

YEAR 7

Autumn Term

Physics

Forces and energy

Threshold concept:

Forces:

Forces, both contact and non-contact, can be represented with arrows and the motion of an object depends on the resultant force acting on the object

Energy:

Conservation of energy; energy cannot be created or destroyed, only shifted between different stores.

Key knowledge

- Contact and non-contact forces
- Measuring forces
- Representing forces
- Balanced and unbalanced forces
- Resultant forces
- Friction
- Energy stores
- Conservation of energy
- Energy transfers

Key Vocabulary

Friction
Contact
Newtons
Balance
Resultant
Conservation
Joules
Transfer
Pathway
Energy

Spiritual, moral, social, cultural

- developing social skills through group and practical work.
- considering the safety of others during practical work.
- understand the importance of engineering and how it keeps people safe when designing vehicles, bridges and machinery

Career links

- Engineer
- Aviation
- Mechanics
- Computing
- Medicine
- Design



			Watch the following videos to recap knowledge: - How Objects Interact Force & Motion Physics FuseSchool - Balanced & Unbalanced Forces Forces & Motion Physics FuseSchool - Conservation Of Energy Energy Physics FuseSchool - Energy stores - Energy - KS3 Physics - BBC Bitesize - Force diagrams and resultant forces - Forces and movement - KS3 Physics - BBC Bitesize	
	Chemistry	Solids, Liquids and Gases	Threshold concept: Particle model: How particles behave in solids, liquids and gases. How particles behave in chemical and physical changes.	Key Vocabulary Arrangement Apparatus hazard Mass Melting Freezing Condensing Evaporating
			Key knowledge • The arrangement and movement of particles in the three states of matter. • Particle model diagrams • Changing state - Melting/freezing/boiling/condensing • Evaporation • Diffusion in terms of the particle model • Understanding the type and use of scientific equipment • Using Bunsen burners safely	
			Spiritual, moral, social, cultural • developing social skills through group and practical work. • considering the safety of others during practical work.	Career links • Particle Physicist • Nuclear power plant operator • Energy Consultant
			Watch the following videos to recap knowledge: - What is the arrangement of particles in a solid, liquid and gas? - BBC Bitesize - What are changes of state? - BBC Bitesize - States of Matter (solids, liquids and gases) Properties of Matter Chemistry FuseSchool - Changes of State Matter Physics FuseSchool	

	Biology	Cells	Threshold concept: Cells and the cell cycle To include the differences between animal, plant and bacterial cells, cell division, and organisation of cells, tissues and organs. Transport and exchange surfaces To include how particles move across membranes via osmosis, diffusion and active transport. Key knowledge • Structure and function of the organelles within animal cells • Structure and function of the organelles within plant cells • Using a microscope to view cells effectively • Calculating total magnification • Specialised cells and their adaptations • Unicellular and multicellular organisms • Diffusion • Diffusion in action across the cell membrane	Key Vocabulary respiration magnify cell sub-cellular organelle photosynthesis adaptation diffusion
			Spiritual, moral, social, cultural • Teamwork developed through paired microscope investigations into cell structure and diffusion. • Contribution of Robert Hooke to the development of scientific understanding.	Career links • Cell biologist • Research scientist • Microbiologist • Biochemist • Forensic pathologist
			Watch the following videos to recap knowledge: - What are cells Cells Biology FuseSchool - How to use a Microscope Cells Biology FuseSchool - Unicellular organisms - Living organisms - KS3 Biology - BBC Bitesize - What is the process of diffusion? - BBC Bitesize	



Spring Term

Biology

Inheritance and the genome

Threshold concept:

The genome

To include the structure of DNA, heredity, protein synthesis and the importance of genetic mutation in variation.

Key knowledge

- The nature of heredity including causes of variation
- How genetic material is inherited from parents
- Structure of DNA
- The role of DNA in providing the genetic code
- How to extract DNA from a plant
- Scientists involved in the discovery of the structure of DNA
- Genes and chromosomes

Key Vocabulary

offspring
heredity
DNA
genome
chromosome
gene

Spiritual, moral, social, cultural

- Focus on the complexity and wonder of the DNA molecule
- Paired discussion of ethical use of research material during DNA structure discovery lesson
- Link to the difficulties that women continue to face when pursuing scientific roles.
- Teamwork developed during paired DNA extraction practical investigation.

Career links

- Forensic scientist
- DNA analyst
- Forensic pathologist
- Genetic counsellor
- Clinical geneticist

Watch the following videos to recap knowledge:

- [What is DNA? FuseSchool](#)
- [What Are Chromosomes | Genetics | Biology | FuseSchool](#)
- [What are causes of variation? - BBC Bitesize](#)
- [Inheritance - Inheritance and genetics - KS3 Biology - BBC Bitesize](#)
- [How DNA Can Be Extracted From Fruit | Genetics | Biology | FuseSchool](#)



	Chemistry	Atoms, elements, compounds and mixtures	Threshold concept: Atoms, Elements, Compounds, Mixtures: To include the difference between these and common examples. Transport and exchange surfaces (Biology) To include how particles move across membranes via osmosis, diffusion and active transport. Key knowledge • Atoms and elements • Chemical formula • Periodic table • Chemical vs Physical changes • Compounds and mixtures • Melting and boiling points of pure substances and mixtures • Mixtures – how are solutions formed • Diffusion – Brownian motion in fluids • Dissolving and attractive forces between particles • Solutions, solvent and solutes	Key Vocabulary Element Compound Mixture Property Conservation Diffusion
			Spiritual, moral, social, cultural • developing social skills through group and practical work. • considering the safety of others during practical work. • Discussion and analysis of scientific discovery of Brownian motion	Career links • Research Chemist • Environmental Chemist • Chemistry Teacher • Quality control analyst • Chemical Engineer
			Watch the following videos to recap knowledge: - What are pure substances? - BBC Bitesize - Dissolving - BBC Bitesize - What is the process of diffusion? - BBC Bitesize - What Is An Element, Mixture And Compound? Properties of Matter Chemistry FuseSchool - What Is Brownian Motion? Properties of Matter Chemistry FuseSchool	



	Physics	Sound and light	Threshold concept: Light: Visible light as a spectrum of colours of different wavelengths and frequencies Light travels in straight lines called rays, which can change direction at a boundary between different media Sound: Is a longitudinal wave produced and transmitted by vibrations Key knowledge • Sound formation – produced by vibrations • How amplitude and frequency relate to pitch and volume • Sound waves transfer energy • Longitudinal waves and vibrations • How sound waves transfer through different mediums (solids, liquids and gases) • Echoes • Light waves - Transverse waves • Representing light waves diagrammatically • Materials and light – Transparent/Translucent/Opaque • Reflection of light - understanding the angle of incidence, angle of reflection and the normal line	Key Vocabulary Longitudinal Transverse Wavelength Frequency Amplitude Parallel Perpendicular
			Spiritual, moral, social, cultural • Understand the fundamentals of nature • developing social skills through group and practical work. • Understand how technology advancements have progressed out society	Career links • Acoustic Engineer • Architecture • Electronics Engineer • Geologist • Surveyor
			Watch the following videos to recap knowledge: - Wave Motion Waves Physics FuseSchool - Ray diagrams Waves Physics FuseSchool - https://youtu.be/qNDH1MHkRyk?si=skEE5ySD_bp_YV-x	



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| | | | <ul style="list-style-type: none">- Transverse & Longitudinal Waves Waves Physics FuseSchool- Features of waves links to energy transfer guide for KS3 physics students - BBC Bitesize- Ray diagrams and transmission of light guide for KS3 physics students - BBC Bitesize- Reflection guide for KS3 physics students - BBC Bitesize |
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Summer Term

Biology

Organs and organ systems

Threshold concept:

Cells and the cell cycle

To include the differences between animal, plant and bacterial cells, cell division, and organisation of cells, tissues and organs.

Enzymes

To include enzyme function, action, and the factors affecting them.

Transport and exchange surfaces

To include how particles move across membranes via osmosis, diffusion and active transport.

Key knowledge

- Cells, tissues and organs
- Human skeleton structure and functions
- Muscles and movement
- Biomechanics and the interaction between bones, muscles, tendons and ligaments
- Levers and moment calculations
- Parts of the human digestive system and their functions
- The role of enzymes in digestion
- Testing foods for starch and sugar
- Bacteria and their role in digestion
- Absorption of nutrients in the small intestine

Key Vocabulary

tissue
organ
contraction
moment
digestion
enzyme



		Spiritual, moral, social, cultural • Promotion of respect and teamwork through grouped food tests investigation. • Development of an awareness of the importance of using sterilised equipment and maintaining good hygiene during food tests investigation.	Career links • Endoscopy technician • Medical assistant • Care coordinator • Organ transplant coordinator • Diabetes consultant • General Practitioner • Surgeon • Nutritionist • Nephrologist
		Watch the following videos to recap knowledge: - What are skeletal muscles? - Living organisms - KS3 Biology - BBC Bitesize - The structure of the digestive system - Nutrition, digestion and excretion - KS3 Biology - BBC Bitesize - Levels of organisation an organism Cells Biology FuseSchool - The Skeleton Physiology Biology FuseSchool - Small intestine and food absorption Physiology Biology FuseSchool -	
Chemistry	Separation techniques	Threshold concept: Atoms, Elements, Compounds, Mixtures: To include the difference between these and common examples. Particle model: How particles behave in solids, liquids and gases. How particles behave in chemical and physical changes. Key knowledge • Understand that mixtures can be separated to become a pure substance • Understand mixtures which have a purpose are known as formulations • Understand mixtures are separated based on their properties • How to separate insoluble and soluble solid from a liquid	Key Vocabulary Element Compound Mixture Property Conservation Diffusion



			- Types of distillation: simple vs fractional - Understand how chromatography can be used for chemical analysis and forensics - Practical apparatus and how to write/perform methods - Practical skills to perform different separation techniques	
			Spiritual, moral, social, cultural - developing social skills through group and practical work. - considering the safety of others during practical work. - Looking at the beauty of natural objects such as formation of crystals through separation techniques - Pupils to become increasingly curious about how techniques can be applied to day to day life and how it can affect food, drink, pharmaceutical and crime industries	Career links - Forensic scientist - Food scientist - Cosmetic chemist - Drug testing - Pharmaceutical science - Water treatment engineer
			Watch the following videos to recap knowledge: What is the process of filtration? - BBC Bitesize Distillation - BBC Bitesize Chromatography guide for KS3 chemistry students - BBC Bitesize How To Separate Solutions, Mixtures & Emulsions Chemical Tests Chemistry FuseSchool Paper & Thin Layer Chromatography Chemical Tests Chemistry FuseSchool	
	Physics	Earth in Space	Threshold concept: Light: Visible light as a spectrum of colours of different wavelengths and frequencies Light travels in straight lines called rays, which can change direction at a boundary between different media Key knowledge - The Earth, moon and sun - Orbits and rotations - Seasons (the Earth's axis) and leap years - Phases of the moon	Key Vocabulary Orbit Rotation Planet Weight Star Galaxy



		• The solar system • Stars (including the sun) • Asteroids • Gravity • The Milky way (galaxy) • The Universe - The geocentric model of the universe and the heliocentric model of the Solar System • Telescopes	
		Spiritual, moral, social, cultural • Reflection on humanities place in the cosmos • Ethical considerations of space exploration • Responsibility of managing space debris • International cooperation	Career links • Astrophysicist • Astrobiology • Astrochemistry • Satellite Engineer • Rocket Engineer
		Watch the following videos to recap knowledge: - The Solar System Part 1 Astrophysics Physics FuseSchool - The Solar System Part 2 Astrophysics Physics FuseSchool - Features of our Solar System guide for KS3 physics students - BBC Bitesize - Sun as a star KS3 Physics guide for students - BBC Bitesize - Days, months, years and seasons guide for KS3 physics students - BBC Bitesize - Phases of the Moon: Astronomy and Space for Kids - FreeSchool	
Biology	Classification and Variation	Threshold concept: Ecology To include interactions and interdependence between organisms. Key knowledge • Classification of organisms into kingdoms • Naming organisms using binomial names • Defining species • Classifying organisms using a key • Sampling using a quadrat	Key Vocabulary Variation classification species biodiversity population variation



			- Classifying species using differences in cellular features - Reproduction and variation - Causes of variation within species - Continuous and discontinuous variation - Plotting data using bar charts and line graphs	
			Spiritual, moral, social, cultural - Discussion of the ethics of trapping organisms for sampling - Focus on the wonder and beauty of nature - Development of social skills during paired variation practical investigation.	Career links - Wildlife biologist - Sustainability consultant - Environmental educator - Behavioural ecologist - Conservation specialist
			Watch the followin videos to recap knowledge: Variation Genetics Biology FuseSchool How Are Organisms Classified? Evolution Biology FuseSchool Types of variation - Inheritance and genetics - KS3 Biology - BBC Bitesize What is classification? - BBC Bitesize	