



KING'S LYNN ACADEMY

KNOWLEDGE ORGANISER

Year 10 Spring Term 2024



NAME:

Science

Year 11

KING'S LYNN ACADEMY

Year 10

Term 6

Chemistry
Atmosphere

Physics
Energy Conservation

Term 5

Experimental Science
Standard Procedures
Enquiry
Understanding

Physics
Home Electricity

Biology
Plants

Term 4

Biology
Genetics

Chemistry
Making Substances

Term 3

Experimental Science
Standard Procedures
Enquiry
Understanding

Physics
Radioactivity

Term 2

Chemistry
Structure and Bonding

Biology
Feedback and Control

Term 1

Welcome back to KLA your Journey continues





Energy

Home Electricity: Big ideas

What expert understanding do we want after 5 years?

Electricity transfers energy

Big idea

Energy can be transferred from place to place by electric current. Electricity is produced from many energy resources by driving a turbine, and stored by a battery or transmitted by currents. Batteries produce voltage that drive current around a circuit, supplying power to components. All these quantities can be calculated and controlled.

How does the unit develop this?

Ohms Law

Key Concept

There is a relationship between current, voltage and resistance in a component. This relationship can be measured and predicted.

Sub-concepts

- Series circuit, parallel circuit
- Required Practical – Ohms Law

Facts

- Voltage = Current x Resistance
- Ohms law in resistors, thermistors and diodes

Power

Key Concept

Electricity is used to transfer energy. The rate of transfer is known as power. Power is related to current, voltage and time. This relationship can be calculated and predicted

Sub-concepts

- Energy
- Efficiency

Facts

- Power = current x voltage
- Power = current² x time
- Energy = power x time
- W, KW, KWh



Matter

Making Substances: Big ideas

What expert understanding do we want after 5 years?

Reactions rearrange matter

Big idea

During a chemical reaction, bonds are broken and the atoms of the reacting substances rearrange to form new bonds. The products have different properties to the reactants. In physical changes the molecules do not change, but their positions and their motion may.

How does the unit develop this?

Making Salts

Key Concept

Understanding different chemical changes means that scientists can predict exactly what new substances will be formed in a reaction, and use this knowledge to develop a wide range of different materials and processes.

Sub-concepts

- The reactions of acids with
- Metals
- Alkalis
- Bases
- Carbonates

Facts

- Reactant
- Product
- Formula

Amount of Substance

Key Concept

Atoms are not created or destroyed in chemical reactions. Chemical equations provide a means of representing chemical reactions and are a key way for chemists to communicate chemical ideas

Sub-concepts

Chemical measurements, conservation of mass and the quantitative interpretation of chemical equations.
Use of amount of substance in relation to masses of pure substances, gases and solutions.

Facts

- Mass and conservation of mass
- Concentration
- The Mole



Energy: Big ideas

Energy

What expert understanding do we want after 5 years?

Energy is conserved
Big idea

Energy is a property that objects must have to do work. It exists in different stores and can move between them. These stores can be kinetic or potential (based on the position in a field), or radiation. During an energy transfer, the total quantity is always constant but useful energy is wasted. This allows us to predict what can or cannot happen, using formulae.

How does the unit develop this?

Kinetic and Potential
Key Concept

Energy is often transferred from a kinetic store to a gravitational potential or elastic potential store and back again.

Sub-concepts

Kinetic Energy, Gravitational Potential Energy, Elastic Potential Energy

Facts

- Total energy is same before and after
- Energy is measured in Joules (J)
- Energy is dissipated – this is often described as wasted energy

Work
Key Concept

When a force causes an object to move through a distance work is done on the object. So a force does work on an object when the force causes a displacement of the object.

Sub-concepts

- Work is an energy transfer measured in joules.
- Levers are force multipliers (physics only)

Facts

- Work done = Force x Distance

Pressure- Physics only
Key Concept

Pressure in fluids is caused by particles. Pressure can be calculated and predicted.

Sub-concepts

Upthrust

Facts

- Pressure is measured in Pascals
- Pressure = Force/Area



Organisms

Plants and Photosynthesis: Big ideas

What expert understanding do we want after 5 years?

Cells are alive Big idea

Organisms are made of cells, which themselves have parts that carry out different functions. Organisms exist as single cells (unicellular) or many cells (multicellular). In multicellular organisms, cell division is essential for growth, development, and repair. Cells differentiate to form specialised cells that perform diverse functions. All living systems need matter and energy. Matter fuels respiration, the energy-releasing chemical reaction that provides energy for life functions and provides the material for growth and repair of tissue. Plants and algae use sunlight, water, and carbon dioxide to facilitate photosynthesis, which stores energy, forms plant matter, releases oxygen, and maintains plants' activities.

How does the unit develop this?

Photosynthesis Key Concept

Plants and algae use sunlight, water, and carbon dioxide to facilitate photosynthesis.

Sub-concepts

Limiting Factors
Inverse Proportion

Facts

- Functions of chloroplasts.
- Measurement of photosynthesis
- Endothermic reaction

Respiration Key Concept

Respiration is an exothermic reaction that takes place in cells to produce energy

Sub-concepts

Aerobic Respiration
Anerobic Respiration
Oxygen Debt



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How does the unit develop this?

Plant Transport Key Concept

The plant's transport system is dependent on environmental conditions to ensure that leaf cells are provided with the water and carbon dioxide that they need for photosynthesis.

Sub-concepts

Plant Tissues
Plant Organs
Plant Organ systems
Transpiration and translocation

Facts

- Functions of: epidermal tissues, palisade mesophyll, spongy mesophyll, xylem and phloem, meristem tissue found at the growing tips of shoots and roots
- The role of stomata and guard cells.

Year 10
Science
Knowledge Questions

Below are a series of questions.

Use these to apply your knowledge and practice.

Biology

What is the function of a chloroplast?

How does transpiration happen in a plant?

What are the similarities and differences between respiration and photosynthesis?

Chemistry

- Give examples of reactions of metals with acids, carbonates and bases.
- Describe (and explain) stages in the synthesis of a salt.
- Describe conservation of mass?

Physics

Define current and voltage

State the law of conservation of energy

Describe the relationship between power, current and voltage

Year 10 Science Knowledge Checklist

KNOWLEDGE

KNOWLEDGE CHECKLIST		R	A	G
1	Life Processes are controlled by nerves and hormones			
2	Life processes need a constant internal environment—Homeostasis			
3	Hormones play a vital role in sexual reproduction in humans			
4	Chemical bonds are made in chemical reactions			
5	Chemical Bonds involve the transfer or sharing of electrons			
6	Chemical bonds can be ionic, covalent or metallic.			
7	Energy is a property that objects must have to do work. It exists in different stores and can move between them. These stores can be kinetic or potential (based on the position in a field), or radiation. During an energy transfer, the total quantity is always constant but useful energy is wasted. This allows us to predict what can or cannot happen, using formulae.			
8	Energy is often transferred from a kinetic store to a gravitational potential or elastic potential store and back again			
9	When a force causes an object to move through a distance work is done on the object. So a force does work on an object when the force causes a			
10	Pressure in fluids is caused by particles. Pressure can be calculated and predicted.			

High Flyers - Enrichment Task



Georg Simon Ohm (16 March 1789 – 6 July 1854) was a German physicist and mathematician. As a school teacher, Ohm began his research with the new electrochemical cell, invented by Italian scientist Alessandro Volta. Using equipment of his own creation, Ohm found that there is a direct proportionality between the potential difference (voltage) applied across a conductor and the resultant electric current. This relation is called Ohm's law, and the ohm, the unit of electrical resistance, is named after him.