

Progression Framework for science

The Progression Framework for science is divided into two parts: *Progression in concepts* and *Working Scientifically*:

- *Progression in concepts* is based on the statements relating to key ideas in science. It is split into Biology, Chemistry and Physics; within each of these a number of 'big ideas' have been identified and used to show how later statements progress from earlier ones. See below for more information about the big ideas.
- *Working Scientifically* is based on the main skill areas which are broadly viewed as processes (e.g. planning investigations, reporting findings). Each of these is then subdivided into individual skills. As the Programme of Study statements are by Key Stage rather than by year, these have been taken as relating to the second year of each Key Stage and statements have been developed for the previous year that represent progress towards that.

In order to manage progression in science, it is important to understand what the big ideas are in the subject. Although the Programme of Study is set out in topics, it is possible to discern underlying ideas within and between these topics. In the development of the Progression Framework, we have identified several big ideas for Biology, Chemistry, Physics and Working Scientifically (e.g. Life exists in a variety of forms and goes through cycles). They are informed by a detailed reading of the Programme of Study, experience in curriculum development and an understanding of the nature of science.

These ideas vary in scale and in frequency of appearance. For example, in the Programme of Study properties of 'materials' has a stronger presence than 'geological processes', so that is reflected in the Progression Framework. As a result, the big ideas do not all have an equal weighting.

Concepts within the Programme of Study do not necessarily show a neat progression. For example, pupils are taught light in Year 3, sound in Year 4, and light again in Year 6, but not until KS3 are they introduced to the idea that these are *both* ways in which energy is transferred as waves. The progression is there but it needs to be dealt with in a different way.

The ideas develop over the years – some from Year 1 through to Year 6. Sometimes they develop through *cognitive* complexity, such as going from observing a phenomenon to applying it to other contexts and sometimes through *conceptual* complexity, such as going from knowing that a push is a force, to understanding that forces can act in different directions.

Sometimes concepts link across big ideas. A good example of this is evolution, which draws upon an understanding of competition within habitats, variation within species and the process of reproduction. We have tried to avoid trivial links but instead drawn attention to where a teacher could usefully relate prior learning to a new topic. In such cases, clear cross-references are provided in the Progression Statement from one idea and one year group to another.

Generally, the Working Scientifically skills form a continuum. For example, pupils should develop the skill of saying what an experiment shows, and get better at supporting this with evidence and scientific ideas.