

Biology

Biology (age 11-14)

Subject map

Big ideas and key concepts

The **Best Evidence Science Teaching** resources can be used with your existing scheme of work, if desired. However, we have used research evidence on learning pathways and effective sequencing of ideas to develop subject maps for biology, chemistry, earth science and physics.

This subject map shows how five **big ideas** of biology education can be developed through a series of **key concepts**, organised into teaching topics.

Each key concept requires approximately 1-3 lessons' worth of teaching time.

The numbering in the subject map gives some guidance about teaching order based on our review of the research and teaching experience. In general, key concepts that appear earlier in the subject map need to be understood before progression to key concepts that appear later. However, the teaching order can be tailored for different classes as appropriate.

Publication of resources

Teaching and learning resources will be added on a topic-by-topic basis throughout 2018 and 2019.

The resources are being developed based on careful consideration of the best available research evidence on learning pathways, common student misunderstandings, and effective teaching approaches.

To find out when new topics have been published, please email uyseg@york.ac.uk and ask to subscribe to BEST project updates, or follow [@BestEvSciTeach](https://twitter.com/BestEvSciTeach) on Twitter.



This document last updated: February 2019

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BIG IDEA:

**THE
CELLULAR BASIS
OF LIFE**

Organisms are made of one or more cells, which need a supply of energy and molecules to carry out life processes.

Topic BCL1
Cells

Key concepts:

- BCL1.1 Living, dead and never been alive
- BCL1.2 Cells and cell structures
- BCL1.3 Cell shape and size
- BCL1.4 Diffusion and the cell membrane

BIG IDEA:

**HEREDITY
AND
LIFE CYCLES**

Genetic information is passed from each generation to the next; this information and the environment affect the features, growth and development of organisms.

Topic BHL1
Inheritance and the genome

Key concepts:

- BHL1.1 Heredity and genetic information
- BHL1.2 The structure and function of the genome

BIG IDEA:

**ORGANISMS
AND THEIR
ENVIRONMENTS**

All organisms, including humans, depend on and interact with other organisms and the environments in which they live.

BIG IDEA:

**VARIATION,
ADAPTATION
AND EVOLUTION**

Differences between organisms cause species to evolve by natural selection of better adapted individuals. The great diversity of organisms is the result of evolution.

BIG IDEA:

**HEALTH
AND
DISEASE**

Organisms must stay in good health to survive and thrive; the health of an individual results from interactions between its body, behaviour, environment and other organisms.

Topic BCL2
From cells to organ systems

Key concepts:

- BCL2.1 Working together – cells, tissues and organ systems
- BCL2.2 Supplying cells – the human circulatory, digestive and gas exchange systems
- BCL2.3 The human skeleton and muscles

Topic BVE1
Variation

Key concepts:

- BVE1.1 Differences within species
- BVE1.2 Changes in species over time – fossil evidence

Topic BHD1
What are health and disease?

Key concepts:

- BHD1.1 Good and ill health
- BHD1.2 Disease

Topic BOE1
Interdependence of organisms

Key concepts:

- BOE1.1 Food chains and food webs
- BOE1.2 Depending on each other

Topic BVE2
Classification

Key concepts:

- BVE2.1 Identifying and classifying organisms
- BVE2.2 Classification systems

Topic BHD2
Human lifestyles and health

Key concepts:

- BHD2.1 Diet
- BHD2.2 Exercise and asthma
- BHD2.3 Recreational drug use

Topic BCL3
Cellular biochemistry

Key concepts:

- BCL3.1 Photosynthesis
- BCL3.2 Cellular respiration
- BCL3.3 Enzymes

Topic BHL2
Changes within an organism's lifetime

Key concepts:

- BHL2.1 Life cycles
- BHL2.2 Growing bigger
- BHL2.3 Growing older

Topic BHL3
Reproduction

Key concepts:

- BHL3.1 Sexual reproduction in humans
- BHL3.2 Sexual and asexual reproduction in plants

Topic BOE2
Organisms in the environment

Key concepts:

- BOE2.1 How organisms affect their environments
- BOE2.2 The effects of environmental changes

Topic BOE3
Biodiversity

Key concepts:

- BOE3.1 The importance of biodiversity
- BOE3.2 Human impacts on biodiversity

Topic BVE3
Adaptation and evolution

Key concepts:

- BVE3.1 Adaptations
- BVE3.2 Competition
- BVE3.3 Developing the theory of evolution by natural selection

Topic BHD3
Infectious disease

Key concepts:

- BHD3.1 Pathogens
- BHD3.2 Preventing infection – animals
- BHD3.3 Preventing infection – plants