



Science at Queen Eleanor

Science comes from the Latin *scientia*, “to know”. Through science, we come to know the majesty of the universe and the intricacies of nature. Science is a collaborative process of building models by inquiring about laws of nature based on systematic observation. It allows us to explain different phenomena through underlying principles. A scientific outlook is open to altering ideas when faced with intriguing results.

Science skills (Classification and retention)



Collecting and organising data to find a trend or pattern

Key models within physics, chemistry, biology and earth sciences. Mental models of biology and Earth sciences also applied to geography.

Build models to explain observations – e.g. weather patterns, particle theory of matter and kinetic theory

Make predictions using laws of nature – e.g. conservation of matter, conservation of energy

Engineering and medicine apply scientific properties to improve the world – structure of materials determines properties, and properties determine uses

Challenge stereotypes about participation in science

Working like a scientist (Retention and application)



Arguments articulated by combining, comparing and contrasting evidence

Use conditional language to show that conclusions may change based on new evidence

Data organised, presented and interpreted with mathematical accuracy

Technical drawing refined to experiment with ideas and communicate

Improve the human condition by seek practical applications and make new inferences from unexpected applications

Sequencing content (Retention and connections)



Objective overviews provide subject knowledge and purpose

Learning journeys sequence cross-subject learning

Explanations progress : what→ how→ why (colourful semantics)

Physical and mental models developed over time through demonstration and experiment, e.g. sound and heat to both explained using kinetic theory

Links to geography curriculum teaching physical processes behind weather, climate , rock cycle and land forms, identify flora and fauna of biomes and appreciate environment when doing biology fieldwork

Links to art curriculum to draw diagrams

Links to history curriculum to teach how knowledge developed, inventions of the past were created and how they influence the modern world

Success for all



Learning with the brain in mind

Oracy – explicit teaching of scientific terminology and academic vocabulary

Literacy - reading scientific non-fiction and history of science. Reading Skills texts aligned with scientific content

Diagrams, writing frames, sentence structures to scaffold arguments

Pre-learning – prepare vocabulary and associated mental images

Assessment and progress



Retention – diagnostic and summative assessment

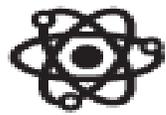
Retention - lessons begin with recall quiz

Retention - summative quizzes

Application - webs have maths strand to statistics, measurement and calculation skills to STEM

Application - writing pieces aligned with English curriculum to apply genres

Application and connections - enrichment time to keep prior knowledge fresh



Key mental models in science



Physics

Conservation of energy

Energy flows from high to low to reach equilibrium

Motion and forces

Motion involves a transfer of energy

Sound, light, magnetism, electricity (electromagnetism), gravity, friction, air resistance, water resistance

Chemistry

Conservation of matter

Particle model of matter

Particle structure of matter explains properties of matter

Properties of matter

Mechanical: hard/soft, rigid/flexible, strong/weak, absorbent/repellent

Conductivity: thermal, electrical

Optical: transparent/translucent/opaque, reflective/matte

Chemical: soluble, reactive

Magnetic

States of matter

Explained by particle structure, change explained by movement of heat

Kinetic theory of heat

Relationship between volume of matter, heat and pressure

Biology

All living things share certain characteristics

Living things can be classified by characteristics

Ecosystems are made up of inter-dependent parts

Living things have evolved to survive in their environment

Offspring resemble parents

There is variation within a population

Changes in the environment will cause changes in which traits survive

Earth sciences

Weather patterns

Result of tilt of Earth's axis

Climate patterns

Long-term weather patterns

Physical processes shaping layers of the Earth

Movement of tectonic plates
Erosion and formation of rivers