

Curriculum Summary – Physics (Year10)

Autumn

P4: Electric circuits

In this chapter, students will:

- Describe the structure of an atom in terms of charged particles and the process of charging by friction.
- Describe electric circuits and the components used to construct them using the concept of current as the rate of charge flow through components.
- Investigate the factors affecting the resistance of a wire and the corresponding current-potential difference graphs,
- Investigate the current-potential difference graphs of wires, filaments, and diodes.
- Investigate the resistance of a thermistor and its temperature along with the relationship between the resistance of a light-dependent resistor and light level.
- Learn about the differences between series and parallel circuits.

P5: Electricity in the home

In this chapter, students will:

- Compare direct and alternating currents in terms of current direction. An oscilloscope will be used to analyse changes in the potential difference causing the current and to measure the peak voltage, period and frequency of a low voltage sinusoidal AC signal.
- Describe the UK mains supply and the wires used within it, outlining the National Grid and the high voltages associated with it.
- Understand mains circuits, including the function of the neutral and earth wires and the choice of materials used for construction of mains circuits
- Mathematically analyse circuits to determine the power supplied by a current and the relationship between power and the resistance of components.
- Evaluate the importance of efficiency within mains powered electrical devices and understand simple energy efficiency ratings.

Spring

P1: Energy and energy resources

In this chapter, students will:

- Develop their understanding of energy, energy transfer and the processes through which energy can be transferred.
- Learn how to measure the work done by a force acting over a distance and analyse energy changes in gravitational stores and elastic potential stores.
- Learn about the dissipation of energy during transfers, how to calculate energy efficiency and how this applies to the selection of electrical devices.
- Learn about the rate of energy transfer in different systems and how power ratings can be used to determine total energy change over time.

P2: Energy transfer by heating

In this chapter, students will:

- Develop their understanding of how energy is transferred by heating and cooling.
- Investigate thermal conductivity and the differences in the processes of thermal conduction in metals and non-metals.

- Analyse the changes in temperature when a material is heated and determine the specific heat capacity of materials experimentally.
- Understand the reduction of energy transfers to the surroundings by insulation, such as loft or cavity wall insulation, and apply this to the context of reducing energy loss in buildings.

P3: Energy resources

In this chapter, students will:

- Examine the different sources of energy that are used to generate electricity or provide heating for homes.
- Evaluate the effect of the production and use of biofuels on the environment and the use of nuclear power in comparison to fossil fuels.
- Describe and evaluate renewable resources and how these can be used to generate electricity in specific locations
- Investigate the principles of solar cells.
- Compare all the energy resources in terms of local environmental impacts.
- Describe how the different resources could be applied in combination to meet the base load and changing energy demands.

Summer

P6: Molecules and matter

In this chapter, students will:

- Learn about density by measuring and calculating the density of solids and liquids.
- Discuss states of matter, the properties of matter in these states and the changes which occur as a material changes from one state to another.
- Understand kinetic theory and analyse the changes in temperature occurring during heating and the concept of latent heat.
- Understand what is meant by internal energy and analyse the behaviour of particles in a solid, liquid or gas as temperature changes.
- Describe latent heat of fusion and vaporisation mathematically, calculating energy changes during the appropriate phase changes and attempt to measure the latent heat of fusion for ice using electrical heating.

P7: Radioactivity

In this chapter, students will:

- Describe how the structure of the nucleus was discovered and how atomic models have changed as a result of experimentation.
- The students will describe the changes in the nucleus which occur during alpha, beta, and gamma decay
- Learn about the properties of alpha, beta, and gamma radiation and discuss their use in thickness monitoring and safety measures required.
- Discuss the concepts of activity, count rate, and the patterns in radioactive decay that explain half-life and the associated graphs.