



A 5-year mastery framework  
towards GCSE combined science,  
developed from first principles.

# Progression

Cognitive science tells us that understanding is more than having knowledge, it's organising it around concepts and big ideas. *Blueprint* has unpacked GCSE content and turned it into a 5-year pathway towards mastery.

Big Idea	Y7	Y8	Y9	Y10
<b>Fields produce forces</b>	<b>Gravity</b> <ul style="list-style-type: none"><li>• Weight</li><li>• Gravitational force</li><li>• Solar system</li></ul>	<b>Magnetism</b> <ul style="list-style-type: none"><li>• Magnetic field</li><li>• Field around wire</li></ul>		<b>Force field</b> <ul style="list-style-type: none"><li>• Non-contact forces</li><li>• Motor effect</li></ul>

# Preparation

Students struggle in exams when they have to apply knowledge – the AO2 assessment objectives. *Blueprint* helps you prepare students for the demands of GCSE right from Year 7, with concept objectives for AO1, AO2 and AO3.

How can students master the understanding and skills?

	<b>Acquire (AO1)</b> Develop the concept	<b>Apply (AO2)</b> Use it in new situations	<b>Analyse (AO3)</b> Use it to evaluate/ conclude
Weight	✓ Objectives	✓ Objectives	✓ Objectives

# Problems

Research into expertise shows that we learn knowledge best not by transmission but as part of the process of doing challenging activities - problems. So the objectives in *Blueprint* are written as activities you can use for teaching and formative assessment.

## Interdependence unit

	Acquire	Apply	Analyse
Feeding relationships	<ul style="list-style-type: none"> <li>✓ <i>Construct a model</i> of an ecosystem, to show the feeding relationships</li> </ul>	<ul style="list-style-type: none"> <li>✓ Make a prediction about how changing one population affects another</li> <li>✓ Explain using the model how energy transfer is transferred in a food web</li> </ul>	<ul style="list-style-type: none"> <li>✓ <i>Argue with evidence</i> to support a claim for how ideas about energy transfer support a claim*</li> </ul>
Competition	<ul style="list-style-type: none"> <li>✓ <i>Construct a model</i> to identify which resources different organisms compete for and why</li> <li>✓ <i>Explain using a model</i> why organisms compete for resources and why some are more successful than others</li> </ul>	<ul style="list-style-type: none"> <li>✓ <i>Explain using the model</i> how a change in resources could affect a population</li> <li>✓ <i>Explain using the model</i> situations where organisms compete for resources</li> </ul>	<ul style="list-style-type: none"> <li>✓ Suggest reasons for a change in population using ideas about competition between organisms</li> </ul>
Abiotic & biotic	<ul style="list-style-type: none"> <li>✓ <i>Deduce a relationship from presented data</i> about the factors that affect an organism</li> </ul>	<ul style="list-style-type: none"> <li>✓ Predict how biotic and abiotic factors may affect populations in a community</li> </ul>	<ul style="list-style-type: none"> <li>✓ <i>Make a prediction</i> about predator and prey populations by interpreting a graph modelling a predator-prey cycle</li> </ul>

# Priorities

The key to preparing students for the demands of GCSE is prioritising content. Blueprint planners gives concepts a higher priority because they are essential for AO1, AO2 and AO3 and take time to learn. It gives facts a lower priority because they are only needed for AO1 – and are easily memorised once concepts are known.

## Higher priority

### Concept **Feeding relationships**

Food webs contain several food chains linked together. They show how energy is transferred from one organism to another.

### Made up of sub-concepts

Ecosystem, producer, population, decomposer

## Lower priority

### Facts

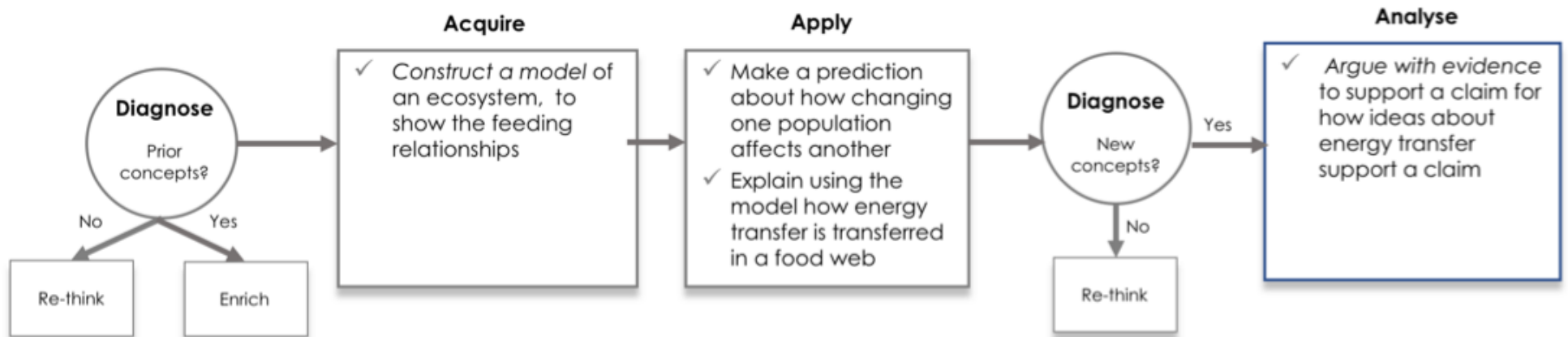
Cells have parts that each have a function: nucleus, cell membrane, cytoplasm, mitochondria, ribosomes, cell wall, vacuole, chloroplasts. Bacterial cells have a cell wall but no nucleus or mitochondria.

## GCSE specification references

Feeding relationships	<ul style="list-style-type: none"><li>• 4.7.1.1 Communities</li><li>✓ 4.7.2.1 Levels of organisation</li></ul>
Competition	<ul style="list-style-type: none"><li>✓ 4.7.1.1 Communities</li></ul>
Abiotic & biotic factors	<ul style="list-style-type: none"><li>✓ 4.7.1.2 Abiotic factors</li><li>✓ 4.7.1.3 Biotic factors</li><li>✓ 4.7.1.4 Adaptations.</li><li>✓ 7.2.1 Levels of organisation</li></ul>

# Pedagogy

*Blueprint* helps you implement strong formative assessment. Unit planners are based around a mastery learning system, and allow you to clarify exactly where students should be before and after teaching. Mastery Science is creating assessments to use at 'Diagnose' points to decide if students are ready to move on or need more learning.



Area	Big Idea Central ideas, models, principles	Y7	Y8	Y9	Y10	Y11
Organisms	<b>Cells are alive</b>	<b>Cells</b> <ul style="list-style-type: none"> <li>• Cell structure</li> <li>• Specialised cells</li> </ul>		<b>Growth &amp; differentiation</b> <ul style="list-style-type: none"> <li>• Stem cells</li> <li>• Cell transport</li> <li>• Cell division</li> </ul>		
	<b>Bodies are systems</b>		<b>Body systems</b> <ul style="list-style-type: none"> <li>• Gas exchange</li> <li>• Cell organisation</li> <li>• Digestive system</li> </ul>		<b>Organ systems</b> <ul style="list-style-type: none"> <li>• Circulatory system</li> <li>• System damage</li> </ul>	<b>Feedback &amp; control</b> <ul style="list-style-type: none"> <li>• Control systems</li> <li>• Enzymes</li> </ul>
Ecosystems	<b>Organisms are interdependent</b>	<b>Interdependence</b> <ul style="list-style-type: none"> <li>• Feeding relationships</li> <li>• Competition</li> <li>• Abiotic &amp; biotic</li> </ul>		<b>Human interaction</b> <ul style="list-style-type: none"> <li>• Biodiversity</li> <li>• Communicable disease</li> </ul>		
	<b>Ecosystems recycle resources</b>		<b>Respiration</b> <ul style="list-style-type: none"> <li>• Aerobic respiration</li> <li>• Anaerobic respiration</li> </ul>		<b>Photosynthesis</b> <ul style="list-style-type: none"> <li>• Photosynthesis</li> <li>• Plant transport</li> </ul>	
Genes	<b>Characteristics are inherited</b>	<b>Reproduction</b> <ul style="list-style-type: none"> <li>• Sexual &amp; asexual</li> <li>• Menstrual cycle</li> <li>• Embryo development</li> </ul>		<b>Genetics</b> <ul style="list-style-type: none"> <li>• Genes</li> <li>• Monohybrid inheritance</li> </ul>	<b>Controlling reproduction</b> <ul style="list-style-type: none"> <li>• Reproductive hormones</li> <li>• Genetic engineering</li> </ul>	
	<b>Species show variation</b>		<b>Evolution</b> <ul style="list-style-type: none"> <li>• Variation</li> <li>• Natural selection</li> <li>• Selective breeding</li> </ul>			<b>Diversity of life</b> <ul style="list-style-type: none"> <li>• Evolutionary evidence</li> <li>• Adaptation</li> </ul>

Area	Big Idea Central ideas, models, principles	Y7	Y8	Y9	Y10	Y11
Matter	<b>Structure determines properties</b>	<b>Substances &amp; particles</b> <ul style="list-style-type: none"> <li>Particle model</li> <li>Substances &amp; mixtures</li> <li>Solutions</li> </ul>	<b>Elements &amp; compounds</b> <ul style="list-style-type: none"> <li>Elements &amp; compounds</li> <li>Simple &amp; giant</li> </ul>	<b>Periodic table</b> <ul style="list-style-type: none"> <li>Periodic patterns</li> <li>Subatomic particles</li> </ul>	<b>Structure &amp; bonding</b> <ul style="list-style-type: none"> <li>Bonding types</li> <li>Structure &amp; properties</li> <li>Electrolysis</li> </ul>	<b>Carbon chemistry</b> <ul style="list-style-type: none"> <li>Hydrocarbons</li> <li>Carbon structures</li> </ul>
	<b>Reactions rearrange matter</b>	<b>Changing substances</b> <ul style="list-style-type: none"> <li>Chemical &amp; physical</li> <li>pH scale</li> <li>Neutralisation</li> </ul>	<b>Reactants &amp; products</b> <ul style="list-style-type: none"> <li>Oxidation</li> <li>Thermal decomposition</li> <li>Acid reactions</li> </ul>	<b>Matter &amp; energy</b> <ul style="list-style-type: none"> <li>Atom conservation</li> <li>Combustion</li> </ul>	<b>Controlling reactions</b> <ul style="list-style-type: none"> <li>Collision theory</li> <li>Bond energies</li> <li>Equilibrium</li> </ul>	<b>Making substances</b> <ul style="list-style-type: none"> <li>Making salts</li> <li>Moles</li> </ul>
	<b>Earth systems interact</b>		<b>Earth systems</b> <ul style="list-style-type: none"> <li>Earth resources</li> <li>Rock cycle</li> </ul>	<b>Using resources</b> <ul style="list-style-type: none"> <li>Reactivity series</li> <li>Potable water</li> <li>Product life-cycle</li> </ul>	<b>Atmosphere</b> <ul style="list-style-type: none"> <li>Changing atmosphere</li> <li>Climate change</li> <li>Air pollutants</li> </ul>	



Area	Big Idea Central ideas, models, principles	Y7	Y8	Y9	Y10	Y11
Forces	<b>Forces predict motion</b>	<b>Contact forces</b> <ul style="list-style-type: none"> <li>Balanced &amp; unbalanced</li> <li>Friction</li> <li>Density</li> </ul>	<b>Speed</b> <ul style="list-style-type: none"> <li>Speed</li> <li>Motion graphs</li> </ul>	<b>Acceleration</b> <ul style="list-style-type: none"> <li>Vectors</li> <li>Acceleration</li> <li>Newton's 1<sup>st</sup> law</li> </ul>	<b>Newton's laws</b> <ul style="list-style-type: none"> <li>Newton's 2nd law</li> <li>Stopping distance</li> <li>Momentum conservation</li> </ul>	
	<b>Fields produce forces</b>	<b>Gravity</b> <ul style="list-style-type: none"> <li>Weight</li> <li>Gravitational force</li> <li>Solar system</li> </ul>	<b>Magnetism</b> <ul style="list-style-type: none"> <li>Magnetic force</li> <li>Current &amp; magnetism</li> </ul>		<b>Force field</b> <ul style="list-style-type: none"> <li>Non-contact forces</li> <li>Motor effect</li> </ul>	
Energy	<b>Energy is conserved</b>	<b>Energy transfers</b> <ul style="list-style-type: none"> <li>Energy model</li> <li>Wasted energy</li> <li>Heat &amp; temperature</li> </ul>		<b>Energy in matter</b> <ul style="list-style-type: none"> <li>Heat transfer</li> <li>Specific &amp; latent</li> <li>Particle motion</li> </ul>		<b>Energy conservation</b> <ul style="list-style-type: none"> <li>Kinetic energy</li> <li>Potential energy</li> <li>Work</li> </ul>
	<b>Electricity transfers energy</b>	<b>Electric circuits</b> <ul style="list-style-type: none"> <li>Electric current</li> <li>Resistance</li> </ul>	<b>Electrical energy</b> <ul style="list-style-type: none"> <li>Electric charge</li> <li>Potential difference</li> </ul>		<b>Home electricity</b> <ul style="list-style-type: none"> <li>Energy resources</li> <li>Circuit components</li> <li>Power</li> </ul>	
	<b>Radiation transfers energy</b>		<b>Light</b> <ul style="list-style-type: none"> <li>Reflection</li> <li>Colour</li> </ul>	<b>Sound &amp; waves</b> <ul style="list-style-type: none"> <li>Wave properties</li> <li>Transverse &amp; longitudinal</li> <li>Refraction</li> </ul>	<b>E.m. radiation</b> <ul style="list-style-type: none"> <li>Electromagnetic spectrum</li> <li>Wave energy</li> </ul>	<b>Radioactivity</b> <ul style="list-style-type: none"> <li>Radioactive decay</li> <li>Radioactive sources</li> </ul>