Science knowledge framework

Disciplines

Biology	Chemistry	Physics

Substantive knowledge	• Knowledge of concepts that run through the curriculum e.g. cell biology, energy transfer and energy stores, forces and motion etc. Building examples of these concepts in different contexts.
	• Knowledge of laws and theories.
	• Knowledge of models e.g. geocentric model of the solar system and how they have changed over time.
	• Subject specific vocabulary.
	• Knowledge of big ideas about science e.g.:
	  ○ **Physics:** fields produce non-contact forces; energy can be transferred but not created or destroyed.
	  ○ **Chemistry:** structure determines key properties and functions; chemical reactions rearrange matter.
	  ○ **Biology:** bodies are complex systems; characteristics can be inherited or due to the environment.

Disciplinary knowledge	• Knowledge of how scientific enquiry generates and grows substantive knowledge.
	• Knowledge of the systematic approaches scientists use.
	• Knowing that science evolves based on new evidence.
	• This is outlined in the working scientifically section of the National Curriculum and includes:
	  ○ the diversity of scientific methods e.g. classification, pattern-seeking, fair testing
	  ○ Scientific attitudes
	  ○ Apparatus
	  ○ Techniques
	  ○ Knowledge of how to carry out procedures
	  ○ Analysis, presentation and evaluating of scientific data to draw valid conclusions
	  ○ Knowledge of how scientific theories and laws develop over time.
	• Disciplinary knowledge should always be related to substantive knowledge.
	• Pupils should build conceptual knowledge about the approaches, methods, apparatus and techniques and not just carry out practical.