Knowledge Organiser: Year 7 – Introduction to Science

Key Vocabulary

Term	Definition
Science	The study of the natural world through observation and experiment.
Laboratory	A place where scientific experiments are carried out.
Hazard	Something that can cause harm.
Risk	The chance of harm occurring.
Variable	A factor that can change in an experiment.
Method	Step-by-step instructions for carrying out an experiment.
Accuracy	How close a measurement is to the true value.
Repeatable	Results are consistent when repeated by the same person.
Table	A way of organising data into rows and columns.
Graph	A visual representation of data.
Conclusion	A summary of what the results show.
Evaluation	A review of how well the experiment was carried out and how it could be improved.

Key Knowledge

• Scientists ask questions, test ideas, and use evidence to understand the world.

• Lab safety rules and hazard symbols help prevent accidents.

• Common measurements include volume (ml), mass (g), time (s), and temperature (°C).

• A Bunsen burner has different flame types: safety flame (yellow) and heating flame (blue).

• A good method includes clear steps, variables, and repeats.

• Data must be recorded in a clear table with headings and units.

• Line graphs show patterns in continuous data; bar charts show categories.

• A conclusion explains the pattern in the data; an evaluation reflects on the method.

Lesson Sequence

- What is science?

- Safety and hazard symbols

- Measuring quantities

- Bunsen burner

- Writing methods

- Results tables

- Graphs

- Writing a conclusion and evaluation

Possible Misconceptions

• Science is only about facts, not questions or experiments.

• All flames from a Bunsen burner are safe to touch.

• You must change more than one variable to get useful results.

• A bar chart and a line graph can be used interchangeably.

• Evaluations are just saying 'it went well' rather than identifying improvements.

3 Key Questions for the Topic

1. Why are safety rules important in science?

2. How can we collect and present results accurately?

3. What makes a fair and reliable scientific investigation?

Knowledge Organiser: Year 7 – Cells, Tissues and Organs

Key Vocabulary

Term	Definition
Cell	The basic unit of life in all living things.
Tissue	A group of similar cells that work together to perform a function.
Organ	A structure made of different tissues that carries out a specific job.
Organ system	A group of organs that work together to perform a complex function.
Microscope	An instrument used to see objects that are too small for the naked eye.
Nucleus	Part of a cell that contains genetic material and controls the cell's activities.
Cytoplasm	The jelly-like substance inside a cell where chemical reactions happen.
Cell membrane	A thin layer that surrounds the cell and controls what enters and leaves.
Skeleton	The framework of bones that supports the body and protects internal organs.
Muscle	Tissue that can contract to produce movement.
Joint	Where two or more bones meet, allowing movement.
Life processes	The seven processes all living things do: MRS GREN.

Key Knowledge

• All living things carry out the 7 life processes: Movement, Respiration, Sensitivity, Growth, Reproduction, Excretion, Nutrition (MRS GREN).

• Cells are the basic building blocks of all living organisms.

• Animal and plant cells have some different structures and functions.

• Microscopes are used to observe cells in detail.

• Tissues are made of similar cells working together.

• Organs are made of different tissues working together for a specific function.

• Organ systems are groups of organs performing complex tasks (e.g., the digestive system).

• The skeleton supports the body, protects organs, and helps with movement.

• Muscles work in pairs to move bones at joints.

Lesson Sequence

- Life processes

- Cells

- Microscopes

- Tissues

- Organs

- Organ systems

- The skeleton

- Muscles

- Joints

Possible Misconceptions

• All cells look the same – different cells have different shapes and functions.

• Tissues and organs are the same thing.

• The skeleton is only for protection – it also supports the body and helps with movement.

• Muscles can push – they only pull when they contract.

• All organisms have the same organ systems – not all organisms have the same internal structures.

3 Key Questions for the Topic

1. What are the building blocks of living organisms?

2. How do cells work together to form complex living systems?

3. Why are the skeleton and muscles important for movement?

Knowledge Organiser: Year 7 – Particles and Matter

Key Vocabulary

Term	Definition
Particle	A small unit of matter, such as an atom or molecule.
Solid	State of matter with a fixed shape and volume.
Liquid	State of matter with a fixed volume but can change shape.
Gas	State of matter that has no fixed shape or volume.
Dissolve	To mix a substance into a liquid so it forms a solution.
Diffusion	The movement of particles from a high to a low concentration.
Density	Mass per unit volume of a substance.
Pressure	Force exerted on a surface per unit area.
Physical change	A change that does not form a new substance.
Chemical change	A change that forms a new substance.
Word equation	A way to describe a chemical reaction using words.
Exothermic	A reaction that releases heat.
Endothermic	A reaction that absorbs heat.

Key Knowledge

- Matter exists in three main states: solid, liquid, and gas, based on particle arrangement.
- Heating and cooling change the energy of particles, affecting state and movement.
- Changes of state (melting, freezing, condensation, evaporation) are physical changes.
- Dissolving forms a solution but does not create a new substance.
- Diffusion occurs faster in gases and when temperature increases.
- Density = mass ÷ volume. Dense substances have tightly packed particles.
- Pressure in gases is caused by particles hitting surfaces.
- Chemical reactions form new substances; physical changes do not.
- Word equations describe the reactants and products in a reaction.

Lesson Sequence

- States of matter

- Cooling

- Heating

- Changes of state

- Dissolving

- Diffusion

- Density

- Density practical

- Pressure

- Chemical + Physical reactions

- Writing word equations

- Exothermic and endothermic reactions

Possible Misconceptions

• Particles expand when heated – they actually move faster but do not get bigger.

• Dissolving is the same as melting.

• Diffusion only happens in gases – it also happens in liquids.

• Density and weight are the same – density is mass per volume, weight is a force.

• Physical changes make new substances – they do not.

• Exothermic means hot – it means heat is released, not that something feels hot.

3 Key Questions for the Topic

1. How do particles behave in different states of matter?

2. What is the difference between physical and chemical changes?

3. How do we measure and compare density?

Knowledge Organiser: Year 7 – Forces and Motion

Key Vocabulary

Term	Definition
Force	A push or pull acting on an object.
Balanced forces	Forces that are equal in size and opposite in direction; no change in motion.
Unbalanced forces	Forces that cause a change in the motion of an object.
Speed	A measure of how fast something moves; calculated as distance ÷ time.
Distance-time graph	A graph that shows how distance changes over time.
Gravity	A force that attracts objects towards each other, especially towards Earth.
Friction	A force that resists motion between two surfaces.
Drag	A type of friction that acts on objects moving through fluids (air or water).
Elastic	A material that returns to its original shape after being stretched or squashed.
Hooke's Law	Extension is proportional to force, up to a limit.
Turning force	A force that causes an object to rotate around a pivot.
Pressure	Force per unit area.
Atmospheric pressure	The pressure exerted by air in the atmosphere.
Pascal (Pa)	The unit of pressure, equal to one newton per square metre.

Key Knowledge

• A force is a push or pull that can change the shape, speed, or direction of an object.

• Balanced forces do not change motion; unbalanced forces cause acceleration or deceleration.

• Speed is calculated by dividing distance by time (speed = distance ÷ time).

• Distance-time graphs show motion over time; a straight line means constant speed.

• Gravity pulls objects towards Earth with a force of approximately 10 N/kg.

• Friction and drag oppose motion; streamlined shapes reduce drag.

• Materials can be squashed or stretched; elastic materials return to their original shape.

• Hooke's Law shows the relationship between force and extension in springs.

• Turning forces cause rotation around a pivot; more force or distance from pivot increases turning effect.

Lesson Sequence

- Forces

- Balanced and unbalanced forces

- Speed

- Distance-time graphs

- Gravity

- Friction & drag

- Squashing & stretching

- Hooke's law

- Turning forces

- Pressure in gases

- Pressure in liquids

- Pressure in solids

Possible Misconceptions

• Objects need a force to keep moving – in fact, they stay moving unless a force stops them.

• Heavier objects fall faster – all objects fall at the same rate without air resistance.

• If an object is not moving, no forces are acting on it – forces can be balanced.

• Pressure is only in gases – it exists in solids and liquids too.

• Hooke's Law applies to all materials – it only applies to elastic materials up to their limit.

3 Key Questions for the Topic

1. How do forces affect how objects move or change shape?

2. What is pressure and how does it differ in solids, liquids and gases?

3. How can we measure and represent motion?

Knowledge Organiser: Year 7 – Plant Reproduction

Key Vocabulary

Term	Definition
Reproduction	The process of producing new individuals.
Sexual reproduction	Reproduction involving two parents and the fusion of gametes.
Asexual reproduction	Reproduction involving only one parent, with no gametes.
Stamen	The male part of a flower, consisting of the anther and filament.
Carpel	The female part of a flower, consisting of the stigma, style, and ovary.
Pollination	The transfer of pollen from the anther to the stigma.
Fertilisation	The fusion of male and female gametes to form a zygote.
Seed	A structure that contains a developing plant embryo.
Dispersal	The spreading of seeds away from the parent plant.
Germination	The process where a seed develops into a new plant.
Ovary	Part of the carpel that contains ovules.
Anther	Part of the stamen that produces pollen.

Key Knowledge

• Plants reproduce either sexually (using flowers and gametes) or asexually (using parts of the parent plant).

• Flowers contain both male (stamen) and female (carpel) reproductive structures.

• Pollination is followed by fertilisation, leading to the formation of seeds in the ovary.

• Seeds must be dispersed away from the parent plant to reduce competition.

• Seeds need water, oxygen, and the right temperature to germinate.

• Flower dissection allows us to identify reproductive parts and understand their functions.

Lesson Sequence

- Sexual and asexual reproduction

- Flower structure

- Flower dissection

- Pollination + fertilisation

- Seed formation + dispersal

- Germination

Possible Misconceptions

• Only animals reproduce sexually – many plants do too using flowers.

• Pollination is the same as fertilisation – they are separate processes.

• All plants reproduce using seeds – some use asexual methods like runners or bulbs.

• Seeds don't need air – oxygen is required for germination.

• Petals are the most important part – they attract pollinators but don't directly help with reproduction.

3 Key Questions for the Topic

1. How do flowers carry out sexual reproduction?

2. Why is seed dispersal important for plant survival?

3. What conditions are needed for a seed to germinate?

Knowledge Organiser: Year 7 – Separation Techniques

Key Vocabulary

Term	Definition
Element	A pure substance made of only one type of atom.
Compound	A substance made from two or more elements that are chemically joined.
Mixture	Two or more substances mixed together but not chemically bonded.
Solute	A substance that dissolves in a solvent.
Solvent	A liquid that dissolves a solute to form a solution.
Solution	A mixture formed when a solute dissolves in a solvent.
Filtration	A method to separate an insoluble solid from a liquid.
Evaporation	A method to separate a solute from a solution by heating.
Distillation	A method to separate liquids with different boiling points.
Chromatography	A method to separate substances in a mixture based on how they move through a medium.
Residue	The solid left behind after filtration.
Filtrate	The liquid that passes through the filter paper.

Key Knowledge

• Elements are pure substances made of one type of atom.

• Compounds are made from two or more elements chemically bonded.

• Mixtures contain two or more substances not chemically bonded and can be separated.

• Solutions form when solutes dissolve in solvents.

• Filtration separates insoluble solids from liquids.

• Evaporation separates dissolved solids from liquids by heating.

• Distillation separates liquids by boiling and condensing.

• Chromatography separates mixtures of coloured substances like inks or dyes.

• Each separation technique works based on different physical properties like solubility or boiling point.

Lesson Sequence

- Elements, Compounds & Mixtures

- Solutions

- Chromatography

- Filtration

- Evaporation

- Distillation

Possible Misconceptions

• Mixtures cannot be separated – most mixtures can be separated using physical methods.

• Filtration works for all solids – it only separates insoluble solids.

• Evaporation and distillation are the same – distillation also collects the liquid.

• Chromatography works for all substances – it is mostly used for coloured soluble substances.

• A solution is the same as a solvent – a solution includes both solute and solvent.

3 Key Questions for the Topic

1. How can we separate mixtures using physical methods?

2. What is the difference between a solution, solute and solvent?

3. Why do we choose different separation techniques for different mixtures?

Knowledge Organiser: Year 7 – Light & Sound

Key Vocabulary

Term	Definition
Wave	A repeated pattern of disturbance that transfers energy.
Longitudinal wave	A wave where the particles vibrate back and forth in the same direction as the wave travels (e.g., sound).
Transverse wave	A wave where particles move at right angles to the direction of the wave (e.g., light).
Frequency	The number of waves that pass a point in one second.
Amplitude	The height of a wave from the middle to the top.
Wavelength	The distance between two identical points on a wave.
Reflection	When a wave bounces off a surface.
Refraction	When a wave changes direction as it passes into a different material.
Speed of sound	The rate at which sound waves travel through a medium.
Pitch	How high or low a sound is.
Volume	How loud or soft a sound is.
Visible spectrum	The range of colours that can be seen in white light.
Absorption	When light or sound is taken in by a material.
Cornea	The transparent front part of the eye that helps to focus light.
Retina	The light-sensitive layer at the back of the eye.

Key Knowledge

• Waves transfer energy without transferring matter.

• Sound is a longitudinal wave and needs a medium to travel through.

• The speed of sound depends on the medium – faster in solids than gases.

• Light is a transverse wave and travels fastest in a vacuum.

• Reflection follows the law: angle of incidence = angle of reflection.

• Refraction occurs when light changes speed between materials, bending the light.

• The eye detects light and focuses it on the retina to form an image.

• White light is made of many colours; coloured objects reflect certain colours and absorb others.

Lesson Sequence

- Waves
- Sound waves
- Speed of sound
- Light
- Reflection
- Refraction
- The eye
- Light and colour

Possible Misconceptions

• Sound can travel through a vacuum – it needs a medium (solid, liquid, gas).

• Light always travels at the same speed – it slows down in materials like glass or water.

• The eye sees light – it detects light reflected from objects.

• All colours are absorbed or reflected equally – different materials reflect specific colours.

• Refraction is the same as reflection – they are different behaviours of waves.

3 Key Questions for the Topic

1. How do waves transfer energy through different materials?
2. What is the difference between how light and sound travel?
3. How do reflection and refraction affect the path of light?

Knowledge Organiser: Year 7 – Space

Key Vocabulary

Term	Definition
Rotation	The spinning of a planet on its axis.
Orbit	The path an object takes around a star or planet.
Axis	An imaginary line around which a planet spins.
Season	A period of the year marked by specific weather conditions, caused by Earth's tilt.
Moon phase	The appearance of the Moon from Earth, which changes in a cycle.
Satellite	An object that orbits a planet (natural or artificial).
Planet	A large body orbiting a star, clear of other debris.
Star	A ball of hot gas undergoing nuclear fusion.
Galaxy	A large collection of stars, gas, and dust held together by gravity.
Universe	All of space and everything in it.
Light year	The distance light travels in one year.
Nebula	A cloud of gas and dust where stars are born.
Mars	The fourth planet from the Sun, often explored for signs of life.
Gravity	A force that attracts objects towards one another.

Key Knowledge

• Earth's rotation causes day and night; its tilt and orbit cause seasons.

• The Moon reflects sunlight and goes through phases in a 28-day cycle.

• The solar system includes 8 planets orbiting the Sun, plus moons, asteroids and comets.

• Beyond the solar system are stars, galaxies, and nebulae in the universe.

• Stars form in nebulae and change over time, ending as white dwarfs, neutron stars or black holes.

• Mars is a planet with extreme conditions; scientists explore the possibility of human survival there.

• Gravity keeps planets in orbit and gives objects weight.

Lesson Sequence

- Day, night & seasons

- Phases of the moon

- The solar system

- Beyond the solar system

- Evolution of stars

- Mars project

Possible Misconceptions

• The Sun moves around the Earth – it's the Earth that rotates and orbits the Sun.

• The Moon produces its own light – it reflects sunlight.

• Seasons are caused by the Earth being closer to the Sun – they are caused by the tilt of the Earth's axis.

• Stars don't change – they have a life cycle, just like living things.

• Gravity is the same everywhere – it varies depending on the mass of the object and distance.

3 Key Questions for the Topic

1. What causes day, night and seasons on Earth?

2. What is our place in the solar system and the wider universe?

3. How do stars and planets form and change over time?