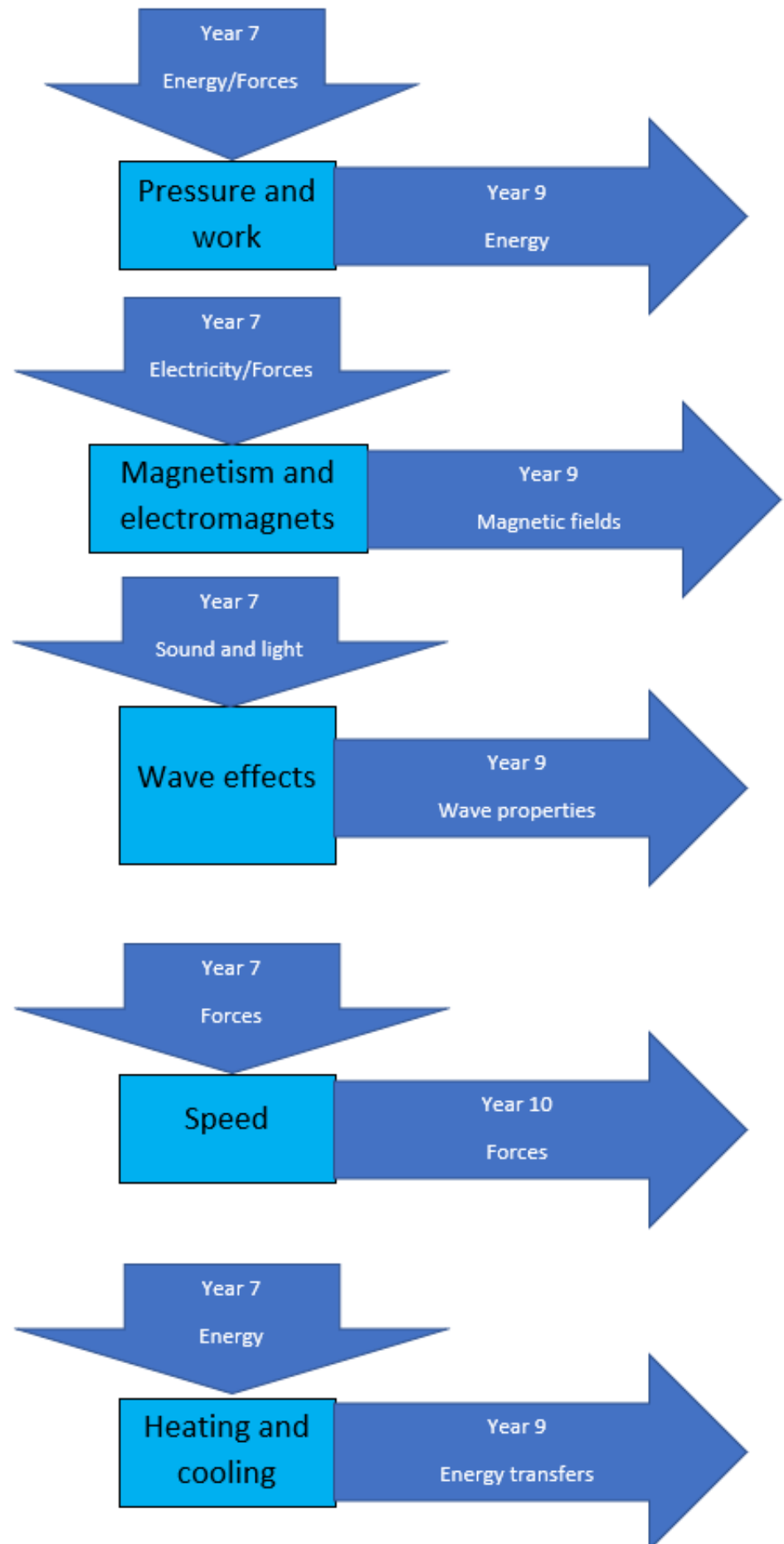
## Chemistry – Year 11



Year 7 – Physics

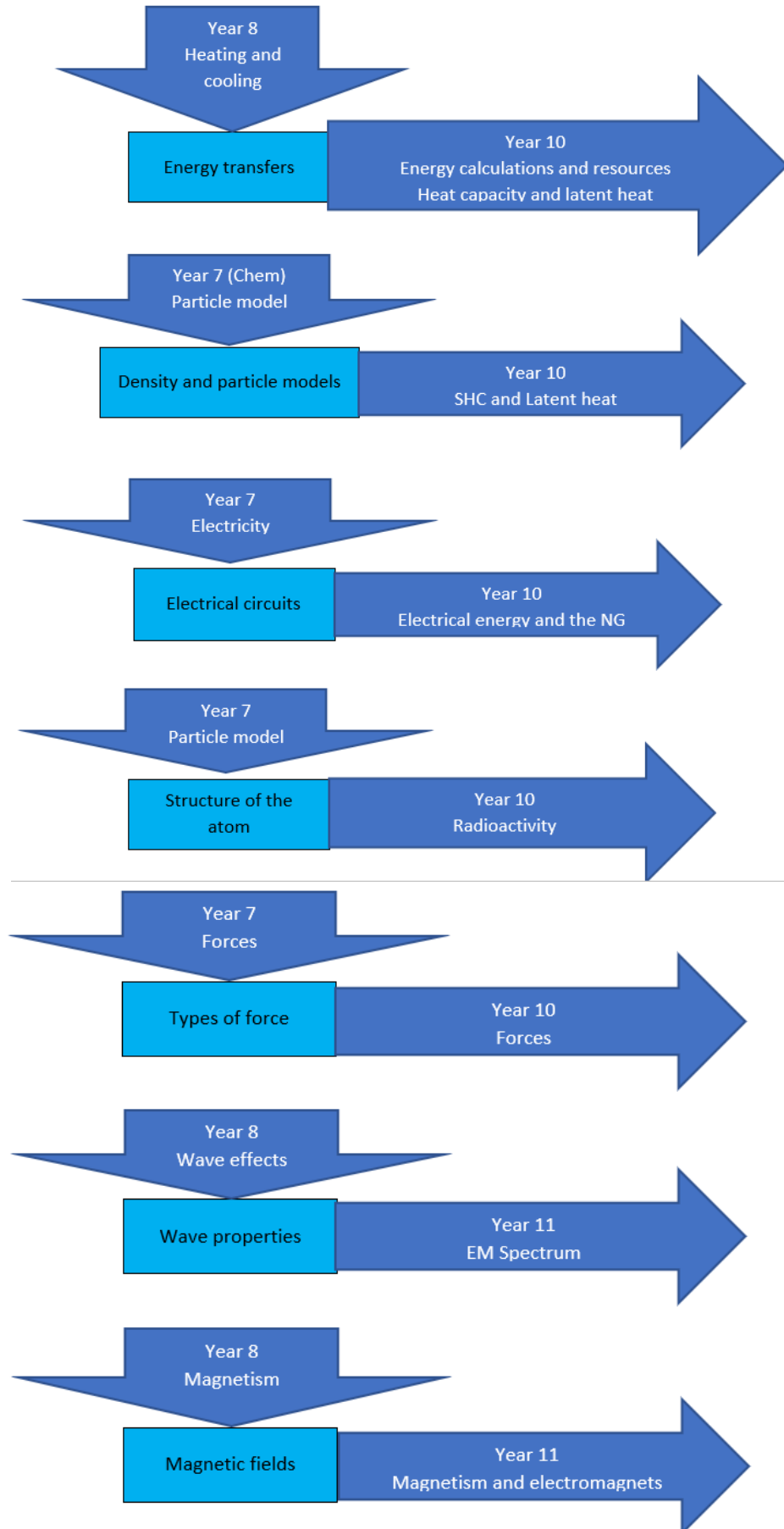


## Year 8 – Physics

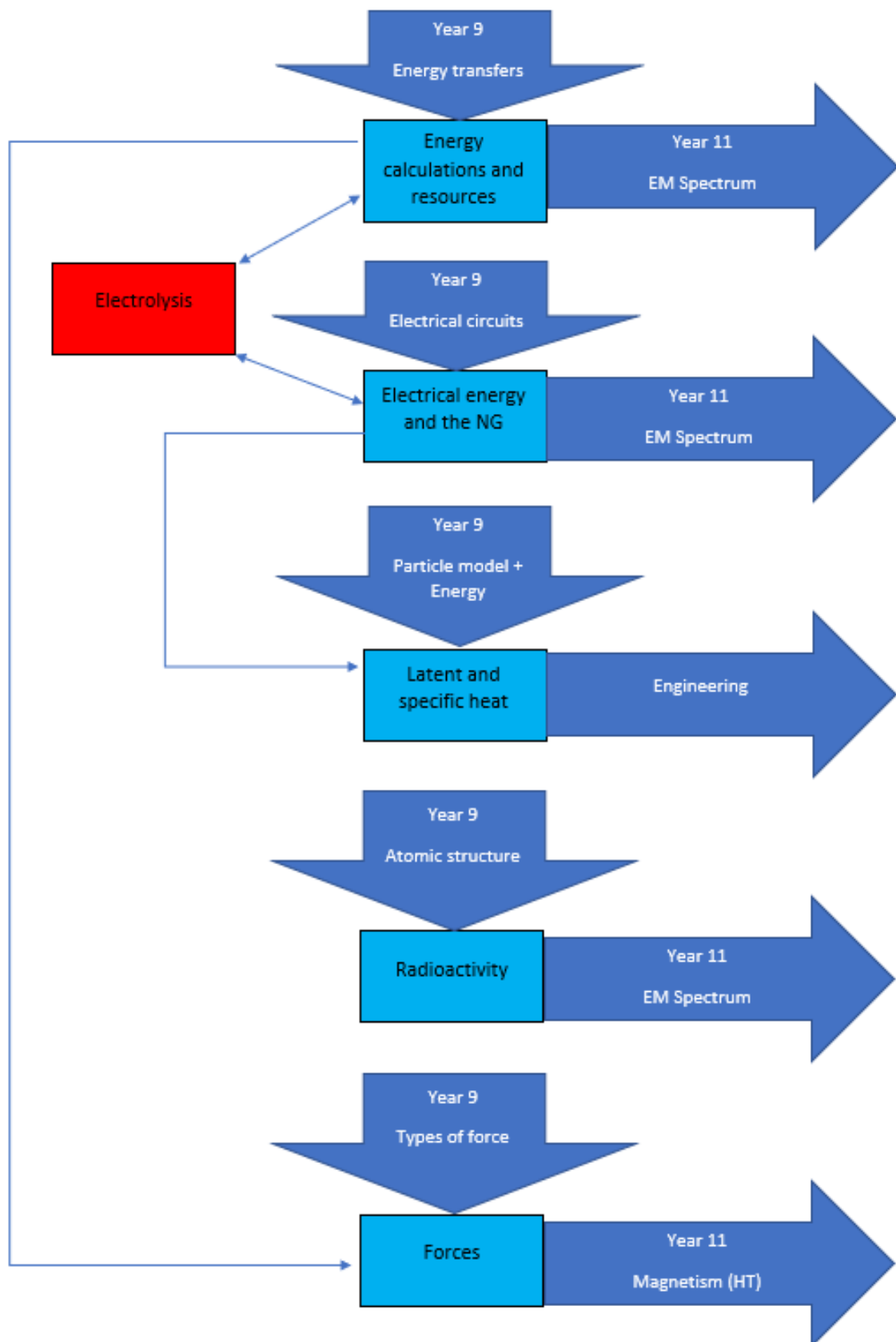




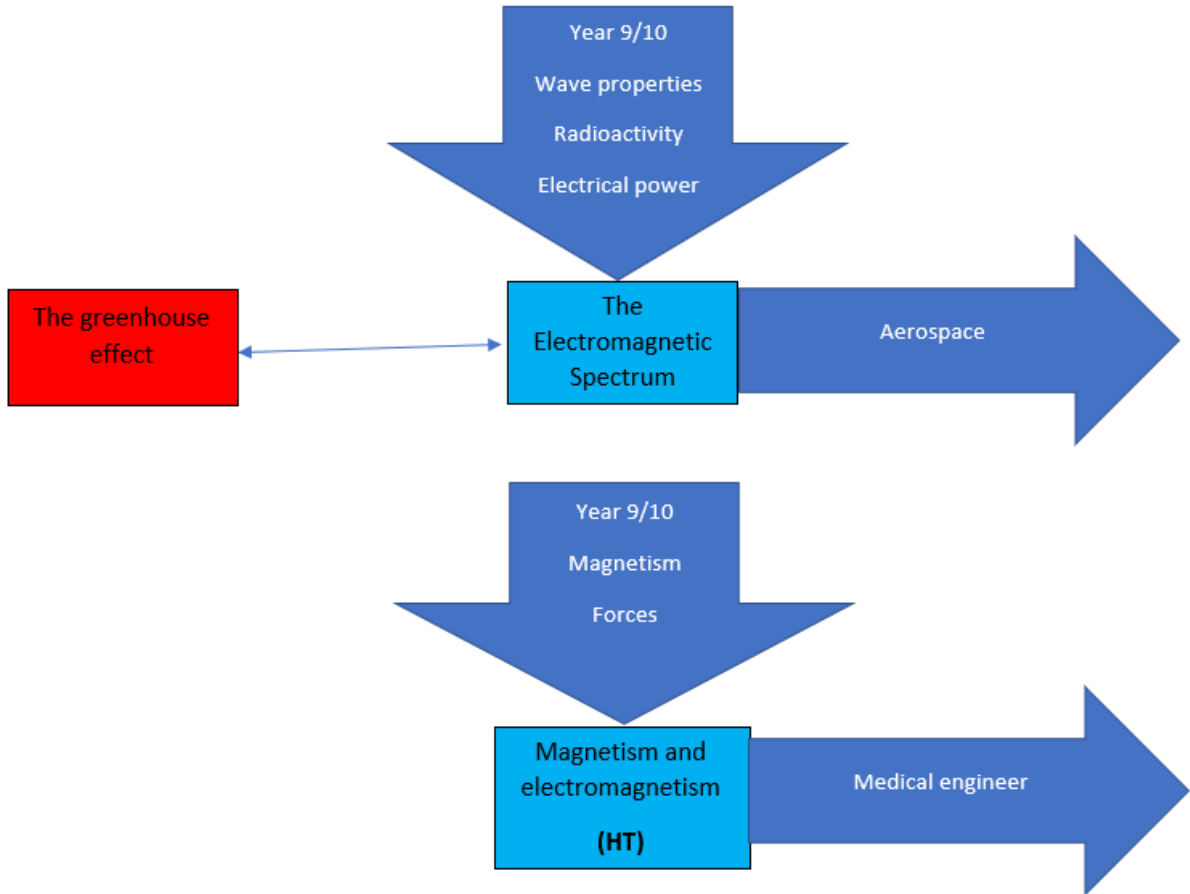
## Year 9 – Physics



## 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 should receive a piece of directed homework each week, at KS3 this alternates between the use of knowledge organisers and suitable tasks to deepen their understanding of content taught that week.

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 the use of exam questions are used regularly in their homework to allow for extended writing opportunities to synthesis the knowledge and skills they have gained over a series of lessons.

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.