Physics Key Stage 3 and 4 Learning Journey

Year 11

Wave Properties
- What type of waves are transverse and longitudinal
- Calculating the period of a wave
- Refraction of a wave front

Electromagnetic Waves
- Why are some parts of the EM spectrum hazardous?
- How can we communicate using radio waves?
- What is ionisation radiation?
- How are x-rays used in medicine?

Electromagnetism
- What is a solenoid?
- What is the motor effect?

Forces and Motion
- Calculating resulant force from acceleration
- Terminal velocity
- Factors affecting stopping distance
- Calculating momentum
- Investigating Hooke's Law

Motion
- How do you calculate acceleration?
- What does the area under the v-t graph tell you?
- How can you calculate acceleration from a v-t graph?

$$a = \frac{v_f - v_i}{t}$$

Forces in Balance
- Describing forces using free body diagrams
- How can we work out the centre of mass?
- How can we work out parallelogram of force?
- How can you resolve a force?

Electricity at Home
- What is the National Grid?
- What is the mains cable?
- Working out the correct fuse to use in an appliance
- Calculating the flow of electric charge

Molecules and Matter
- Calculating density
- Kinetic theory of matter
- Using temperature-time graphs to find melting and boiling points
- Latent heat
- Using smoke machines to observe Brownian Motion

Radioactivity
- What is a Geiger Counter?
- Alpha-particle scattering experiment
- Radioactive decay
- Calculating half-life

Electrical Circuits
- What do current-potential difference graphs show for a resistor?
- Identifying I-V graphs from components
- Rules for resistance in series and parallel circuits

Energy Resources
- Different fuels
- Renewable energy sources
- Why are we concerned about nuclear energy?
- Electricity demands and plans for the future.

Energy Transfer by Heat
- What is thermal conductivity?
- How do we heat a block of metal to calculate specific heat?
- How do we insulate buildings?

Conservation and Dissipation of Energy
- Energy stores
- Energy changes in bungee jumping
- How can we calculate GPE, KE and elastic energy?
- Improving and calculating efficiency
- Calculating power

Year 10

Waves, Sound and Light
- Describe how ideas about light have changed, and explain the link between colours of the spectrum, primary, and secondary colours.
- Name the waves of the electromagnetic spectrum, and describe how and why some of them are dangerous.

Waves, Sound and Light
- Describe some uses of the waves of the electromagnetic spectrum, and reasons for those uses.

Electricity and Magnetism
- Use the domain theory of magnetism to explain permanent and induced magnetism.
- Describe how to induce a p.d. I can describe what affects the sign and magnitude of the p.d. I can describe how a simple generator works.

Electricity and Magnetism
- Describe the difference between alternating and direct current. I can describe how a.c. is used to induce a p.d. I can describe what the National Grid is.

Energy
- Describe what elastic energy depends on. I can calculate elastic energy using an equation or a graph.

Energy
- Analyse situations and do calculations involving work and power.
- Describe what is meant by 'efficient' and calculate 'efficiency'

Force and Motion
Calculate acceleration and deduce types of motion from a speed-time graph.

$$s = \frac{d}{t}$$

Force and Motion
- Explain equilibrium and circular motion in terms of force.
- Use ideas about vectors and scalars to calculate resultant forces.

Year 9

Motion and Pressure
- How do I calculate speed?
- What do distance-time graphs tell us?
- What happens to atmospheric pressure as you go up a mountain?

Motion and Pressure (continued)
- Why do some things float and some things sink?
- How can you calculate pressure?
- How can you calculate momentum?

Electricity and Magnetism (continued)
- What is resistance in a circuit and how can we calculate it?
- What is a magnetic field?
- How do I make an electromagnet stronger?
- Uses of electromagnets

Electricity and Magnetism
- What is an electric field?
- Where do the charges come from?
- What is potential difference?
- What happens to current in a series and parallel circuit?

Energy (continued)
- What is conduction, convection and radiation?
- What's in a power station?
- How do we calculate power?
- How do we calculate work done?

Energy
- How much energy do we need in a day?
- What brings about changes in energy?
- What is temperature?

Year 8

Sound
- What is a wave?
- Describing longitudinal and transverse waves
- Which is faster - light or sound?
- What frequencies can you hear?
- How can you damage your hearing?
- What is ultrasound?

Light
- What happens to light as it travels?
- Why do I see an image in a mirror?
- Why does light change direction?
- How is the eye like a camera?
- Why are objects different colours?

Space
- How is a comet different from meteors?
- How did our solar system form?
- Why do we have different seasons?
- Why do we see eclipses?

Year 7

Forces
- How do you measure forces?
- What happens when you stretch a spring?
- How can you reduce friction?
- What happens to my weight in space?
- How do unbalanced forces change direction?

Introduction to the Science Laboratory and Investigation Skills (continued)
- How to record and calculate changes in temperature
- Hazard symbols
- Writing conclusions and making simple evaluations from investigations

Introduction to the Science Laboratory and Investigation Skills
- How could hazards be dangerous and how can we prevent them?
- Setting up a Bunsen burner safely

Year 11 Overview

In Year 11 students are fully prepared for the formal GCSE assessments through mock preparation. Regular exam assessments are completed to encourage students to frequently review the content taught. This allows teachers to assess students' understanding of key concepts in a range of questions and applying to a variety of contexts. It emphasises the need to continually revisit prior learning, enhancing long term memory stores. Students leave the Grange School equipped with the scientific knowledge base and skills to keep them well informed within an increasingly science-based society.

Year 10 Overview

The aim of the curriculum delivered in Year 10 is to build upon the understanding, and refine the skills that were developed in KS3. All students follow the Combined Science Pathway. This exposes students to the full breath of all three science disciplines. Our curriculum interweaves the subject specific content with the Working Scientifically aspects of the National Curriculum. Each topic is taught so that the key skills are mastered. The curriculum draws on real world contexts, modelling, and analogies where possible, so that students find concepts more relevant and interesting.

Year 9 Overview

The aim of the Year 9 Curriculum is to build on the key constructs of the KS3 Curriculum. The content taught early on is revisited again throughout KS4, creating opportunities for students to make connections within and across their learning. There is also an increased focus on the skills required to be successful at GCSE (for example planning valid investigations, collecting, analysing, and evaluating data).

Year 8 Overview

The Year 8 Curriculum builds on the knowledge and skills gained in Year 7. It covers the remainder of the KS3 Science National Curriculum. Students continue to develop their skills and acquire new knowledge, in addition to revisiting and building on the content covered in Year 7. Topics still focus around practical teaching and learning, with further emphasis on Working Scientifically. Content taught in Year 7, is now pursued in a greater detail, introducing more scientific terminology. them.

Year 7 Overview

The Year 7 Biology Curriculum is designed to review and extend the students' knowledge from primary school (KS2). It engages learners through practicals and demonstrations, and helps them develop their skills for Working Scientifically, while acquiring new knowledge across four distinct topics. Lessons are designed to support all learners, providing support and challenge. The structure of the lessons provides opportunity to assess prior learning and current level of understanding (from KS2) and then build on this.