

Introduction

This teaching pack is a collection of teaching ideas and student-facing resources (all of which were specifically commissioned for the pack), on the overarching theme of Biomimicry to be used as an introduction to GCSE Science for Y9 students. The theme of Biomimicry was chosen as it is an exciting area of research that extends across scientific disciplines using inspiration from nature to help scientists solve contemporary problems. The pack aims to bridge the gap between what students will have studied at KS3 (e.g. energy transfer, chemical reactions and photosynthesis) and areas studied at GCSE (e.g. nanotechnology, nerve impulses and forces).

It is planned as a six-week unit of work (18 lessons). Included are:

* starter, main and plenary activities
* practical investigations
* suggestions for differentiation and extension of activities
* suggested assessment opportunities
* resources to develop mathematical skills and understanding
* differentiated weekly homework activities
* links to areas of current research and scientists.

It is arranged lesson by lesson, with several suggested starters, main and plenary activities. It lends itself to a ‘pick and mix’ approach; choose from the suggested activities the most appropriate for your students. It could be dipped into on an ad hoc basis or it could form the basis of a longer unit of work. The resources are all available in adaptable formats, making it easy to differentiate the tasks by ability.

The practical investigations are all designed to use materials and equipment that are all easy to resource. They could be extended into more substantial investigations.

To help with navigation, there is a contents table which summarises the resources found in each lesson. Included are several interactive resources, to access these please go to <www.teachitscience.co.uk/aqa-biomimicry>

Our special thanks go to the author, Jane Robertson, who has created and written this pack.

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Resources summary

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| **Lesson** | **Resource** |
| **W1L1**  Introduction to biomimicry | Introduction to biomimicry — starter activities |
| Trying to fly: making a model of Cayley’s glider |
| Units and equations |
| Week 1 homework |
| **W1L2**  Nanotechnology | Large and small prefixes |
| Large and small prefixes (interactive whiteboard version)\* |
| Powers of ten |
| What is nanoscience and technology? |
| **W1L3**  Developments in microscopy | Important developments in microscopy |
| Different types of modern microscope |
| **W2L1**  Things that glow in the dark | Using fluorescence — background information |
| Fluorescent chemicals |
| Week 2 homework |
| **W2L2**  What can we learn from termite mounds? | Odd one out |
| What can we learn from termite mounds? |
| Cross section of a termite mound |
| **W2L3**  What’s special about a lotus leaf? | What’s special about a lotus leaf? |
| Magnification activity |

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| **Lesson** | **Resource** |
| **W3L1**  Spiny–headed worms and skin grafts | Interviewing the professor |
| Week 3 homework |
| **W3L2**  Desalination | Water cycle |
| Water cycle (interactive whiteboard version)\* |
| World’s population and water |
| **W3L3**  Freshwater in deserts | Freshwater in deserts |
| Questions and answers |
| **W4L1**  Neural networks | The brain — true or false? |
| Neural networks |
| A brief history of neural networks |
| Week 4 homework |
| **W4L2**  Mussel adhesive | How do mussels stick? |
| How do mussels stick? (interactive whiteboard version)\* |
| Making a glue |
| Comparing mussel strength |
| **W4L3**  Tardigrades and vaccines | The problems with vaccines |
| Tardigrades under the microscope |

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| **Lesson** | **Resource** |
| **W5L1**  The Bombardier beetle | Scientist — who’s who? |
| Charles Darwin and the Bombardier beetle |
| Week 5 homework activity |
| **W5L2**  Wind turbine blades | Wind turbine blades |
| Investigation – comparing designs for a helicopter blade |
| **W5L3**  Silk moths and chitin | Silk moths and chitin |
| Comparing polymers |
| Shrilk |
| Maths and measuring volume |
| Match the Greek word with its meaning |
| **W6L1**  Artificial photosynthesis (1)  **W6L2**  Artificial photosynthesis (2) | Artificial photosynthesis —starter |
| Is chlorophyll the only pigment in green leaves? |
| Artificial photosynthesis – obstacles to overcome |
| What am I? |
| **W6L3**  A new look at wood | A new look at wood |
| Comparing concrete and wood |
| Cellulose and other materials |

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