



Strategies for teaching and learning

Welcome to Creative Teaching and Learning's brand new feature, 'Strategies for teaching and learning'. In each issue, we'll select three aspects of the new National Curriculum for Key Stages 1, 2 and 3, and share a variety of approaches to teaching its more demanding content from our panel of expert practitioners.

The new curriculum for all key stages is undeniably tougher and more demanding of teachers and pupils alike. In combination with higher floor standards and a fierce inspection regime, it can be tempting to buckle under the pressure of the new curriculum and do more of the same, just harder. At Creative Teaching and Learning, however, we want to support teachers to retain their creativity in the face of such pressure – which is why we are launching this brand new regular feature: 'Strategies for teaching and learning'.

In each issue, we will provide a summary of teaching approaches to different aspects of the new English, maths and science curriculum for Key Stages 1, 2 and 3. Each summary will present an overview of the key issues teachers need to address if they wish to improve on this particular area, including ideas for classroom activities, links to thinking skills, opportunities to make connections across the curriculum, and more. All have been put together by a panel of experienced teachers, so you'll know the strategies provided are practical, age-appropriate and effective.

In this first edition, our expert practitioners consider:

- **reading comprehension** in upper **KS2** English;
- **multiplication and division** in **KS1** mathematics; and
- the **KS3 biology** topic, **relationships in an ecosystem**.

The strategies for English, maths and primary science are presented according to year group. We realise, however, that all secondary schools teach KS3 science differently, so have structured our summaries according to topic, rather than any specific year.

Expert teaching advice is available for the entire English, maths and science curriculum as part of our progress tracker app, Climbing Frames. The app provides a complete set of curriculum assessment frames for all core and foundation subjects, and enables teachers to track individual, class and cohort progress across KS1, 2 and 3. For more information, visit: www.climbingframes.org.uk.

English – Reading comprehension – Upper Key Stage 2

Year 5

Writing a **book review** is an activity that has been around for years, with the review itself going no further than a display board or folder. However, pupils' opinions of what they have read and their recommendations can be very powerful when promoting reading for pleasure.

Recommendations and reviews can be done in a variety of ways, not necessarily written. Pupils can make a **short video** and record their view of the book. Setting up an area in the school with a chair and webcam works, and pupils can record their opinion independently. It is a good idea to view and edit the reviews. In fact, a team of pupils can take on the task. Webcam reviews can then be made available for pupils to view and can be organised by author and genre. Then, when they are looking for a book to read, they have access to a resource to help them. It also helps with ICT and speaking and listening skill development.

Reading stock in classrooms, and in schools as a whole, tends to be static, generally the same books on the same shelves or in the same box. To create more interest in an author, consider the following:

- Have an **author focus fortnight** where the books of one author are all that is available every half term.
- Have multiple copies of some titles so that pupils can read the same book independently but then have a chance to discuss it afterwards.
- Have the biography of the author available or make it a research task.
- Find a video of the author talking about their work and how they became a writer.
- Let the pupils suggest authors for the next session.

When studying non-fiction texts and practising information retrieval, try finding and **using real texts**, such as leaflets from supermarkets and DIY stores, and looking for persuasive text in real advertisements rather than textbook versions.

Pupils need to learn the **technical terms**, such as 'metaphor', 'simile', 'analogy', 'imagery', 'style and effect', to be able to discuss their writing and the writing of others. They should 'read as a writer', spotting the devices the writer has deliberately chosen to have an effect on the reader and explaining what that effect is. Many teachers begin with teaching the simile, but children quickly grasp this device. Writing a poem using similes is a useful activity, as is researching familiar ones that are used in everyday language.

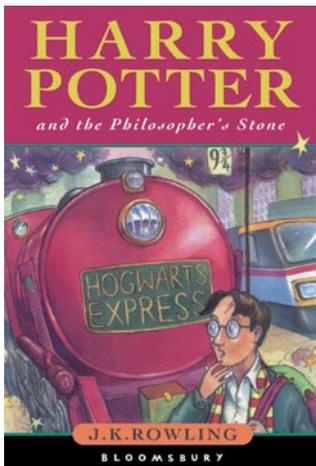
Pupils can begin to comment on an author's **style of writing** and why they like particular writers and stories. Now they have the knowledge, they can begin to understand how different writers have different styles.



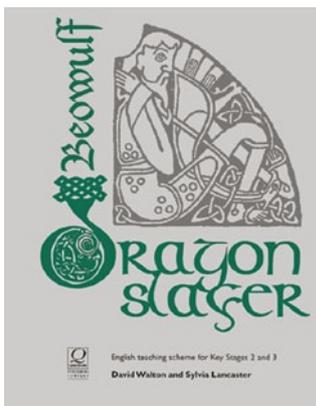
Year 6

Pupils will have had experience **distinguishing between fact and fiction** from retrieving and recording information from non-fiction and the work they have done in other subjects across the curriculum.

Investigation is a good exercise to check whether they know the difference – give pupils a mixed list of factual and fictional statements to identify. They can work in small groups to produce statements of their own for each other to identify. Depending on the level of understanding, determine how much time needs to be spent in English on this, but take the opportunity to reinforce it in other subjects. In history, it is likely that viewpoint and bias will have been discussed in relation to the reliability of evidence; it may be interesting to follow this by exploring where fact meets fiction.

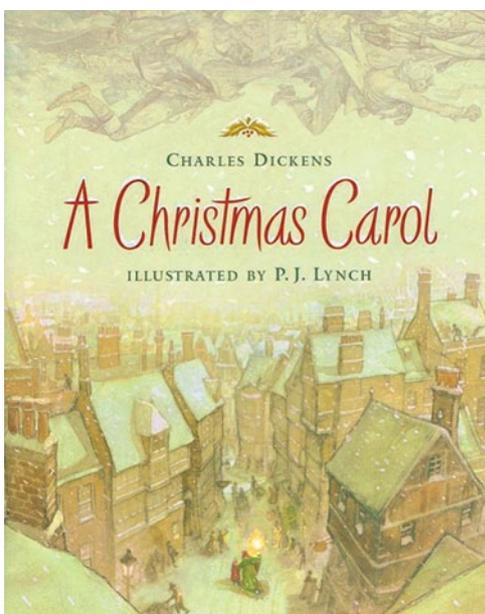


Encouraging **reading for pleasure** depends to a large extent on the type and number of books available. Pupils often prefer one **genre** for a considerable amount of time, but can be encouraged to read other authors while staying within a genre they enjoy. Many more able pupils, particularly boys, enjoy the fantasy fiction and magic genre, starting with JK Rowling, but progressing to Eoin Colfer and Tolkien. Teachers need to know the authors in such genres and to have read some of the books in order to be able to choose and recommend.



Keeping enthusiasm for reading for pleasure depends on giving the right book to the right child at the right time, so knowledge of a range of children's fiction for upper KS2 is essential. Libraries can often provide and recommend lists but matching the book to the pupil remains with the teacher.

Choosing extracts from **classical literature** can mean using translations of Greek myths or Old English texts such as *Beowulf*. Looking at a short extract of the original Anglo Saxon *Beowulf* – the description of Grendel's mother, for example – will fascinate pupils, and provides the opportunity to explore how words have changed but can still be recognised. If the teacher chooses to study Greek myths, then having books available for pupils to read beyond the confines of the lesson will encourage them to read more.



Extracts from Dickens can be used to look at sentence structure and description. The four-line description of Scrooge from *A Christmas Carol* illustrates so many literary devices and would provide a good resource to look at older language, but also the choice of words and their effect in one short paragraph. Dickens also provides the opportunity to look at the author's choice of names for a character. Make a list and pupils can discuss what they think a character would be like from names like Gradgrind, Pumblechook, Uriah Heep and so on.



Mathematics – Multiplication and division – Key Stage 1



Year 1

Pupils should be able to **link counting in twos, fives and tens with arrays**. A range of practical experience is needed to develop this thinking over time. For example, invite ten pupils to line up in single file, then in twos, then fives. Each time, engage the class in counting the pupils in ones, twos and fives. Use counters to represent the lines of pupils and explore different ways of describing each of the arrays – for example, five rows of two, two columns of five.

Arrays are important in developing understanding of multiplication and division. Ensure that pupils **see and interpret arrays in different ways**: as two different sets of repeated addition, for example, or as a number of 'rows of' and 'columns of'. Show pupils how to develop and describe their own arrays – for instance, give pupils 20 counters and invite them to find different ways to organise them in an array. Describe each array in terms of number of rows and columns and invite

pupils to make statements like, 'There are two rows of ten', or '20 = 10 + 10'. It is probably better to keep the focus on twos, fives and tens to secure the link between counting in steps and early thinking about multiplication and division.

At this stage, pupils should work with **practical sharing activities** to begin to get a feel for dividing a number of objects equally. Pupils will need plenty of experience with real objects. Secure links with previous learning by keeping the focus on twos, fives and tens. Keep a link between sharing activities

and the idea of multiplying, so if ten sweets shared between five people gives two sweets each, that means five lots of two sweets makes ten sweets. Also, link back to arrays to explore how the array shows the answer to the problem.

Pupils should also work with **practical grouping activities** by doing repeated subtraction – for example, finding how many boxes of ten pencils can be filled with 60 pencils. This is an important stage in developing pupils' early thinking about division. They will need a lot of practice – for example, starting with 50 cubes and exploring how many groups it is made up of, linking the grouping activity with the related multiplication by focusing on twos, fives and tens.

Pupils should know the **doubles** of numbers to at least ten and know the halves of the corresponding even numbers. Incorporate regular mental recall activities to ensure pupils remember these number facts.

Year 2

Pupils need practice to **secure recall** of their tables. Move pupils from counting forward and backwards in steps of two (or five or ten), to chanting, 'one times two is two, two times two is four...', up to and occasionally beyond, 'twelve times two is twenty four'. As pupils become more competent, start to do the same in reverse, then start from, 'five times two is ten', and go forward.

It is important to keep **work on multiplication alongside work on division**, so pupils can get a feel for the connections this year. For example, they should be able to find the set of **related facts** (one further multiplication and two divisions), given a number sentence like ' $6 \times 5 = 30$ '. Look for opportunities for pupils to find a set of related facts. Help to secure the understanding of multiplication and division by inviting pupils to make up



This year, pupils begin to use **more formal approaches to multiplication and division**, but still based on practical contexts. Arrays continue to be an important image for developing understanding. Pupils will need to move from describing arrays as, for example, 'two rows of five' and 'five columns of two', to ' $2 \times 5 = 10$ ' and ' $5 \times 2 = 10$ '. Use arrays to ensure that pupils can see the link between multiplication and repeated addition.

Pupils should understand division as both **sharing and grouping**, working with practical contexts for each of these. At this stage, pupils should be using division notation accurately and be able to interpret, for example, ' $18 \div 2$ ' as, 'how many twos make 18'.

stories or problems that fit the number sentences.

Pupils should be able to use the **language and symbols** of multiplication and division. This takes time and experience in a range of contexts. One approach is to use missing number/sign puzzles, for example, ' $\square \times 2 = 12$ ', ' $20 \div \square = 2$ ', ' $15 \square 3 = 5$ '. Secure links by asking pupils to use arrays to demonstrate some of the sentences. Gradually expand the language that pupils use for multiplying – 'double', 'lots of', 'times', and increasingly 'multiplied by' – and for dividing – 'halve', 'share', and increasingly 'divided by'. Use these interchangeably and encourage pupils to do the same.

Science – Relationships in an ecosystem – Key Stage 3

In KS2, pupils should have learnt to construct and interpret **food chains**, identifying producers, predators and prey. They should understand that environments change and that this can sometimes pose dangers to living things. These ideas lay the foundation for wider understanding developed in this topic and also support learning of another biology-based topic, 'Genetics and evolution'.

Research shows that although pupils have studied food chains at KS2, they are likely to have poor understanding of food chains as a model of **energy flow** and the **interdependence** of living things. The arrow symbols are one source of confusion, so be explicit about food chains and webs showing energy flow, and give pupils opportunities to compare them with other energy flow diagrams. Talking about the strengths and limitations of food chains as a model of interdependence within an ecosystem and the advantages of joining food using food webs will help pupils' understanding, while careful introduction of key words will help them to distinguish between concepts such as ecosystems and environment.

Understanding the role of producers in food chains is key to understanding interdependence. Pupils may need help to identify producers, especially in aquatic ecosystems, so studying a range of examples is important. **Opportunities to observe real life interactions** in a fish tank, the school grounds or a garden will enrich learning and allow pupils to bridge

understanding from accessible local examples to more remote examples, such as rainforests. Extensive guidance for teachers on studying **urban ecosystems** at KS4 which could be adapted for KS3, can be found on the **Field Studies Council website**, as can **identification guides**.

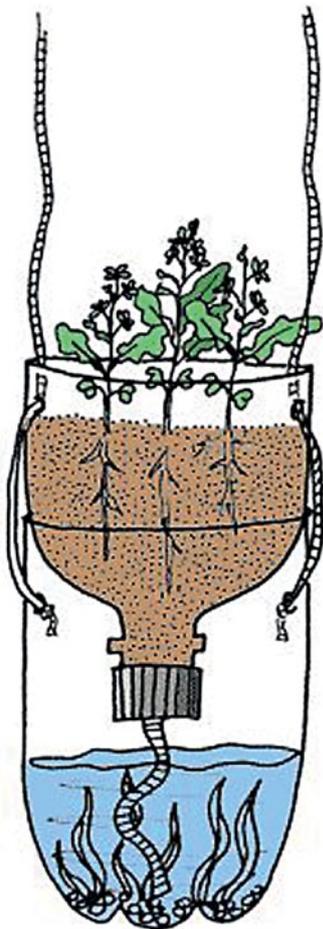
Relationships within ecosystems are complex, so give pupils opportunities to consider what happens if one species decreases in numbers, and elicit understanding that a dependent species can be affected in a number of ways, such as decreasing in number in turn or exploiting a different food source.

Applications of the uses of food chains are unlikely to be obvious to pupils, so give them opportunities to find out about human food chains and examples of when food security has been under threat – for example, the Irish potato famine in the 1900s. Researching the role of understanding food chains and webs in protecting endangered species, such as tigers and sharks, is likely to be motivating and interesting.

To understand the **accumulation of toxic materials** as they are passed through food webs, pupils need to know that the toxins are not excreted or lost from the organism, but build up in tissues such as the liver of animals, so that each organism gets a larger and larger dose as the toxin is passed along the food chain. Asking pupils to act out what they think is happening is a useful way to elicit their understanding of this. Pupils may not be familiar with units used by environmental scientists such as parts per million, so there are good opportunities here for talking about appropriate units, calculations and proportions.

Ideas about **pollination** link to plant fertilisation covered in the KS3 topic of reproduction. Encourage pupils to distinguish between pollination as the transfer of pollen from the male to the female part of the flower,





and fertilisation as the fusion of the male and female sex cells. Be prepared to reiterate the idea that plants do indeed have sex cells and that sexual reproduction in biology means reproduction where fertilisation takes place.

The sequence of events from pollination to fertilisation to seed and fruit production will not be obvious to most pupils. **Role play and sequencing activities** are likely to help. Dissect flowers so pupils can see the distance between the stigma, the landing platform for the pollen, and the ovule (female sex cell). Growing pollen tubes to observe under the microscope is problematic, but rewarding when it works, and the practical can be backed up with video material.

Teachers may have misconceptions or lack knowledge of plant reproduction. A reliable source of background information can be found at **[Science and Plants for Schools](#)**.

Foraging behaviour in bumblebees can be studied in gardens and makes a rewarding activity to reinforce pupils' understanding of pollination. Where schools have allotments, food growing or gardening clubs, there are excellent opportunities for curriculum links with this topic.

About our experts

Wendy Morton (English KS1-3)

Wendy taught for over 20 years, before becoming one of the first primary national strategy consultants and a KS3 specialist consultant. She was a regional director for English in the Secondary National Strategy, and is now an independent education consultant.

Barbara Miller (Mathematics KS1-3)

Barbara has worked in maths education for more than 30 years. She played a key role in the government-funded national numeracy strategies, and more recently, worked for the DfE Effective Practice Team, leading a range of school studies, including exploring why some children make slow progress in maths.

Ed Walsh (Science KS3 – Working scientifically, Physics)

Ed is a science adviser for Cornwall Learning, and regional development leader for the Science Learning Centre, South West consortium. He taught science for 20 years in Manchester, South Wales and Cornwall, and was a head of science for 12 years.

Mary Howell (Science KS3 – Chemistry, Biology)

Mary has 25 years of successful teaching and curriculum development experience across KS3, 4 and 5, including KS3 coordinator for science and head of biology. She is now a science training consultant.

Janette Catton (Science KS1-2)

Janette was a primary science consultant for the Coventry LA. She is now assistant head at a large primary school, a specialist leader of education for science and a teacher practitioner for the Science Learning Centre, Bishop Challoner. She is a hub leader for the Primary Science Quality Mark and provides termly subject leader outreach training for local primary schools.

Tina Dhillon (Science KS1-2)

Tina has 15 years' teaching experience in both primary and secondary schools. She was primary science teacher of the year in 2012 and is a member of the Primary Science Teaching Trust. She is currently a specialist leader of education for science and leads the science and technology faculty at a large primary school in Coventry.