SCIENCE
CURRICULUM MAP

Our subject vision:

Aspiration	**Mission statement:** *'We aim to teach students to become scientifically literate and responsible citizens as well as our next generation of inspirational professional scientists. A solid understanding of science is imperative for everyone and we have an aspirational curriculum full of great opportunities for every student.* *As a faculty "we enable all students to **acquire knowledge** that takes them beyond their experience. Access to knowledge is the **right** of all pupils as future citizens'* (Young, 2014). **Knowledge:** In Science we aim to understand the world around us. We look at everything from tiny atoms to enormous stars as well as how our bodies work. We have a spiral curriculum so key ideas are revisited and built-upon such as cells, energy and atomic structure. **Skills:** Students learn how to plan experiments, use laboratory equipment, analyse data and draw valid conclusions. We encourage a deep level of analytical thinking around topical scientific issues and believe that all students should learn to think like scientists. **Understanding:** At the end of students' study of Science they will be able to understand the world around them to be able to make decisions for themselves and their families. They will be prepared to undertake further study and have developed a curiosity for how and why things work.
Opportunity	**Within the classroom:** In Science lessons, students study a range of topics along with developing their practical skills. We ensure that every topic begins with links to relevant careers for students to explore using a research-based homework. Each topic also contains a link to a relevant real-life scientist. We offer "extra-curricular" within our curriculum such as a project tracking local wildlife, sponsored by the Royal Society. **Beyond the classroom:** Beyond the curriculum, students may participate in: • Science club • Eco club • IRIS Research project • Lots of partnership activities as part of the Abingdon Science partnership • External talks and visits
Integrity	**Knowledge:** Scientific knowledge allows students to engage with the world around them, to be active and knowledgeable citizens. Students are taught key information to help them make life choices such as around reproduction, genetic engineering and climate change. **Skills:** Students often work in pairs or small groups to complete practical work. This allows them to develop team working skills such as negotiation and clear communication. They are encouraged to have a solution-focused approach to problems that arise during the practical. **Understanding:** They demonstrate their character development through their increasing ability to apply real-world knowledge to their work, and through their application of empathy and interpretation skills in discussion and in writing.

SUBJECT CURRICULUM MAP
KS4: PHYSICS (TRIPLE)
AQA GCSE Physics (8463)

Further study

- A-level in Physics
- Apprenticeships
- BTEC Applied Science

Career pathways

- Physics Teacher
- Engineer
- (Mechanical / Electronic / Aerospace)
- Astrophysicist
- Architect
- Medical Physicist / Radiotherapist
- Laboratory Technician

Year 11

Space Physics

- Formation of the solar system
- Life history of a star
- Planets, satellites and orbits
- The expanding Universe
- The beginning and future of the Universe

Summer exams

Electromagnetism

- Magnetic fields
- Magnetic effect of electric currents
- Electromagnets in devices
- Motor effect
- Forces in magnetic fields
- Generator effect and electromagnetic induction
- Transformers and their uses
- Transformers and their uses

Mock exams

Mock exams are a complete **GCSE Physics paper 2** (Forces, Waves, Electromagnetism, Space physics)

Waves

- Nature and properties of waves
- Calculating and measuring wave speed
- Electromagnetic waves and their uses
- Dangers of electromagnetic waves
- Reflection and refraction of light
- Lenses
- Light and colour
- Infrared radiation
- Sound and ultrasound
- Seismic waves

Forces and motion

- Vectors and scalars
- Forces between objects
- Resultant forces and motion
- Newton's laws of motion
- Distance-time graphs
- Velocity and acceleration
- Velocity-time graphs
- Forces and acceleration
- Weight and terminal velocity
- Forces and braking
- Momentum
- Using conservation of momentum
- Impact forces and safety
- Forces and elasticity
- Pressure and surfaces
- Pressure in liquids
- Upthrust and flotation
- Atmospheric pressure
- Moments and equilibrium
- Centre of mass
- Levers and gears

Mock exams

Students also use their revision guides and an application (Educake) that help them learn and retrieve the basic knowledge they need to succeed.

Mock exams

Mock exams are a complete **GCSE Physics paper 1** (Energy, Electricity, Atomic structure, Particle model of matter)

Throughout KS4 students have end of unit assessments and then larger assessments to allow them to revisit earlier topics.

Extra opportunities
Physics Olympiad and Physics Challenge
Practical science workshops
Careers fairs and workshops

Atomic structure and radioactivity

- Discovery of the nucleus
- Structure of the atom
- Changes in the nucleus
- Properties of alpha, beta and gamma radiation
- Dangers of nuclear radiation
- Activity and half-life
- Contamination and irradiation
- Nuclear radiation in medicine
- Fission and fusion

Mains electricity

- Alternating currents
- Structure and function 3-pin plugs
- Using mains electricity safely
- Electrical power and fuses
- Electrical currents and energy transfer
- Transmission of electricity and the National Grid

Electrical circuits

- Electric charges and fields
- Current and charge
- Potential difference and resistance.
- Investigating resistance in circuits
- Analysing circuits
- Series and parallel circuits
- Component characteristics

Year 10

Year 11

1 Forces and motion

Why this?	All objects around us are acted upon by forces. This topic introduces the foundations of the forces topic, looking at what forces do, how they can be measured and looking at the effects that forces can have on an object. Forces can cause the motion of an object to change. Having studied the common forces and their effects, the topic now focuses on describing the motion of an object in terms of calculating its speed or acceleration, or calculating the distance travelled and the changes in motion of objects explained by considering the forces that are acting. The final section of the forces topic is to consider the pressure exerted on a surface by solids, liquids and gases. Explaining the origin of this pressure allows for explanation of its effects and on the design of objects.
Why now?	This unit provides the core knowledge needed for the forces topic Identifying forces and their effects on objects allows us to explain the motion and changes in shape that may occur. By considering resultant forces on objects, the motion and changes to motion of objects can be calculated and explained in more detail. This topic also allows for consolidation of some key ideas of kinetic theory from the Year 9 topic on the Particle model of matter.

2 Electromagnetism

Why this?	The link between electric currents and magnetic fields is explored in this topic of electromagnetism. Electromagnetic devices such as motors, circuit breakers and relay switches are investigated, and the key principle of electromagnetic induction is explored.
Why now?	This topic provides a great opportunity to revisit key ideas from the electricity and energy topics and to look at them in more detail. The principles behind the workings of motors, generators and transformers are revealed.

3 Space physics

Why this?	A topic full of wonder and big questions! In this topic the focus moves from the formation of the solar system, to the life cycle of stars and finishes with evidence to support the Big Bang theory, and what this tells us about the beginning and the future of the universe.
Why now?	An exciting culmination to the GCSE Physics course and a topic that always encourages deep thought and big questions. This topic provides an opportunity to explore ancient and cutting edge astronomy.

Year 10

1 Electrical circuits

Why this?	This topic introduces the pupils to electrical circuits. There is plenty of opportunity for investigative work as current, potential difference and resistance in different circuits is studied.
Why now?	This is an exciting topic to start year 10 which revisits ideas from year 7 on electrical circuits and builds on the energy topic from year 9. Understanding this topic will allow for application in the Mains electricity topic.

2 Mains electricity

Why this?	An important topic, the safe use of mains electricity in the home. Looking at the design and function of the 3-pin plug and how electricity can be transmitted from the power station to the consumers
Why now?	The topic builds upon key ideas studied in the previous topic of electrical circuits and knowledge of this topic can be applied to the safe use of mains electricity in the home.

3 Atomic structure and radioactivity

Why this?	Having looked at the properties of solids, liquids and gases in Year 9, we now delve deeper and look at the structure of atoms and consider the radiation emitted by an unstable nucleus. An understanding of the properties and risks associated with nuclear radiation allows us to consider the uses of radioactive substances in industry and in medicine.
Why now?	This topic follows on from the bulk properties of matter and now considers the structure of the atom. Properties, practical uses and the dangers associated with alpha, beta and gamma radiation are explored.

4 Waves

Why this?	Waves are all around us and are used in a variety of ways. In this topic the nature of waves and their properties is explored. The interaction of waves with materials leads on to how waves can be used for sending information, imaging the body and exploring the structure of the Earth. Electromagnetic waves are used for a huge range of applications in the modern world. The properties, uses and the dangers associated with each of the electromagnetic waves are also explored. This topic then focuses on the most familiar electromagnetic wave, visible light. The properties of reflection, refraction, colour and the use of lenses are explored in greater detail.
Why now?	Appreciating the nature and properties of waves allows their uses to be investigated in detail. The many uses of electromagnetic waves in our modern world are explored as well as the risks associated with some of the waves. Wave effects such as reflection, refraction are investigated, and this provides the knowledge needed to investigate the use of lenses, seismic waves and ultrasound.

SUBJECT CURRICULUM MAP
KS4: PHYSICS (COMBINED)
AQA GCSE COMBINED SCIENCE Trilogy (8464)

Further study

- A-level in Physics
- Apprenticeships
- BTEC Applied Science

Career pathways

- Physics Teacher
- Engineer
- (Mechanical / Electronic / Aerospace)
- Astrophysicist
- Architect
- Medical Physicist / Radiotherapist
- Laboratory Technician

Year 11

Atomic structure and radioactivity

- Discovery of the nucleus
- Structure of the atom
- Changes in the nucleus
- Properties of alpha, beta and gamma radiation
- Dangers of nuclear radiation
- Activity and half-life
- Contamination and irradiation

Mains electricity

- Alternating currents
- Structure and function 3-pin plugs
- Using mains electricity safely
- Electrical power and fuses
- Electrical currents and energy transfer
- Transmission of electricity and the National Grid

Mock exams

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Forces and motion

- Vectors and scalars
- Forces between objects
- Resultant forces and motion
- Newton's laws of motion
- Distance-time graphs
- Velocity and acceleration
- Velocity-time graphs
- Forces and acceleration
- Weight and terminal velocity
- Forces and braking
- Momentum
- Forces and elasticity

Students also use their revision guides and an application (Educake) that help them learn and retrieve the basic knowledge they need to succeed.

Extra opportunities
Physics Olympiad and Physics Challenge
Practical science workshops
Careers fairs and workshops

Electrical circuits

- Current and charge
- Potential difference and resistance.
- Investigating resistance in circuits
- Analysing circuits
- Series and parallel circuits
- Component characteristics

Year 10

Summer exams

Electromagnetism

- Magnetic fields
- Forces in magnetic fields
- Magnetic effect of electric currents
- Electromagnets in devices

Mock exams

Mock exams are a complete **GCSE Physics paper 2** (Forces, Waves, Electromagnetism)

Waves

- Nature and properties of waves
- Calculating and measuring wave speed
- Electromagnetic waves and their uses
- Dangers of electromagnetic waves
- Reflection and refraction of light

Year 11

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Why now?	This unit provides the core knowledge needed for the forces topic Identifying forces and their effects on objects allows us to explain the motion and changes in shape that may occur. By considering resultant forces on objects, the motion and changes to motion of objects can be calculated and explained in more detail. This topic also allows for consolidation of some key ideas of energy transfer from the Year 9 topic on the Energy.

2 Waves

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