KS3 Curriculum Overview

PHYSICS

Curriculum Intent

Our ambition is for all students to understand Physics as the science of energy, forces and matter, that everything that happens is the result of energy being stored and transferred in its various forms.
Students who are able to effectively propose and investigate a hypothesis are scientists by definition. Through investigation students learn how to make sense of the natural world. They are able to marvel at the beauty of nature and the elegance of its laws and apply this understanding to solve real world problems.

How does the KS3 curriculum build on that from KS2?

The priority at KS2 is to gain an understanding of how to undergo a scientific investigation and by consideration of macroscopic observation (e.g. classifying rocks, classifying living things, investigating magnetism). In Y7 especially, we reinforce these ideas and then push students beyond KS2 by considering how microscopic (in biology) or nanoscopic (in chemistry and physics) processes act as drivers for the macroscopic observations

What do students *do* with this knowledge or these skills?

We are increasingly looking for students to be able to carry out full scientific investigations. Over time students should increasingly be able to:

- propose a hypothesis
- design an experiment
- select suitable apparatus
- identify a variable to change, measure and explain how all others will be controlled
- select a suitable method to record and present data and any relationships therein, followed by a sensible conclusion
- write an honest evaluation of the validity of the method and the reliability of the data

How does the KS3 curriculum align to the National Curriculum?

Whilst students will have been taught science at Primary school, we want to introduce them to the subject as specialists. Students should appreciate the three distinct but complementary disciplines: Physics – we study energy including sound and light – how it drives every process in the universe. In Year 8 students need to consider how energy is transferred by considering thermal energy and should appreciate energy is conserved throughout space. In Year 9 students complete KS3 by looking at forces and electricity in more depth to appreciate the nuanced behaviour of electrons in circuits or how forces can be multiplied to great effect.

What new knowledge or skills are students taught?			
Term	**Year 7**	**Year 8**	**Year 9**
Autumn	**Energy** • Energy is never created or destroyed. • Energy is transferred between stores via pathways. • We pay for energy transferred to our homes. • Energy resources have lots of advantages and disadvantages linked to ecology and cost • When Energy is transferred, the total amount is conserved, but some is dissipated, reducing the useful energy.	**Heating & cooling** • Thermal energy of an object depends on its mass, temperature and what its made off. • Energy travels from hotter to cooler by conduction, convection or radiation. • When force is used energy gets transferred. Energy transferred means that work is done. • The bigger the force or distance moved, the greater the work.	**Work** • Pressure is force acting on an area P=F/a • Pressure in fluids is caused by the collisions of particles with a surface and depends on depth • Describe and interpret the Springs investigation • Calculate moments for pivots and levers • Calculate work done.
Spring	**Forces** • Resultant force makes things speed up, slow down or change direction or shape. • Mass and weight are different, but related. Weight is caused by gravitation pull on a given mass. • Every object exerts gravitation force on every o0ther object. This force increases with mass, and decreases with distance • Gravity holds planets and moons in orbit around larger bodies.	**Space** • Gravity is a force that differs in strength amongst the planets. • Our solar system consists of different planets which are all unique. • When force is used energy gets transferred. Energy transferred means that work is done. • The bigger the force or distance moved, the greater the work. • Machines make work easier by reducing the force needed.	**Particle model of matter** • Density is the mount of particles in a volume of space. P-m/v • Temperature is the measure of internal energy of particles (Kinetic and potential). • Charles's law explains that pressure of a fluid increases when it is heated in a sealed container.
Summer	**Waves** • Sound consists of vibrations travelling as a longitudinal wave- the denser, the faster. • How fast do sound and light travel? • How do lenses correct short and long sight? • Why do coloured objects seem to change colour when the colour of the light changes? • Angle of reflected light is equal to the angle of incidence. • Refraction through lenses is described using ray diagrams.	**Electricity** • Voltage is a push from the battery which makes charges to move through the wires – Electric current. • In a series voltage is shared between components, in a parallel circuit voltage is same in each branch • Resistance reduces the current flowing and transfers energy to the surroundings as heat. • Current is a movement of electrons and is the same around the series circuit.	**Atomic structure** • Atoms are made of protons and neutrons in the nuclei, and electrons on outer shells. • Some atoms release radiation; alpha, beta or gamma, each differs greatly for example in penetrating power. Separate Only: • Nuclear fusion is the process during which lighter nuclei fuse together creating heavier nucleus as well as lots of energy. Nuclear fission is the process of splitting unstable nuclei producing smaller nuclei, 2-3 neutrons as well as huge amounts of energy.
Rationale for this sequencing	Students's curriculum knowledge builds in breadth and depth as they progress through KS3 science. Each term and topic focussing on key threads through the three sciences; biology chemistry and physics. There is also a core focus throughout the curriculum on developing key practical skills to become young scientists		

Additional support at home	
Additional reading for enjoyment, enhancement and extension	• Space Boy by David Walliams • The space we're in by Katya Balen
Online resources to practice, consolidate and revise	• BBC Bitesize • Kay Science
Workbooks & revision guides to practice, consolidate and revise	• Higher: KS3 Study Guide • Foundation: KS3 Study Guide

EASTERN LEARNING ALLIANCE