

connecting science

**Full flexibility, endless possibilities,
outstanding support**



- Makes it easy to teach Key Stage 3 in 2 years, or 3 - it's your choice
- Offers unparalleled support and guidance for teachers
- Provides a truly flexible way to bring your lessons to life with Dynamic Learning software
- Will help you meet QCA and National Strategy requirements for Assessing Pupil's Progress (APP) as part of the package

**Order today
to make the
most of fantastic
discounts.**

**Call
01235 827720**

Connecting Science has been written especially for the new Key Stage 3 Science curriculum. It's an enquiry-led course that focuses on bringing lessons to life using our flexible Dynamic Learning technology.



The structure of Connecting Science

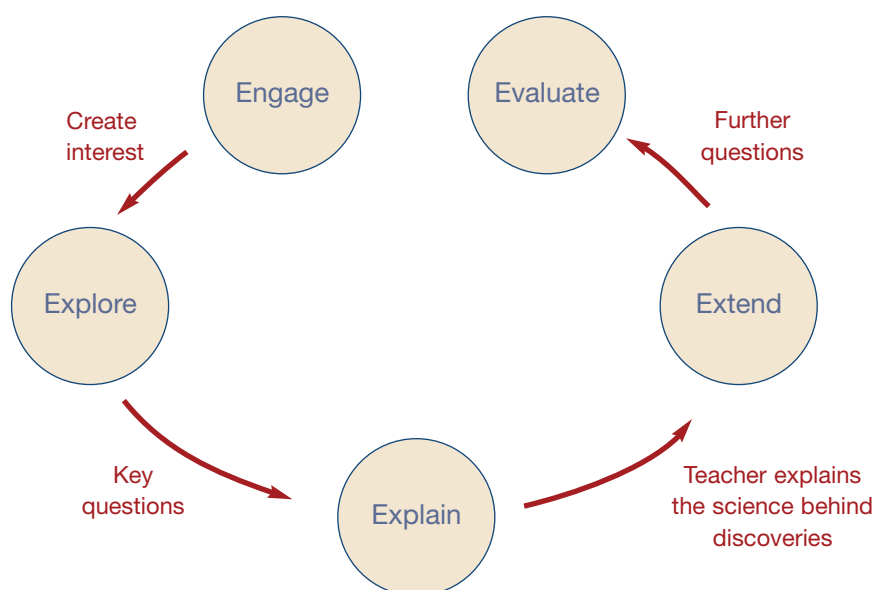
There is one **Pupil's Guide** that covers everything your pupils need to know for the entire Key Stage in one handy, easy-to-use book.

A **Dynamic Learning and Assessment Network Edition CD-ROM** is available for years 7, 8 and 9. Dynamic Learning Network Edition CD-ROMs are designed for whole-class learning and contain a wide range of resources to bring your lessons to life. They can be launched directly from your school network and can also be used to populate your VLE.

There is a separate **Teacher's Resource Book** for years 7, 8 and 9 that contains full teacher support. There is also a dedicated Guide for teachers who would like to teach Key Stage 3 in 2 years.

Connecting Science is an enquiry-led course to motivate and enthuse your pupils...

Connecting Science uses the '5Es' to build pupils' scientific thinking skills, so that they can challenge opinions, develop arguments and explanations and apply these skills to new topics as they progress through the Key Stage and beyond.



Connecting Science helps you teach enquiry effectively and emphasises how science works and the relevance of science in the real world. Pupils are engaged before the science is explained to ensure they stay motivated.

The Pupil's Guide

The **Pupil's Guide** is a useful reference tool containing all the key explanations and diagrams needed for the whole Key Stage 3 course. The guide has visually stimulating diagrams and photographs that can be used at any point in a lesson, motivating your students with interesting facts. It is perfect for both a 2-year or 3-year Key Stage 3.



Easy to follow diagrams make it easy for pupils to understand concepts

Separating mixtures

FILTERING

Filtering is used to separate insoluble solids from liquids.

Sand can be separated from a mixture of sand and salt water by filtering.

Filtering works because the small liquid particles pass through the filter paper into the container below but the insoluble solid can't get through. The insoluble solid stays on the filter paper.

For example, if a mixture of salt solution and sand is filtered, the salt solution passes through the filter paper but the sand does not.

EVAPORATION

Evaporation is used to separate a soluble solid from the liquid it is dissolved in.

For example, evaporation can be used to separate salt from water in a salt water solution.

Evaporation works because the solvent particles in the solution evaporate and leave the solid (solute) behind.

In simple evaporation only the solid can be collected because the liquid has evaporated away into the air.

'Things to think about' uses enquiry-based questions to engage pupils

Key terms are identified and explained



Free **Dynamic Learning Student** electronic resources are included with the Pupil's Guide. Pupils have access to an interactive version of the guide with lots of additional resources to encourage independent learning.

Order today to take advantage of fantastic discounts – see the order form for more details. Or call 01235 827720 to see resources on inspection. Find out more at www.hoddereducation.co.uk/connecting-science

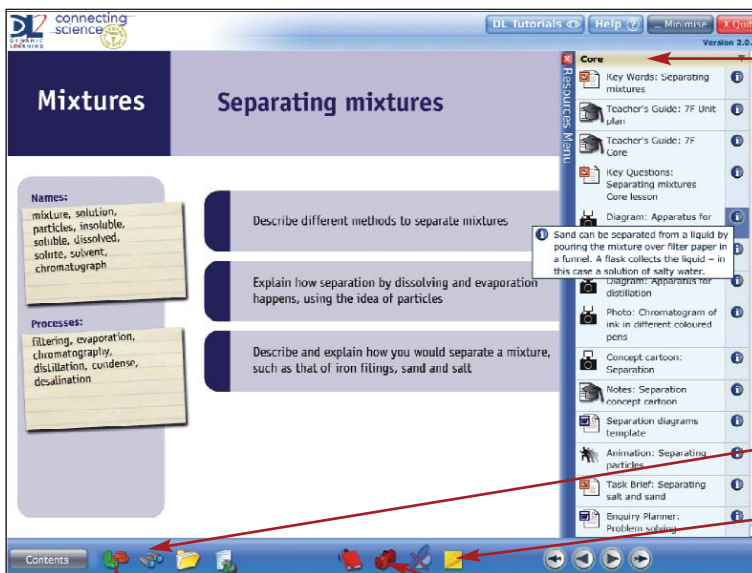
■ Digital Solutions



- Solutions for
- Personalisation
 - Enrichment
 - Whiteboards
 - VLEs

Our unique **Dynamic Learning technology** is at the heart of **Connecting Science**. It gives you the flexibility to embrace the ethos of the new curriculum – less prescription, more freedom - and really enhance your lessons as they explode into life with animations, audio files, photos and illustrations, web links, interactive activities and quizzes. Dynamic Learning allows you to personalise your lessons to increase your pupils' enjoyment of Science, meeting the 'How Science Works' guidelines and boosting your Science results at the same time.

- Dynamic Learning Network Editions load easily onto your computer or school network and enable you to search all the content
- You don't need to be online to access it, giving you added reliability, convenience and flexibility
- With a click of a button you can export the Dynamic Learning digital resources to your VLE



Drop down contents menu shows what resources are available

Search Function allows you to search across all your Dynamic Learning resources - allowing you to find the material that is perfectly suited for your lesson

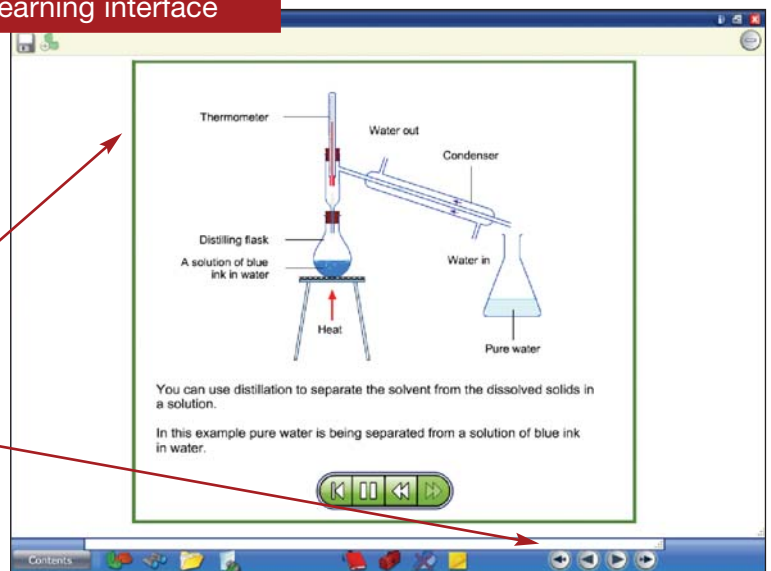
Annotate resources and make your own notes

Lesson Builder technology enables you to browse and choose resources with ease and upload any tried and tested materials that work in your classroom

Toolbox enables you to personalise the Dynamic Learning interface

Animations bring difficult concepts to life

Buttons provide easy navigation



Screenshots from the Year 7 Dynamic Learning and Assessment Network Edition CD-ROM

There is a Dynamic Learning and Assessment Network Edition CD-ROM available for years 7, 8 and 9



Dynamic Learning and Assessment Network Edition CD-ROM also comes with an Assessment Engine that contains 200 levelled questions giving you full support for the Assessing Pupils' Progress initiative. The reports generated enable you to make judgements on your pupils' progress, identify their strengths and weaknesses and then personalise your lessons to suit their needs. Our assessment software is quick, simple and easy to use and allows you to test your whole class simultaneously or assess individual pupils at appropriate stages.

- Assessment reports give you and your pupils instant feedback on the National Curriculum level they are working towards
- Suggestions for improvement are included to facilitate progress
- The automatic report generator allows you to support the students who need more help

Intro screen shows all the topic tests that are available

View the interactive test answers

National Curriculum levels are given

Set up a test to give to a whole class

View marksheets and reports

Suggestions as to how students can improve are given

Review buttons show students where they went right and wrong

Question	Topic	Level	Score	Action
1	Mixtures and type of change	level 4	1 / 3	Review
2	Separating mixtures	level 4	0 / 5	Review
3	Separating liquids	level 5	0 / 1	Review
4	Separating salt and sand	level 4	2 / 5	Review
5	Physical properties and separations	level 5	3 / 5	Review
6	Separating mixtures	level 5	0 / 3	Review
7	Separating mixtures	level 5	1 / 5	Review
8	Applying knowledge of separation methods	level 5	1 / 5	Review
9	Soluble, insoluble and filtering	level 4	1 / 1	Review
10	Mixtures	level 4	0 / 1	Review
11	Expanding desalination	level 5	1 / 5	Review
12	Chromatography method	level 5	2 / 5	Review

The Teacher's Guide

Connecting Science offers unrivalled teacher guidance, in a choice of formats. Our clear and easy to use Teacher Guides are available as a separate book for years 7, 8 and 9 or as one Guide written especially for teaching a 2-year Key Stage 3. The Teacher Guides contain

everything you need to navigate through the new Key Stage 3 Programme of Study and the Science Framework, and have been produced in full colour ensuring they are easy to use and you can see at a glance what resources and background information are required for a lesson.

Unit plan: 7F Mixtures

3 hours

In this unit pupils will learn:

Chemistry

- To build on ideas from KS2, further developing their knowledge of techniques for separating mixtures including filtering, evaporation and chromatography
- To use the particle model to explain how separation techniques work

Key concepts and processes

- How to select suitable equipment and carry out a range of practical and investigative activities
- To recognise possible risks in practical work
- To use scientific conventions about the particle model in particle diagrams
- About some of the applications of separation techniques to real life

KS2 prior knowledge

- How to separate solid particles of different sizes by sieving
- That some solids dissolve in water to give solutions
- How to separate insoluble solids from liquids by filtering
- How to recover dissolved solids by evaporating the liquid from the solution
- How to use knowledge of solids, liquids and gases to decide how mixtures might be separated

KS4: next steps

Pupils go on to study the Periodic Table in more depth. They:

- Learn how compounds form by chemical bonding involving electron sharing or transfer
- Represent compounds as chemical formulae and write balanced equations
- Learn how metals are extracted from their compounds by reduction and electrolysis.
- Learn how the substances in crude oil can be separated by fractional distillation
- Consider the way that atomic structure determines an element's position in the Periodic Table
- Study patterns of behaviour in families of elements, such as the alkali metals, noble gases and the halogens

Where this unit fits: KS3 progression

Topics (teaching order and levels)	Progression
Year 7 • Separating mixtures (4–6)	Pupils learn how to separate simple mixtures using filtering, evaporating, chromatography and distillation, and use the particle model to understand the process involved in each technique.
Year 8 • Atoms and elements (6) • Combining elements: compounds (6–7) • Mixtures and compounds (6–7) • Mixtures and pure substances (4–7)	Pupils meet the idea of an element and of an atom as the smallest building block. They look at the combination of pure materials (elements) to form mixtures and compounds in terms of atoms of elements joining together, and begin to use word equations and symbols for compounds.
Year 9 • Periodic Table (6–7)	Pupils look at the organisation of the Periodic Table, group patterns and the development of the Table.

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Core: Separating mixtures

1½–1h hours

Resources provided

- Enquiry planner: Problem solving
- Separation diagram template
- Animation: Separating particles
- Concept cartoon: Separation
- Practice: How would you separate...?

Objectives

Chemistry
Pupils develop their understanding of the particle model by considering how it can be used to explain separation methods in terms of the processes of filtering, dissolving and evaporation.

Key concepts and processes
Pupils plan and carry out a problem-solving enquiry that separates salt and sand. They report on their work using diagrams.

PLTS

Reflective learners
Communicate their learning in relevant ways for different audiences, by using an appropriate combination of diagrams and text in their final report to promote understanding in their audience

Outcomes

Level	Pupils:	by:
4	Communicate their conclusions using appropriate scientific language.	Identifying that particle size and solubility can be used to separate mixtures. Presenting labelled diagrams that show the apparatus and using the terms <i>filtering</i> , <i>dissolving</i> and <i>evaporation</i> .
5	Communicate their findings and conclusions using scientific and mathematical conventions and terminology.	Identifying the key properties for each process. Presenting diagrams that begin to show how separation by dissolving and evaporation happens at particle level.
6	Communicate qualitative and quantitative data effectively, using scientific conventions and terminology.	Including some consideration of the effectiveness of evaporation compared with heating the salt-water mix, e.g. crystal size. Using particle diagrams and correct terminology to explain these processes.
Level	Pupils:	by:
4	Describe some processes and phenomena, drawing on scientific knowledge and understanding and using appropriate technology, for example separation methods.	Describing the processes of separation (with apparatus diagrams) and correctly using terms such as <i>evaporation</i> , <i>soluble</i> and <i>insoluble</i> .
5	Describe some processes and phenomena, drawing on abstract ideas. Recognise that both evidence and creative thinking contribute to the development of scientific ideas, such as basing separation methods for mixtures on physical and chemical properties.	Beginning to use particle diagrams to show separation procedures. Identifying the difference in properties that enable separation, e.g. explaining that evaporation works because water can easily be changed to vapour and removed, but salt particles cannot.

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Shows how the lesson builds on knowledge already acquired

Refers to Key Stage 4 so you can see what pupils will go on to study

Personal Learning and Thinking Skills are highlighted

Shows what resources are available for the lesson and in what format

Shows what pupils need to do to achieve certain National Curriculum levels

'How Science Works' is fully integrated into lessons along with levelled outcomes

Connecting Science is ideal for teaching a 2-year Key Stage 3

A two-year APP Teacher's Guide is available. This resource makes it easy to implement a 2-year Scheme of Work and provides support in planning progression, showing how the Framework yearly teaching objectives for Years 7, 8 and 9 may be covered in six or seven terms. This provides a flexible approach for schools.

In addition to this you can load all your Dynamic Learning Network Editions onto your computer or school network and search all the content. You're not limited to just material associated with Year 7 – you can search and use whatever suits your lesson best.

Learning objectives are clearly shown

Key Questions fit in with the enquiry-led teaching ethos

The '5Es' teaching method is fully explained

Core 1: Classifying organisms 1½ hours

Resources required

- Activity: Animal description
- Science story: Aristotle's and Linnaeus' classification systems
- Guidance: Classifying animals, using cats example
- Guidance: Using identification keys
- Practice: Using a key to classify butterflies
- True/false: Classification

Pages 70–71 from Pupil's Guide

Objectives

Biology
Pupils explain which criteria to use to put animals in groups, and assess their effectiveness. They consider the reasons why scientists use a common system to classify animals.

Key concepts and processes
Pupils evaluate scientific evidence and working methods by determining disadvantages of Aristotle's system of classification and describing the advantages of Linnaeus' system. They use a key to identify and name a group of organisms.

PLTS

Independent enquirers
Analyse and evaluate information, judging its relevance and value by evaluating and constructively criticising identification keys

Effective participators
Identify improvements that would benefit others as well as themselves

Outcomes

HSW Using methods

Level	Pupils:	by:
4	Record their observations, comparisons and measurements using tables.	Describing their choice of criteria and grouping similar animals using them.
5	Select and use methods to obtain data systematically. Evaluate their working methods to make practical suggestions for improvements.	Gathering sufficient criteria to construct a useful key. Constructively criticising other groups' identification keys.
6	Use scientific knowledge and understanding to account for any inconsistencies in the evidence.	Suggesting reasons why some organisms cannot be classified within plant and animal kingdoms, or why the total numbers of species is unknown.

Biology Scientific Ideas

Level	Pupils:	by:
4	Recognise that evidence can support or refute scientific ideas, such as in the identification and grouping of living things.	Using identification keys for familiar organisms. Grouping familiar organisms by using similar features. Evaluating, with support, the effectiveness of keys.
5	Apply and use knowledge and understanding in familiar contexts. Recognise that both evidence and creative thinking contribute to the development of scientific ideas, such as the classification of living things.	Evaluating the effectiveness of ready-prepared keys. Making and using identification keys for familiar organisms. Explaining the importance of classifying organisms.

Teaching notes

Engage 10 mins
Teacher: reads or projects description of an animal in verse and scientifically.
Pupils: participate by considering the differences in the style of writing and the reasons behind this.

Explore 15 mins
Teacher: asks pupils to write down, in groups, 20 animals and put them into at least three groups based on their own criteria.
Pupils: participate in the group activity, and discuss the criteria they are using to group the animals and whether any were difficult to place.

Key Questions 1 What criteria did you use to group your animals? Were any animals difficult to group using your system? Why do you think we need a common system to classify organisms?

Explain 15 mins
Teacher: invites feedback, drawing out the different criteria pupils used to group animals, highlighting the need for a common classification system.
● Introduces Carl Linnaeus' and Aristotle's systems of classification using the Science story, explaining that Linnaeus' system is based on differences in form and structure.
● Explains the five-kingdom system and taxonomic groups using the diagram and either gorilla or cat classification as an example.
● Shows how to use a simple identification key.

Extend 20 mins
Teacher: supports pupils in the Practice activity, and supports them as they test one another's keys.
Pupils: complete the activity of identifying and naming butterflies. They consider how criteria allow accurate, easy identification, and identifying characteristics of a given animal, use these to design their own key based on physiological differences.

Key Questions 2 How useful are the other groups' identification keys? How could their keys be improved?

Evaluate 10 mins
Teacher: encourages reflection on the need for a common system and the use of keys.
Pupils: feedback on their definitions of classification and their evaluation of others' identification keys.

Technician's notes
Cards with pictures of eight different animals (for example, spider, starfish, octopus, insect) or, using more detailed features, eight different types of the same animal (e.g. spiders); large sheets of paper (to write down names of animals and to list characteristics of animals).

Example spreads from the Year 7 Teacher Guide

Notes for technicians help them prepare for lessons



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REMEMBER

connecting science

**Provides everything you need to teach a successful
Key Stage 3 in 2 or 3 years**

- Engages and motivates your pupils and encourages progression so you can ensure your pupils make the required progress through Key Stage 3
- Truly integrates digital resources with a handy Pupil Guide that can transform your lessons and enable you to meet the ethos of the 2008 curriculum
- Provides full teacher support but allows plenty of flexibility to teach the way you want to

“The Connecting Science Dynamic Learning Network Edition CD-ROM contains lots of excellent starter and plenary activities. These are really useful tools to quickly analyse students' understanding and misconceptions of difficult principles. Key questions are provided for each lesson with the questions being of both lower and higher order so that all pupils can feel a real sense of accomplishment yet still allowing for all pupils to be extended.

The Network Edition also contains many innovative practicals and activities. Definitely a fun way to get students thinking about several topics. Pupils can benefit greatly from the hands-on approach used throughout this resource. Some activities are open-ended to help develop pupils own concepts and allow them to reach their own conclusions.

The Teacher's Resource Book is fantastic as it is indexed by topic and linked to the National Curriculum levels for easy reference. Lesson plans detail attainment level of the Science Curriculum, also providing teachers with differentiated resources across the entire pupil ability range. Overall, an easy way to plan lessons for the busy teacher, which will engage, excite and extend pupils.

”

Dr Beverley Timothy-Webber, Bishop Hedley High School

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