

# 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](mailto:uyseg@york.ac.uk) and ask to subscribe to BEST project updates, or follow [@BestEvSciTeach](https://twitter.com/BestEvSciTeach) on Twitter.



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**BIOLOGY (AGE 11-14)****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 healthy to survive, but lifestyle, environmental factors and pathogens can all affect health.*

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 Defining health and disease
- BHD1.2 Treating disease

Topic BOE1  
**Interdependence of organisms**

Key concepts:

- BOE1.1 Food chains
- BOE1.2 Food webs
- BOE1.3 Depending on each other

Topic BVE2  
**Classification**

Key concepts:

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

Topic BHD2  
**The effects of human lifestyles on health**

Key concepts:

- BHD2.1 Diet
- BHD2.2 Exercise, asthma and smoking
- BHD2.3 Alcohol and other recreational drugs

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
- BHD3.3 Causing symptoms