

PHYSICS

Unit I is studied in the Autumn term and units J, K and L will be studied between New Year and May 2017.

7I Energy and Sustainable Living

Topic 7Ia introduces the idea of 'green living' and the need for energy, and looks at how fossil fuels were formed and how long they will last. Extension material looks at the fuel resources used to generate electricity. Topic 7Ib explains the idea that burning fossil fuels is thought to be leading to global warming, and looks at different ways in which we might reduce our energy use.

Topic 7Ic outlines energy resources other than fossil fuels, and introduces the idea of renewable resources. Students are encouraged to consider the advantages and disadvantages of using different energy resources.

Topic 7Id looks at food as a store of energy.

Topic 7Ie completes this unit by looking at the idea that energy from the Sun is the original source of most of our energy resources, including fossil fuels, wind, waves and hydroelectricity. The unit concludes by considering whether science is the cause of energy-use problems or part of the solution (or both!).

7J Electrical circuits

Topic 7Ja starts by revising some concepts that many pupils will have covered at KS2 – electrical safety at home and in school, and basic circuits and switches – and then goes on to look at using ammeters to measure current in a series circuit and the idea of resistance.

Topic 7Jb discusses the heating effect of current and how it is used in electric fires, light bulbs and fuses. Students will study using bimetallic strips to control circuits. The practical on investigating the resistance of different lengths of wire can be used as an embedding practical for KS4.

Topic 7Jc develops a conceptual model for an electric circuit. This is used to emphasise that current is not used up around a circuit and that electricity is a means of transferring energy. A couple of alternative models are presented, and pupils are encouraged to think about their strengths and weaknesses, and which model helps them to think about electricity.

Topic 7Jd introduces parallel circuits in the context of lighting circuits and discusses the differences between series and parallel circuits.

Topic 7Je discusses electricity and the body, including nerves, organs and electric shocks. There is an opportunity to discuss the development of ideas about electricity by looking at the disagreement between Galvani and Volta. The unit concludes by discussing the potential use of electric cars.

7K Forces and their effects

Topic 7Ka introduces the outdoor activity theme for the unit, and revisits ideas about forces first met at KS2: that forces are pushes or pulls, that forces can change the speed or direction of movement of something or change its shape. This topic also looks at the difference between mass and weight.

Topic 7Kb looks at friction, the effects of surface roughness on friction, and lubrication. It also discusses various ways in which friction is helpful and not helpful. We will ask pupils to analyse the results of a weight and friction experiment. A practical activity on investigating the factors affecting friction will be studied.

Topic 7Kc looks at floating and sinking, and emphasises that things float when weight is balanced by up thrust. Students will carry out study on the Plimsoll line and Archimedes, and in looking in more detail at how the use of friction and buoyancy can help to keep outdoor sports safe.

Topic 7Kd looks at balanced forces, and how forces are measured using springs.

Topic 7Ke introduces the idea that different units for speed can be appropriate for different circumstances. Vehicle stopping distances and distance–time graphs are introduced.

7L The solar system

Topic 7La starts by revisiting KS2 work on the shape of the Earth, the reasons we have day and night, and the definitions of years and leap years.

Topic 7Lb describes the Moon, phases of the Moon and eclipses.

Topic 7Lc looks at the differences in day length, temperature and Sun elevation through the seasons, and explains why this happens.

Topic 7Ld discusses the Earth's place in the Solar System, briefly describes the other planets and explains that we can only see the planets because of reflected light.

Topic 7Le looks at stars and galaxies, and discusses the distances between the stars.