

Physics Topics

SP1 Motion

In this unit you will learn about quantities that have direction. You will find out how to calculate speeds and accelerations, and how to represent changes in distance moved and speed on graphs.

Builds upon:

From KS3:

- What forces are and the effects of balanced and unbalanced forces
- How average speed, distance and time are related
- How to represent a journey on a distance-time graph

Introduces:

- The difference between vector and scalar quantities
- How to calculate speed and acceleration
- How to represent journeys on distance-time and velocity-time graphs
- How to use graphs to calculate speed, acceleration and distance travelled

Assessment

- End of topic test
- Six mark question

SP2 Forces and Motion

In this unit we will learn about forces and how they determine the motion of objects. We will look at applying these ideas to car safety.

Builds upon:

From KS3:

- What forces are and the effects of balanced and unbalanced forces
- What a resultant force is
- Gravity as a non-contact force
- How energy is stored and transferred

Introduces:

- Newton's laws of motion
- How to calculate an object's weight from its mass
- The factors that affect the stopping distance of a vehicle
- Calculate braking distances using energy
- The dangers of large decelerations
- How to calculate momentum and apply ideas about momentum to collisions (H)

Assessment

- End of topic test
- Six mark question

SP3 Conservation of Energy

In this unit you will learn about the ways in which energy can be transferred and stored, how to reduce energy transfers and the renewable and non-renewable resources we use in everyday life.

Builds upon:

From KS3:

- Temperature differences lead to energy transfers
- How energy can be transferred by conduction, convection and radiation
- Ways of reducing energy transferred by heating
- That energy is conserved

Introduces:

- How energy is stored and transferred
- How to represent energy transfers using diagrams
- How to calculate efficiency
- How to reduce transfers of wasted energy
- How to calculate gravitational potential energy and kinetic energy
- Different renewable and non-renewable energy resources

Assessment

- End of topic test
- Six mark question

SP4 Waves

This unit introduces you to waves characteristics and how they transfer energy and information.

Builds upon:

From KS3:

- Light and sound waves and how they can be described
- How sound waves are produced and detected
- Some uses of sound waves
- How light can be absorbed, scattered and reflected
- Different colours of light

Introduces:

- How waves transfer energy and information
- How to describe the characteristics of waves
- How the speed of a wave is related to its frequency and wavelength
- How the speed of a wave is related to time and distance
- How waves are refracted at boundaries between different materials
- More about how our ears work
- The uses of ultrasound and infrasound

Assessment

- End of topic test
- Six mark question

SP5 Light and the Electromagnetic Spectrum

This unit will help you learn about the electromagnetic spectrum, harmful effects of waves from this spectrum and that light is part of this family of waves which all have some properties in common.

Builds upon:

From KS3:

- How light transfers energy
- How different colours are absorbed and reflected

Introduces:

- That light is part of the electromagnetic spectrum
- Uses of the waves in the electromagnetic spectrum
- Harmful effects of waves in the electromagnetic spectrum
- How to use ray diagrams to explain reflection, refraction and total internal reflection
- How to make coloured light and why some objects appear coloured
- How lenses work and their uses
- Factors that affect the temperature of the Earth

Assessment

- End of topic test
- Six mark question

SP6 Radioactivity

This unit looks at the structure of atoms, types of radiation and their effect on atoms, and the dangers of radioactive substances and sources.

Builds upon:

From KS3:

- The particle model of matter
- That atoms contain electrons
- Nuclear fuel as a non-renewable energy resource

Introduces:

- How the particles inside atoms are arranged
- How to represent atoms using symbols
- The different types of radiation and how they affect atoms
- Background radiation
- The uses of radioactivity
- The dangers of radiation and how we can protect ourselves
- How radioactive materials are used to diagnose and treat cancer
- The advantages and disadvantages of nuclear power
- Fission and fusion reactions

Assessment

- End of topic test
- Six mark question

SP7 Astronomy

In this unit we learn about the Solar System and how gravity affects orbits. We learn about the life cycles of stars and evidence for different theories of the universe.

Builds upon:

From KS3:

- The Solar System
- The Earth's gravitational field and weight
- That there are stars and galaxies beyond the solar system

Introduces:

- The bodies in our Solar System and how ideas about it have changed over time
- How methods of observing the universe have changed over time
- Why gravity is different on different bodies and how this affects orbits
- What redshift is and what it shows
- Different theories of the universe
- The life cycles of stars

Assessment

- End of topic test
- Six mark question

SP8-9 Energy and Forces

This unit introduces you to the ways in which energy can be changed in a system, and how to calculate power and work done.

Builds upon:

From KS3:

- How energy can be stored and transferred
- Balanced and unbalanced forces
- Moments as the turning effect of forces

From KS4 CP1 and CP3:

- The difference between vector and scalar quantities
- How to calculate GPE and KE
- Energy transfer diagrams and calculating efficiency

Introduces:

- How the energy in a system can be changed
- How to calculate power and work done
- Force fields and contact forces
- Calculate moments to understand how levers and gears work
- Using vector diagrams to work out the effects of forces on an object (H)

Assessment

- End of topic test

SP10-11 Electricity and Circuits / Static Electricity

This unit introduces you to electric circuits, current and potential difference, charge and energy, resistance, transferring energy, and power. You also learn about static electricity and its uses and risks.

Builds upon:

From KS3:

- That current is measured in Amps and potential difference is measured in volts
- That components can be connected in series or parallel
- That conductors have low resistance and insulators have high resistance
- Electric fields, how objects become charged and how charged objects behave

Introduces:

- Current, charge and potential difference
- How to calculate resistance, power and energy transferred
- Components with changing resistance
- The UK domestic electricity supply and safety features
- How earthing works and why it is important
- The shape and size of electric fields and how they explain electrical phenomena

Assessment

- End of topic test
- Six mark question

SP12-13 Magnetism and the Motor Effect / Electromagnetic Induction

CP10 introduces you to magnets and magnetic fields, electromagnetism and magnetic forces. CP11 covers transformers and energy.

Builds upon:

From KS3:

- How to plot the shape of a magnetic field and that the Earth has a magnetic field
- That electric currents cause magnetic fields, including electromagnets and motors

Introduces:

- Permanent and induced magnets, and how to represent a magnetic field
- The magnetic field around a current in a wire
- The magnetic field in a solenoid
- The power equation for transformers
- How to use the turns ratio equation for transformers (H)
- How transformers are used in the national grid
- How current can be induced in a wire (H)
- How to calculate the force on a wire in a magnetic field (H)
- How to work out the direction of the force on a wire in a magnetic field (H)

Assessment

- End of topic test
- Six mark question

SP14-15 Particle Model / Forces and Matter

This unit introduces you to particles and density, energy and changes of state, energy calculations, and gas temperature and pressure. It also covers bending and stretching, and extension and energy transfers.

Builds upon:

From KS3:

- That mass is conserved during changes of state
- The properties of solids, liquids and gases
- How particles are arranged in solids, liquids and gases, and how this is affected by temperature

From KS4 CP2:

- The effects that forces have on objects

Introduces:

- How to calculate densities of substances
- How to calculate specific heat capacity and specific latent heat
- How changing the temperature of a gas affects its pressure and how to calculate temperatures and pressures
- The Kelvin and Celsius temperature scales
- Elastic and inelastic distortion
- The relationship between force, extension and the spring constant
- How to calculate the work done when stretching a spring
- How pressure in fluids depends on density and depth

Assessment

- End of topic test
- Six mark question