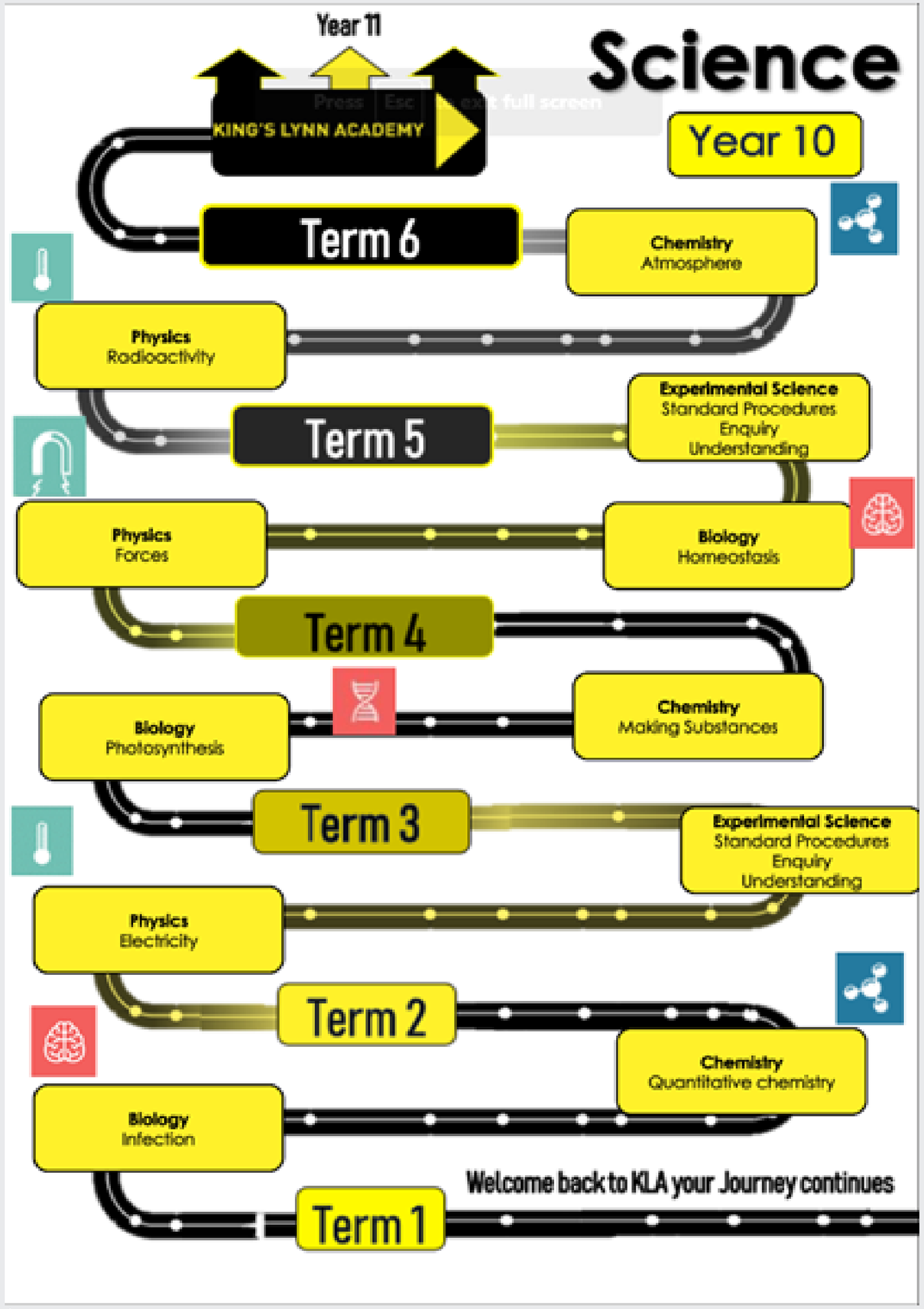
Year 11
Science
KING'S LYNN ACADEMY
Year 10
Term 6
Chemistry
Atmosphere
Physics
Radioactivity
Term 5
Experimental Science
Standard Procedures
Enquiry
Understanding
Physics
Forces
Biology
Homeostasis
Term 4
Biology
Photosynthesis
Chemistry
Making Substances
Term 3
Experimental Science
Standard Procedures
Enquiry
Understanding
Physics
Electricity
Term 2
Chemistry
Quantitative chemistry
Biology
Infection
Welcome back to KLA your Journey continues
Term 1

Plants and Photosynthesis: Big ideas

Organisms

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 exists 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

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.

Notes on practical work

Year 10

Science

Knowledge Checklist

	KNOWLEDGE CHECKLIST	KNOWLEDGE PROGRESS R	A	G
1	Plants and algae use sunlight, water, and carbon dioxide to facilitate photosynthesis.			
2	Respiration is an exothermic reaction that takes place in cells to produce energy			
3	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 photo-synthesis.			
4	Understanding different chemical changes means that scientists can predict exactly what new substances will formed in a reaction, and use this knowledge to develop a wide range of different materials and processes.			
5	Atoms are not created or destroyed in chemical reactions. Chemical equations pro-vide a means of representing chemical reactions and are a key way for chemists to communicate chemical ideas			
6	Describe the composition of gases in the Earth's atmosphere using percentages, frac-tions or ratios			
7	Describe how early intense volcanic activity may have helped form the early atmos-phere and how the oceans formed			
8	Explain why the levels of carbon dioxide in the atmosphere changes as the oceans were formed			
9	State the approximate time in Earth's history when algae started producing oxygen and describe the effects of a gradually increasing oxygen level			
10	Explain the ways that atmospheric carbon dioxide levels decreased			
11	Describe the penetration through materials, the range in air and the ionising power for alpha particles, beta particles and gamma rays			
12	Apply knowledge of the uses of radiation to evaluate the best sources of radiation to use in a given situation			
13	Use the names and symbols of common nuclei and particles to complete balanced nuclear equations, by balancing the atomic numbers and mass numbers			
14	Define half-life of a radioactive isotope			
15	The four types of nuclear radiation are alpha, beta, gamma and neutrons			

Cells: Big ideas

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Notes

Year 10

Science

Knowledge Questions

Below are a series of questions.

Use these to apply your knowledge and practice.

Biology
Where does photosynthesis take place in plants? Why? How do you measure the rate of photosynthesis?
What do plants use the products of photosynthesis for?
Why are offspring like their parents—how does inheritance work?

Chemistry
Which 3 gases were present in Earth's atmosphere 4 billion years ago?
How were the oceans formed?
How was the Carbon Dioxide locked up?
How did oxygen evolve? Which plant species was the first to appear?

Physics
How do you explain the properties of the different types of radiation?
Why is radiation harmful?
What are the properties of the three main forms of nuclear radiation?

B6 Inheritance and Variation: Big ideas

Genes

What expert understanding do we want after 5 years?

Characteristics are inherited
Big idea

All cells contain genetic material, in the form of DNA in chromosomes. Genes are specific regions that contain the instructions that code for characteristics. Organisms reproduce, transferring their genetic material to their offspring. In sexual reproduction fertilisation produces genetic variation in the offspring. Asexual reproduction forms genetically identical offspring.

How does the unit develop this?

Reproduction and Genes
Key Concept

Reproduction involves mixing genetic material from two parents, or copying cells from one parent

Sub-concepts

Sexual and Asexual reproduction
Meiosis
Genome

Facts

- Sperm, eggs, pollen and ovules are gametes.
- Gene
- DNA structure –GCSE Bio only.

Monohybrid Inheritance
Key Concept

Genes are inherited – this can be used to make predictions about sex and genetic illnesses.

Sub-concepts

Genetic Inheritance
Sex Determination
Inherited Disorders
Punnet Square

Facts

- Gene
- Allele
- Dominant
- Recessive
- Homozygous
- Heterozygous

Genetic Engineering
Key Concept

Modification of a genome of organism by introducing a gene from another organism

Sub-concepts

Risk and Benefit
Stages in the process of genetic engineering.

Facts

- Insulin and Diabetes
- GM Crops

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How does the unit develop this?

Cloning –GCSE Biology only
Key Concept

Cloning is used to create a genetically identical organism from an original plant or animal

Sub-concepts

Risk and Benefit
Ethics

Facts

- Tissue Culture
- Plant cutting
- Embryo transplant
- Adult Cloning

6

Making Substances: Big ideas

Matter

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 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

Radioactivity: Big ideas

Energy

What expert understanding do we want after 5 years?

Radiation transfers energy
Big idea

Radiation is the emission of waves or subatomic particles, from a source, which spread through space and through materials. Waves transfer energy without the material moving, and travel as longitudinal vibrations, or as transverse electromagnetic oscillations. Waves have characteristic properties when they meet boundaries, and pass into different materials. High energy waves cause ionisation.

How does the unit develop this?

Radioactive Decay
Key Concept

Some atomic nuclei are unstable. The nucleus gives out radiation as it changes to become more stable. This is a random process called radioactive decay.

Sub-concepts

Nuclear Equations show the process of decay

Facts

- The terms used to understand radioactive decay are
- Activity
- Count Rate
- The properties and composition of nuclear radiation:
- Alpha
- Beta
- Gamma

Half Life
Key Concept

Radioactive decay is random. The large number of atoms involved in decay mean that half life can be predicted for different elements.

Sub-concepts

Experimental and graphical methods to calculate half life

Facts

- Radioactivity is measured in Sieverts (Sv)
- Nuclear radiation can cause harm.
- Irradiation means that an object is exposed to radioactive particles or waves.
- Contamination means radioactive material is on or inside an object.
- Radioactive materials have hazards and uses linked to activity and half life.

Earth's Atmosphere: Big ideas

Matter

What expert understanding do we want after 5 years?

Earth systems interact: Big idea

- The cycling of matter in earth systems depends on physical and chemical processes over long and short timescales. Humans rely on resouces from these systems for minerals, fresh water, fuels and other raw materials

How does the unit develop this?

Earth's Atmosphere
Key Concept

For 200 million years, the proportions of different gases in the atmosphere have been much the same as they are today:
- about four-fifths (approximately 80%) nitrogen
- about one-fifth (approximately 20%) oxygen
- small proportions of various other gases, including carbon dioxide, water vapour and noble gases.

Sub-concepts

Earth's early atmosphere did not contain oxygen.

Facts

- Plants have evolved and oxygen is now present as a result of photosynthesis.

Human influence
Key Concept

Global warming is a direct response to burning fossil fuels.

Sub-concepts

Greenhouse gases are released when fossil fuels burn.
Some greenhouse gases carbon dioxide, methane, water vapour.