Knowledge Organiser: Year 8 – Food & Nutrition

Key Vocabulary

Term	Definition
Nutrient	A substance needed by the body for energy, growth, and health.
Carbohydrate	Provides energy; found in foods like bread, rice, and pasta.
Protein	Used for growth and repair of tissues.
Lipid	Fats and oils that provide energy and insulation.
Vitamin	Helps regulate body processes and maintain health.
Mineral	Essential elements like calcium and iron needed in small amounts.
Balanced diet	A diet that provides all necessary nutrients in the correct proportions.
Digestion	The process of breaking down food into smaller, absorbable components.
Enzyme	A protein that speeds up chemical reactions in the body.
Absorption	The process of nutrients passing from the digestive system into the bloodstream.
Surface area	The extent of exposed surface, important in absorption in the small intestine.
Villus (plural: villi)	Tiny finger-like structures in the small intestine that increase surface area for absorption.

Key Knowledge

• A balanced diet includes carbohydrates, proteins, lipids, vitamins, minerals, fibre, and water.

• Each nutrient has a specific function: energy, growth, repair, and maintaining health.

• Food tests help identify the presence of key nutrients (e.g., iodine for starch, Benedict's for sugar).

• Digestion breaks food into smaller molecules that the body can absorb.

• Enzymes such as amylase, protease, and lipase help speed up digestion.

• The digestive system includes organs like the mouth, stomach, small intestine, and large intestine.

• Absorption occurs in the small intestine, which has villi to increase surface area for efficient uptake.

• Food labels provide information about the nutritional content of packaged foods.

Lesson Sequence

- Nutrients and food labels

- Food tests

- Balanced diet

- Uses of nutrients

- The digestive system 1

- The digestive system 2

- Enzymes

- Absorption

- Surface area

Possible Misconceptions

• All fats are bad – the body needs some fats for energy and insulation.

• Digestion happens only in the stomach – it begins in the mouth and continues through the intestines.

• Food goes into the blood as solid chunks – it must be broken down into soluble molecules first.

• Enzymes are alive – they are proteins that act as biological catalysts, not living organisms.

• The small intestine is short – it is actually very long and coiled to maximise absorption.

3 Key Questions for the Topic

1. What nutrients does the body need and why?

2. How does the digestive system break down and absorb food?

3. What role do enzymes and surface area play in digestion and absorption?

Knowledge Organiser: Year 8 – Periodic Table

Key Vocabulary

Term	Definition
Atom	The smallest unit of an element, made up of protons, neutrons, and electrons.
Element	A substance made of only one type of atom.
Compound	A substance made from two or more elements chemically bonded.
Periodic Table	A table of elements arranged by increasing atomic number.
Group	A vertical column in the periodic table with elements that have similar properties.
Period	A horizontal row in the periodic table.
Metal	An element that is typically shiny, conducts electricity, and is malleable.
Non-metal	An element that is not metallic, often brittle and does not conduct electricity.
Reactivity	How easily an element reacts with others.
Group 1	The alkali metals – very reactive and soft.
Group 7	The halogens – reactive non-metals.
Group 0	The noble gases – very unreactive gases.

Key Knowledge

• The periodic table arranges elements by increasing atomic number.

• Elements in the same group have similar properties and the same number of outer electrons.

• Metals are generally found on the left; non-metals on the right of the table.

• Group 1 metals are very reactive, soft, and increase in reactivity down the group.

• Group 7 halogens are reactive non-metals and become less reactive down the group.

• Group 0 noble gases are very unreactive due to having full outer electron shells.

• Each element has a unique chemical symbol (e.g., H for hydrogen, O for oxygen).

Lesson Sequence

- Atomic model

- Elements and symbols

- Group and period trends

- Metals and non-metals

- Group 1

- Group 7 and 0

Possible Misconceptions

• Group numbers represent mass – they actually show the number of outer electrons.

• All metals are hard and shiny – some, like Group 1 metals, are soft.

• Group 0 elements must react slowly – they are mostly inert (unreactive).

• Elements in the same period have similar properties – it is the group that determines this.

• All elements with similar names are in the same group – names don't always indicate group.

3 Key Questions for the Topic

1. How is the periodic table organised and what does it show us?

2. What patterns exist in groups and periods of the periodic table?

3. How do Group 1, 7, and 0 elements behave and why?

Knowledge Organiser: Year 8 – Energy

Key Vocabulary

Term	Definition
Energy store	A way that energy is stored, such as thermal, kinetic, chemical, or gravitational potential.
Energy transfer	The movement of energy from one store to another.
Thermal energy	Energy stored in a substance due to its temperature.
Kinetic energy	Energy of a moving object.
Work done	Energy transferred when a force moves an object.
Fossil fuels	Natural fuels like coal, oil, and gas formed from ancient remains.
Renewable energy	Energy from sources that are naturally replaced, like solar or wind.
Solar energy	Energy from the sun, used in solar panels or heating.
Hydroelectric power	Electricity generated by moving water.
Efficiency	A measure of how much useful energy is transferred.
Dissipation	The spreading out and loss of useful energy, usually as heat or sound.
Conduction	Heat transfer through solids.
Convection	Heat transfer in fluids due to movement of particles.
Radiation	Heat transfer through infrared waves, which can happen in a vacuum.

Key Knowledge

• Energy is stored in different ways, such as kinetic, thermal, chemical, and gravitational stores.

• Energy can be transferred mechanically, electrically, by heating, or by radiation.

• Heat can transfer by conduction, convection, and radiation.

• Work is done when energy is transferred by a force moving an object.

• Fossil fuels are non-renewable and release carbon dioxide when burned.

• The sun is the original source of most energy on Earth, including wind and biomass.

• Hydroelectric energy uses moving water to generate electricity without pollution.

• Efficiency = (useful energy out ÷ total energy in) × 100%.

Lesson Sequence

- Energy stores

- Energy transfers

- Heat energy transfer

- Work done

- Energy from fossil fuels

- Energy from the sun

- Energy from moving water

- Energy efficiency

Possible Misconceptions

• Energy is used up – energy is conserved, not used up, but it may be dissipated.

• Heat rises – hot air rises due to convection, but heat itself transfers in all directions.

• Renewable energy is always available – some depend on weather or location.

• More energy input always means more useful output – not if the device is inefficient.

• Work is only done when something moves far – work is done as soon as a force moves an object, even a small distance.

3 Key Questions for the Topic

1. How is energy stored, transferred, and used in different systems?

2. What are the advantages and disadvantages of different energy sources?

3. How can we measure and improve energy efficiency?

Knowledge Organiser: Year 8 – Plant Growth

Key Vocabulary

Term	Definition
Photosynthesis	The process by which green plants make their own food using sunlight.
Chlorophyll	The green pigment in leaves that absorbs light energy for photosynthesis.
Glucose	A type of sugar made by plants during photosynthesis.
Starch	A storage form of glucose in plants.
Limiting factor	A factor that slows down the rate of photosynthesis when in short supply.
Carbon dioxide	A gas taken in by plants for photosynthesis.
Oxygen	A gas released by plants during photosynthesis.
Minerals	Nutrients from the soil that plants need for healthy growth.
Nitrate	A mineral needed for making proteins and growth.
Magnesium	A mineral needed to make chlorophyll.
Palisade cells	Leaf cells that contain many chloroplasts for photosynthesis.
Starch test	A method to show if photosynthesis has occurred using iodine solution.

Key Knowledge

• Photosynthesis uses carbon dioxide, water, and light to produce glucose and oxygen.

• The word equation for photosynthesis is: carbon dioxide + water → glucose + oxygen (in the presence of light and chlorophyll).

• Photosynthesis occurs mainly in the leaves, especially in palisade cells containing chloroplasts.

• Limiting factors such as light, carbon dioxide, and temperature affect the rate of photosynthesis.

• Starch can be tested in leaves using iodine solution – a blue-black colour indicates its presence.

• Leaves are adapted for photosynthesis with features like a large surface area and many chloroplasts.

Lesson Sequence

- Photosynthesis 1

- Photosynthesis 2

- Limiting factors 1

- Limiting factors 2

- Leaf structure

- Testing a leaf for starch

- Plant minerals

Possible Misconceptions

• Plants get food from the soil – they make their own food through photosynthesis.

• Photosynthesis happens at night – it requires light and happens during the day.

• All parts of the plant photosynthesise – it mostly happens in leaves.

• More light always means more photosynthesis – only up to a certain point.

• Plants don't need minerals if they have sunlight – minerals are essential for growth and health.

3 Key Questions for the Topic

1. What do plants need to carry out photosynthesis?

2. How do limiting factors affect plant growth?

3. Why are minerals and leaf adaptations important for photosynthesis?

Knowledge Organiser: Year 8 – Electricity & Magnetism

Key Vocabulary

Term	Definition
Circuit	A complete path for current to flow.
Current	The flow of electric charge, measured in amperes (A).
Voltage (Potential Difference)	The push that makes current flow, measured in volts (V).
Resistance	A measure of how much a component resists current flow, measured in ohms (Ω).
Power	The rate at which energy is transferred, measured in watts (W).
Series circuit	A circuit where components are connected end to end in a single loop.
Parallel circuit	A circuit where components are connected on separate branches.
Fuse	A safety device that melts and breaks the circuit if the current is too high.
Static electricity	A build-up of electric charge on a surface.
Magnet	An object that produces a magnetic field.
Magnetic field	The area around a magnet where magnetic forces can be felt.
Electromagnet	A magnet created by an electric current flowing through a wire coil.

Key Knowledge

• Electric current flows in complete circuits and is measured in amperes.

• Voltage provides the energy to push charges around a circuit.

• In series circuits, current is the same everywhere; in parallel circuits, voltage is the same across branches.

• Resistance reduces current flow; more resistance means less current.

• Power = Voltage × Current; it shows how quickly energy is used.

• Fuses and circuit breakers protect against too much current by breaking the circuit.

• Static electricity involves charges building up and suddenly discharging.

• Magnets produce magnetic fields which can attract or repel magnetic materials.

• The Earth behaves like a giant magnet with a magnetic field.

Lesson Sequence

- Circuit components

- Series circuits

- Parallel circuits

- Current and voltage

- Resistance

- Power

- Electrical safety

- Static electricity

- Magnetic fields

- Magnetic materials

- Earth as a magnet

- Electromagnets

Possible Misconceptions

• Current is 'used up' – current is not used; energy is transferred.

• Voltage and current are the same – voltage pushes, current flows.

• More bulbs mean more brightness – in series, more bulbs share voltage and dim.

• Magnets attract all metals – only magnetic materials like iron, nickel, and cobalt are attracted.

• Static electricity only happens in winter – it can occur any time under the right conditions.

3 Key Questions for the Topic

1. How do electric circuits work and how can we measure electricity?

2. What is the difference between series and parallel circuits?

3. How are electricity and magnetism connected in electromagnets?

Knowledge Organiser: Year 8 – Ecosystems

Key Vocabulary

Term	Definition
Habitat	The natural environment where an organism lives.
Organism	A living thing, such as a plant, animal, or microbe.
Ecosystem	A community of living organisms interacting with their environment.
Producer	An organism that makes its own food, usually through photosynthesis.
Consumer	An organism that eats other organisms.
Predator	An animal that hunts and eats other animals.
Prey	An animal that is hunted and eaten by a predator.
Food chain	A sequence that shows how energy is transferred from one organism to another.
Food web	A network of interconnected food chains in an ecosystem.
Pollution	The introduction of harmful substances into the environment.
Variation	Differences between individuals of the same species.
Genetic variation	Differences in characteristics due to genes inherited from parents.
Environmental variation	Differences caused by the surroundings or lifestyle.

Key Knowledge

• Habitats provide organisms with the resources they need to survive.

• Organisms in ecosystems are connected through feeding relationships.

• Producers, consumers, predators, and prey form food chains and food webs.

• Human activities such as pollution, deforestation, and climate change impact ecosystems.

• Variation exists within all species, helping with survival and adaptation.

• Genetic variation is inherited, while environmental variation is influenced by surroundings.

• Food webs show how multiple food chains are linked together in ecosystems.

Lesson Sequence

- Organisms & habitats

- Food chains and webs

- Human affects on the environment

- Variation

- Genetic variation

- Environmental variation

Possible Misconceptions

• All organisms in a food chain eat plants – only producers are plants.

• Humans are not part of food chains – humans are consumers in ecosystems.

• Variation is always caused by the environment – it can also be inherited.

• Only animals are affected by environmental changes – all organisms, including plants, are affected.

• Food chains and food webs are the same – food webs show many connected food chains.

3 Key Questions for the Topic

1. How do organisms interact within an ecosystem?

2. What effects do humans have on the environment?

3. How does variation occur and why is it important for survival?

Knowledge Organiser: Year 8 – Acids & Alkalis 2 (Neutralisation & Titrations)

Key Vocabulary

Term	Definition
Acid	A substance that releases hydrogen ions (H^+) in solution.
Alkali	A soluble base that releases hydroxide ions (OH^-) in solution.
Neutralisation	A chemical reaction between an acid and a base to form a salt and water.
Strong acid	An acid that completely dissociates in water (e.g., HCl).
Weak acid	An acid that only partially dissociates in water (e.g., ethanoic acid).
Ionic equation	An equation showing only the ions involved in a chemical reaction.
Indicator	A substance that changes colour depending on the pH of the solution.
pH curve	A graph showing how pH changes during a titration.
Titration	A method used to find the exact volume of acid and alkali needed to neutralise each other.
Burette	A piece of equipment used to accurately add acid or alkali in a titration.
Pipette	Used to measure and transfer a fixed volume of solution.
Endpoint	The point in a titration when neutralisation is complete, often shown by an indicator.

Key Knowledge

• Strong acids fully ionise in solution; weak acids only partially ionise.

• Neutralisation reactions produce a salt and water: acid + base → salt + water.

• Indicators show the pH of a solution by changing colour (e.g., phenolphthalein, methyl orange).

• A pH curve shows the change in pH as acid is added to alkali (or vice versa).

• Titration is a practical method to accurately measure volumes for neutralisation.

• During titration, a pipette and burette are used to measure volumes precisely.

• The endpoint of a titration is when the reaction is just neutral – shown by an indicator change.

• Titration calculations use the formula: concentration × volume = moles, to find unknowns.

Lesson Sequence

- Strong and weak acids

- Acid reactions and ionic equations

- Indicators and pH curves

- Intro to titrations

- Titration practical

- Titration calculations

Possible Misconceptions

• All acids are strong – acids vary in strength depending on how much they dissociate.

• Neutralisation always results in pH 7 – this depends on exact proportions and strengths.

• More acid always means more neutralisation – equal amounts (in moles) are needed.

• pH changes are always gradual – strong acid/alkali reactions cause sharp changes shown in pH curves.

• Titrations are only about mixing – they require precision and controlled conditions.

3 Key Questions for the Topic

1. What is the difference between strong and weak acids?

2. How can we use titration to find unknown concentrations?

3. What does a pH curve show us about neutralisation?

Knowledge Organiser: Year 8 – Metal Reactivity and Reactions

Key Vocabulary

Term	Definition
Atom	The smallest part of an element that can exist.
Element	A substance made from only one type of atom.
Compound	A substance made from two or more different elements chemically bonded.
Molecule	Two or more atoms bonded together.
Chemical reaction	A process where new substances are formed.
Word equation	A way to describe a reaction using words.
Chemical formula	A way of representing elements and compounds using symbols.
Balanced equation	An equation with equal numbers of each atom on both sides.
Thermal decomposition	A reaction where a compound breaks down when heated.
Displacement reaction	A reaction where a more reactive metal replaces a less reactive one.
Combustion	A chemical reaction where a substance reacts with oxygen and releases energy.
Reactivity series	A list of metals ordered by how reactive they are.

Key Knowledge

• All matter is made of atoms; elements contain one type, compounds contain more than one.

• Chemical reactions involve rearranging atoms to form new substances.

• Word and symbol equations are used to represent chemical reactions.

• Formulae show the elements in a compound and their ratios.

• Balanced equations have the same number of each type of atom on both sides.

• Thermal decomposition involves heating compounds to break them down into simpler substances.

• In displacement reactions, a more reactive metal displaces a less reactive metal from its compound.

• Burning fuels (combustion) releases energy and forms products like carbon dioxide and water.

• The reactivity series helps predict the outcome of reactions between metals and compounds.

Lesson Sequence

- Atoms, Compounds, Molecules & Elements

- Chemical reactions

- Word equations

- Chemical formulae

- Formulae equations

- Balanced equations

- Thermal decomposition

- Displacement reactions

- Burning fuels

Possible Misconceptions

• Atoms are destroyed or created in chemical reactions – they are only rearranged.

• Chemical equations don't need to be balanced – they must show conservation of mass.

• All metals react the same – reactivity varies greatly between different metals.

• Combustion always produces flames – not all combustion is visible.

• Displacement can happen regardless of reactivity – only more reactive metals can displace less reactive ones.

3 Key Questions for the Topic

1. What happens during a chemical reaction and how can we represent it?

2. How can we use the reactivity series to predict metal reactions?

3. What types of reactions involve metals and what do they produce?

Knowledge Organiser: Year 8 – Breathing & Respiration

Key Vocabulary

Term	Definition
Respiration	A chemical process that releases energy from glucose.
Aerobic respiration	Respiration that uses oxygen to release energy.
Anaerobic respiration	Respiration that does not use oxygen and produces less energy.
Glucose	A sugar used as fuel in respiration.
Oxygen	A gas needed for aerobic respiration.
Carbon dioxide	A waste gas produced by respiration.
Lungs	Organs where gas exchange takes place.
Alveoli	Tiny air sacs in the lungs where gas exchange occurs.
Gas exchange	The swapping of oxygen and carbon dioxide in the lungs.
Diaphragm	A muscle that helps draw air into the lungs.
Bronchi	The two tubes that carry air from the trachea to each lung.
Trachea	The windpipe that carries air to the lungs.

Key Knowledge

• Respiration is how cells release energy from glucose.

• Aerobic respiration needs oxygen and produces carbon dioxide, water, and lots of energy.

• The word equation for aerobic respiration is: glucose + oxygen → carbon dioxide + water (+ energy).

• Anaerobic respiration occurs without oxygen and produces less energy (in animals: glucose → lactic acid).

• The respiratory system includes the trachea, bronchi, lungs, and diaphragm.

• Gas exchange happens in the alveoli where oxygen enters the blood and carbon dioxide is removed.

• Breathing helps move air in and out of the lungs for gas exchange to happen.

• Exercise increases breathing rate to meet the oxygen demand of cells.

Lesson Sequence

- Aerobic respiration

- Respiratory system

- Respiratory system 2 (Gas exchange)

- Anaerobic respiration

- Investigating breathing in humans

Possible Misconceptions

• Breathing and respiration are the same – respiration happens in cells; breathing is air movement.

• Oxygen is a product of respiration – oxygen is used, not made.

• Lungs do the respiration – cells in the body do respiration, lungs provide the oxygen.

• Anaerobic respiration is better because it doesn't need oxygen – it makes less energy and builds up lactic acid.

• Carbon dioxide is not important – it must be removed or it can harm cells.

3 Key Questions for the Topic

1. What is the difference between breathing and respiration?

2. How does the respiratory system help supply oxygen to the body?

3. What happens to our body during aerobic and anaerobic respiration?