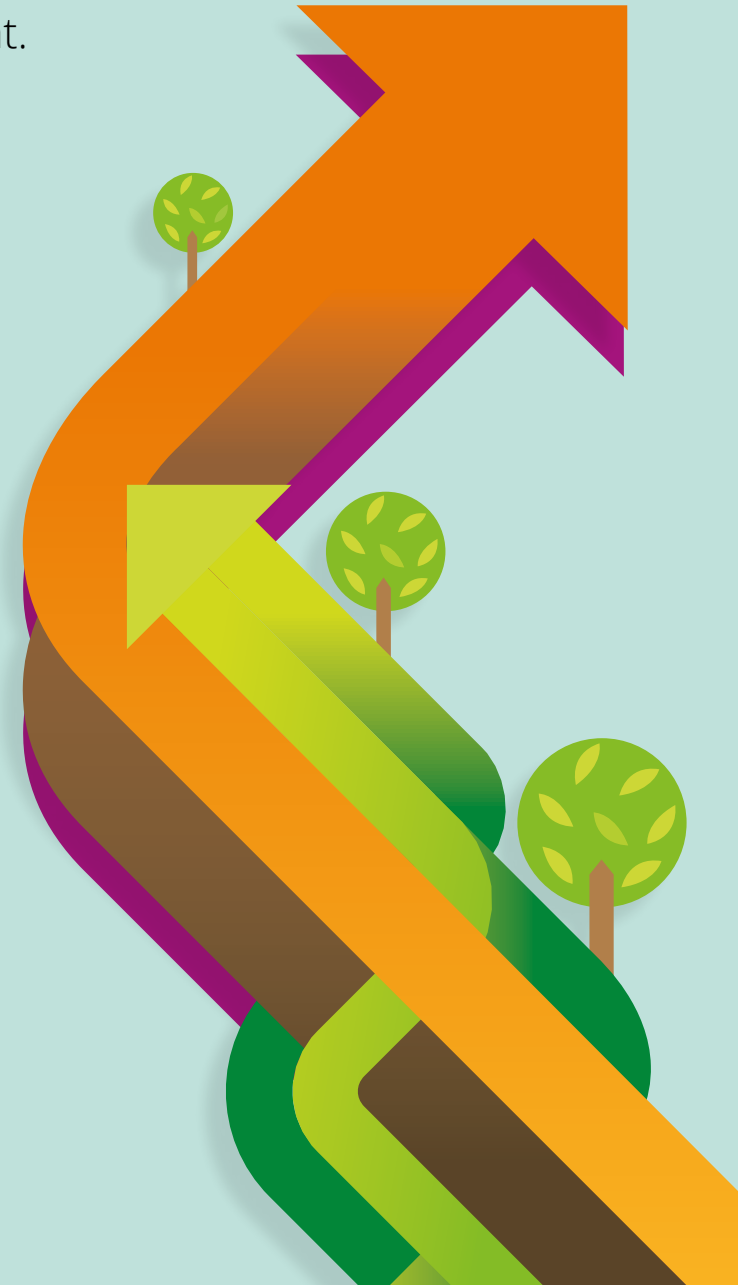
11-16 Science

5-year curriculum

progression built in

- Prepare in KS3 for success at GCSE.
- Support for all abilities.
- Built-in tracking and assessment.



Pearson

11-16 Science 5-year curriculum with progression built in.

Key Stage 3

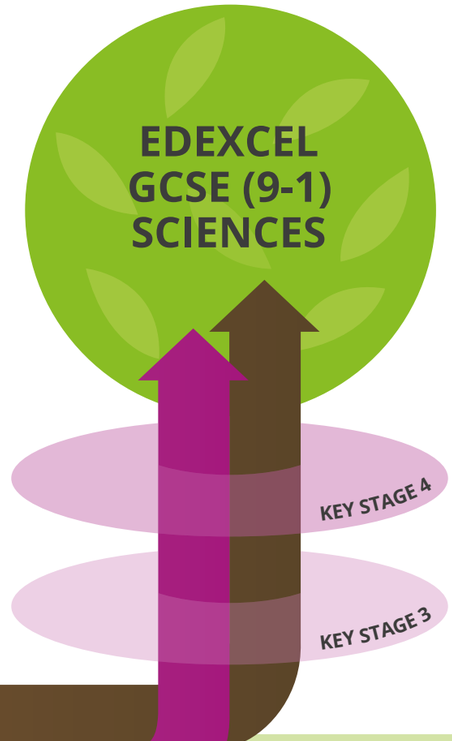
Free support

- Course planner
- PD and Events
- Subject Guides

Key Stage 4

Free support

- Training
- Year 10 exam
- Practical guides
- Exemplars & specimen papers



5–year schemes of work

Pearson Progression Services

Pearson published resources

Pearson published resources

The best preparation for Edexcel GCSE from the start of KS3

- Our popular **KS3 course Exploring Science** gives your students the best start in Science with engaging topics presented in a relevant and accessible way. **Pages 8-11**
- **Edexcel GCSE (9-1) Combined and single science** courses build on the skills and knowledge taught in Exploring Science. **Pages 12-13**

Support for all abilities

- **The Support Edition for Edexcel GCSE (9-1)** means you can co-teach GCSE (9-1) Combined Science and Entry Level Certificate to lower-ability students. **Pages 14-15**
- **Lab Books and Checklist Books** support core practicals and independent study. **Pages 16-18**

Built in tracking and assessment

- **Pearson Progression Services** help you track and assess students' progress throughout KS3 and KS4. **Pages 6-7**.

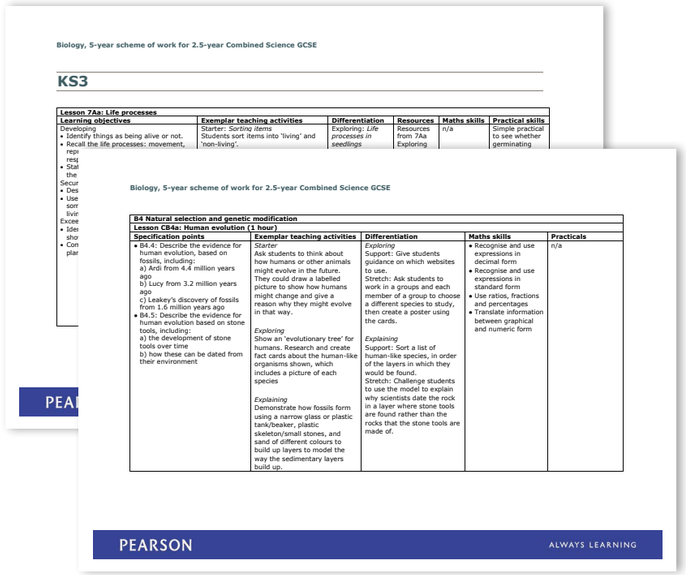
Go to: **www.pearsonschools.co.uk/5yearCurriculum**

Plan using our 5-year curriculum

Schemes of work

Our KS3 and KS4 resources support the 5-year schemes of work for Edexcel GCSE (9-1) Sciences in one simple, inclusive and inspiring course.

These schemes of work provide routes through the curriculum that are suitable for you whether you are following a 2, 2.5 or 3-year KS4.


Biology, 5-year scheme of work for 2.5-year Combined Science GCSE

KS3

Lesson 7Aa: Life processes

Learning objectives	Exemplar teaching activities	Differentiation	Resources	Maths skills	Practical skills
Developing • Identify things as being alive or not. • Recall the life processes: movement, repr resp • Stat the Secur • Des • Use sor livir Excee • Ider sho • Con plar	Starter: *Sorting items* Students sort items into 'living' and 'non-living'.	*Exploring: Life processes in seedlings* Resources from 7Aa Exploring	n/a		Simple practical to see whether germinating

Biology, 5-year scheme of work for 2.5-year Combined Science GCSE

B4 Natural selection and genetic modification

Lesson CB4a: Human evolution (1 hour)

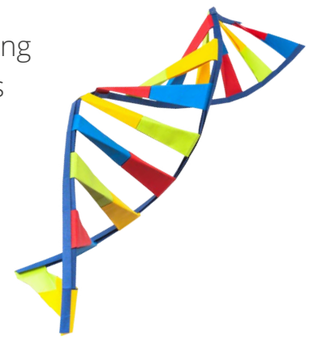
Specification points	Exemplar teaching activities	Differentiation	Maths skills	Practicals
• B4.4: Describe the evidence for human evolution, based on fossils, including: a) Ardi from 4.4 million years ago b) Lucy from 3.2 million years ago c) Leakey's discovery of fossils from 1.6 million years ago • B4.5: Describe the evidence for human evolution based on stone tools, including: a) the development of stone tools over time b) how these can be dated from their environment	*Starter* Ask students to think about how humans or other animals might evolve in the future. They could draw a labelled picture to show how humans might change and give a reason why they might evolve in that way. *Exploring* Show an 'evolutionary tree' for humans. Research and create fact cards about the human-like organisms shown, which includes a picture of each species *Explaining* Demonstrate how fossils form using a narrow glass or plastic tank/beaker, plastic skeleton/small stones, and sand of different colours to build up layers to model the way the sedimentary layers build up.	*Exploring* Support: Give students guidance on which websites to use. Stretch: Ask students to work in a groups and each member of a group to choose a different species to study, then create a poster using the cards. *Explaining* Support: Sort a list of human-like species, in order of the layers in which they would be found. Stretch: Challenge students to use the model to explain why scientists date the rock in a layer where stone tools are found rather than the rocks that the stone tools are made of.	• Recognise and use expressions in decimal form • Recognise and use expressions in standard form • Use ratios, fractions and percentages • Translate information between graphical and numeric form	n/a

PEARSON ALWAYS LEARNING

Course Planner

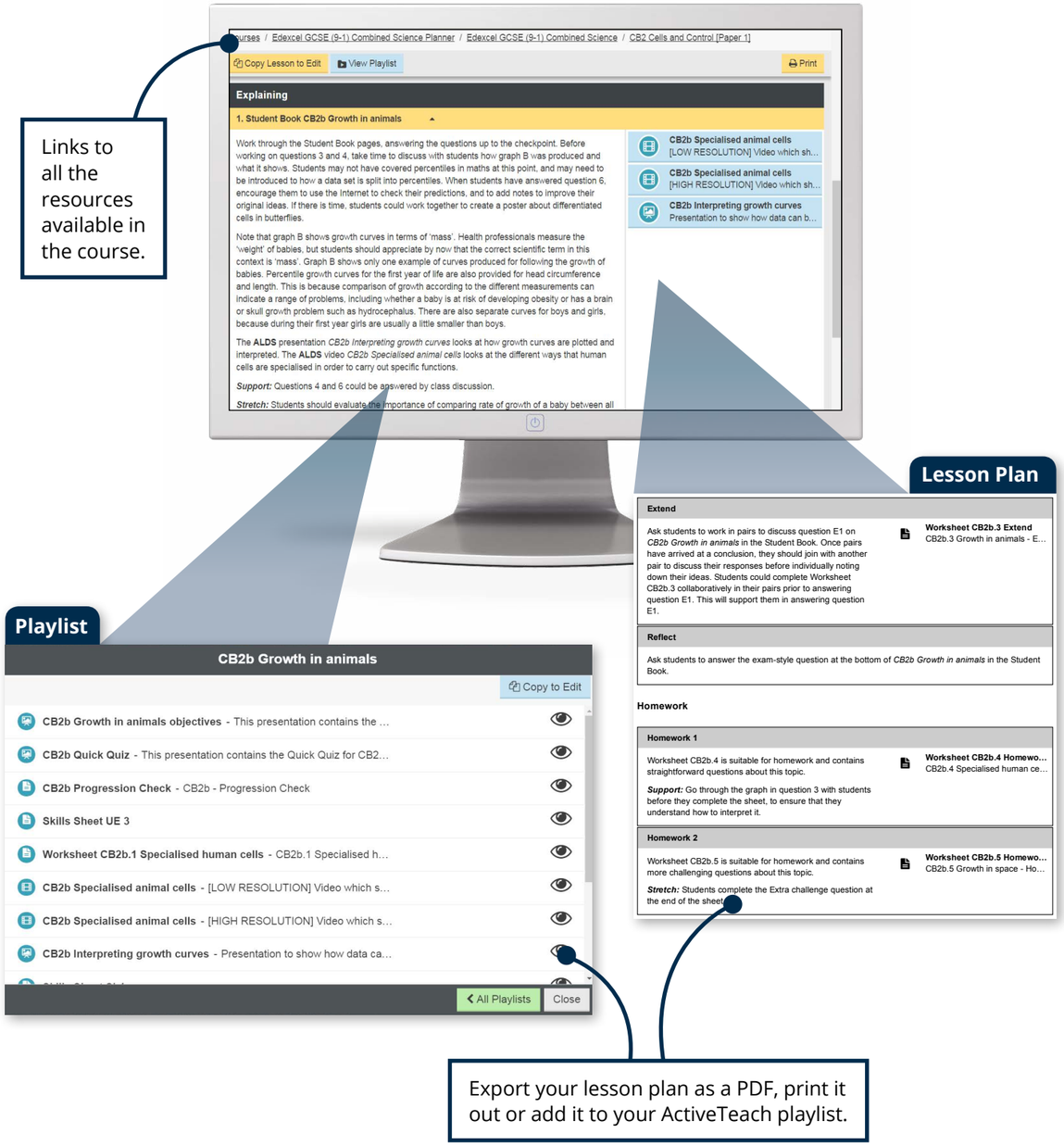
Our free editable Excel course planner helps you plan your teaching. It covers a number of different approaches for teaching Combined Science and separate sciences over 2, 2.5 or 3 years to suit your requirements.

You can download the schemes of work and course planners from: **qualifications.pearson.com/SciPlanner**



The ActiveLearn Digital Service Planner

Our ActiveLearn Digital Service Planner provides detailed lesson plans for each topic in the schemes of work. It also links directly to the relevant resources. It allows you to choose from four pre-populated differentiated routes through the course covering 2, 2.5 and 3-year schemes of work.



Go to: **www.pearsonschools.co.uk/5yearCurriculum**

Pearson Progression Services

Helping you to track and assess progress throughout Science Key Stage 3 and Key Stage 4.

Progression Scale and Map

Our **Science Progression Scale** is a reliable, easy-to-use tool to track students' progress over Key Stage 3 and Key Stage 4. It comprises of 12 Steps ranging from low (1) to high (12) challenge. We anticipate that the average student will enter Year 7 working at the 3rd or 4th step. The expectation is that a student will make one Step of progress a year.

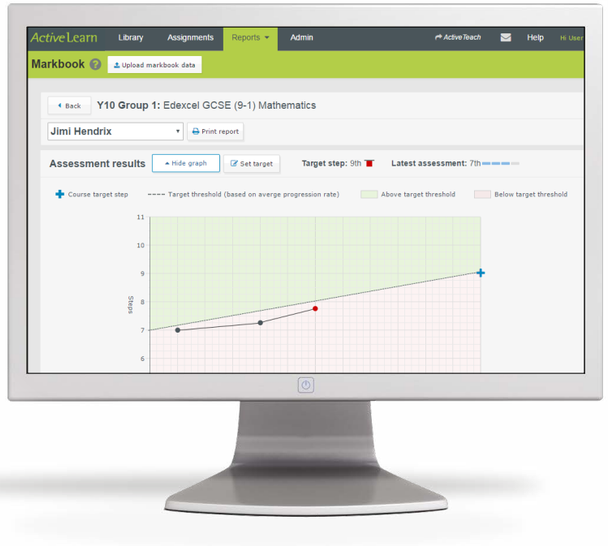
The **Science Progression Map** builds on the Scale, breaking down the curriculum with clear progress descriptors, any prior knowledge required and boosters for additional challenge. This provides you with a more detailed view of how learning progresses across each of the 12 steps.

You can access the Progression Scale and Map for free at:
www.pearsonschools.co.uk/SciProg

Assessments

We have created a range of **Science assessments** aligned to our Progression Scale and tied to the Edexcel schemes of work, which can be used to assess students' understanding, skills and knowledge.

	Key Stage 3	Key Stage 4
Baseline tests*	✓	✓
End of unit tests	✓	✓
End of year tests	✓	✓



Each assessment has an accompanying markbook to help you track progress and quickly identify problems. Coming soon, our new online reporting tool offers visual data analysis to help predict future performance. For more information, visit **www.pearsonschools.co.uk/SciProg**

Indicative Grades

You have told us that mapping the Steps from the Pearson Progression Maps to indicative grades will make it simpler for you to accumulate the evidence to formulate your own grade predictions, apply any interventions and track student progress. Our initial mapping of steps to grades for GCSE Sciences 2016 is available to view online now: **www.pearsonschools.co.uk/SciProg**

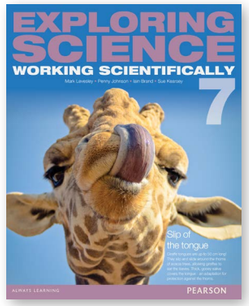
Go to: **www.pearsonschools.co.uk/5yearCurriculum**

KS3 resources – **Exploring Science**

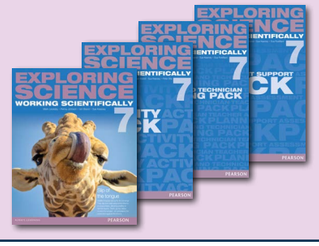
The best preparation for studying GCSE Science

Exploring Science: Working Scientifically provides **simple, inclusive and inspiring** resources to support you and your students in Key Stage 3.

- Following the Edexcel 5-year Scheme of Work for GCSE (9-1) Sciences.
- Building the required skills in literacy, mathematics and practicals.
- With built-in progression from Pearson Progression Services, with baseline, end-of-unit and end-of-year assessments .



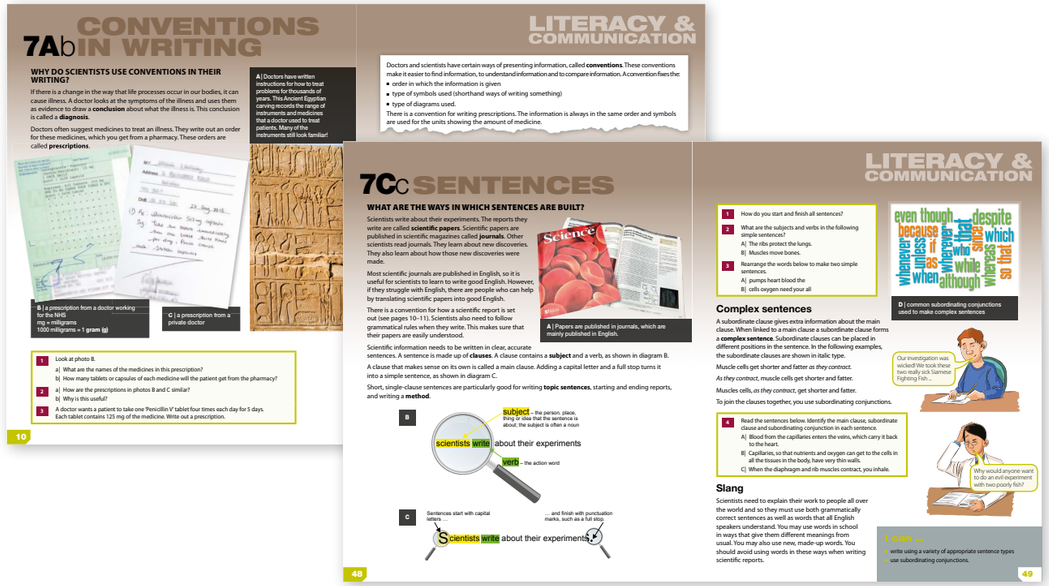
Exploring Science: Working Scientifically course components

	Year 7	Year 8	Year 9
ActiveLearn Digital Service	**Teaching Service part of *Active*Teach Digital Service** • Front-of-class Teaching Resources • Activity Pack • Assessment Support Pack • Teacher and Technican Planning Pack • Planner **Homework, Practice and Support part of *Active*Learn Digital Service** • Interactive Homework tests • Sample answers • Automarked activities • Detailed feedback on each student's progress • 100+ Learning aids.	• Front-of-class Teaching Resources • Activity Pack • Assessment Support Pack • Teacher and Technican Planning Pack • Planner • Interactive Homework tests • Sample answers • Automarked activities • Detailed feedback on each student's progress • 100+ Learning aids.	• Front-of-class Teaching Resources • Activity Pack • Assessment Support Pack • Teacher and Technican Planning Pack • Planner • Interactive Homework tests • Sample answers • Automarked activities • Detailed feedback on each student's progress • 100+ Learning aids.
Print and Online			

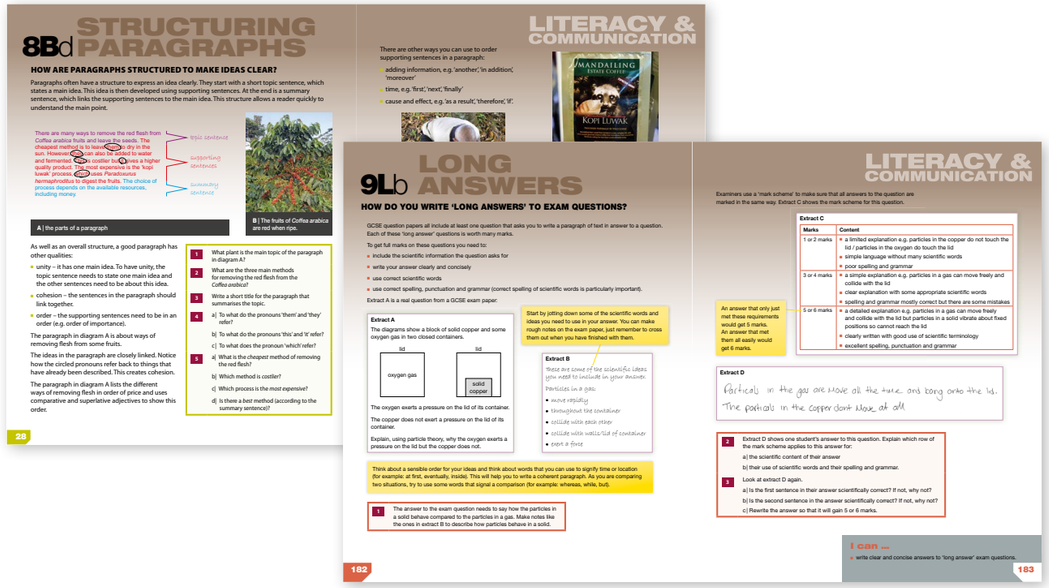
Student books are available in print or as an ActiveBook subscription. The Teacher and Technician Planning Pack, The Activity Pack and the Assessment Support Packs are available in print or downloadable online.

Literacy skills

Informed by literacy experts, **Exploring Science** helps students gradually build up science literacy skills. These skills are then met again in increasingly specific exam contexts before practising writing long answers in Year 9.



Exploring Science also provides repetition, practice and the honing of these techniques. Students will build up the required literacy skills and have sufficient practice to gain confidence and fluency in their technique under exam conditions.



Go to: **www.pearsonschools.co.uk/5yearCurriculum**

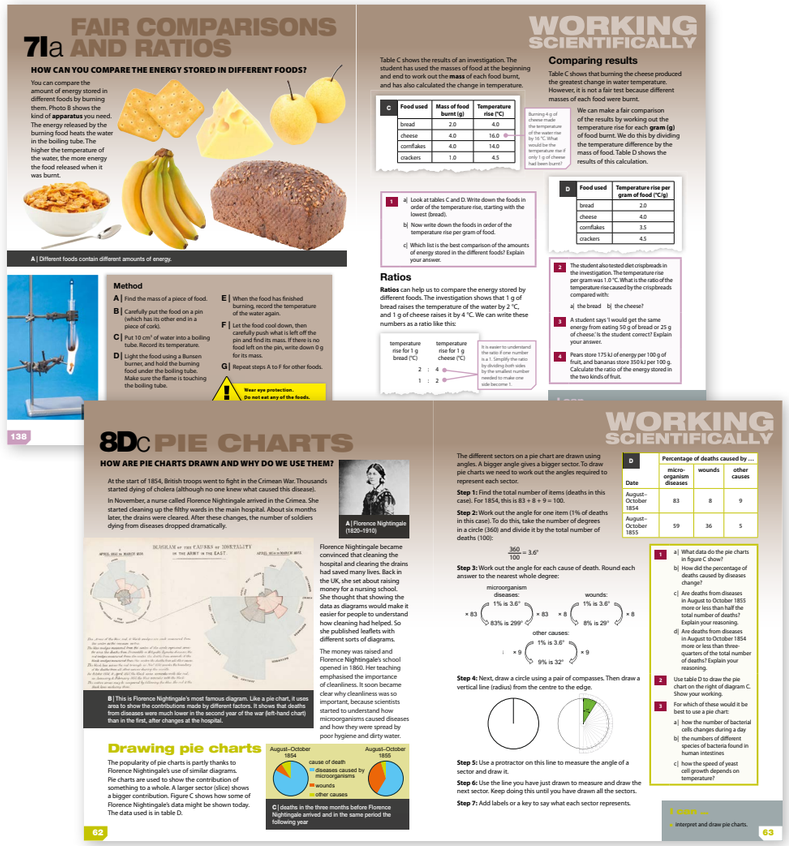
KS3 resources – Exploring Science

Maths skills

The maths requirements of the new GCSE assessments are integrated right from the beginning of Year 7.

Language and teaching approaches are consistent with those from maths classes so they are familiar to students.

Terminology and concepts from the GCSE specification are introduced early at KS3, allowing students to become familiar with the application of maths within science.



Worked example

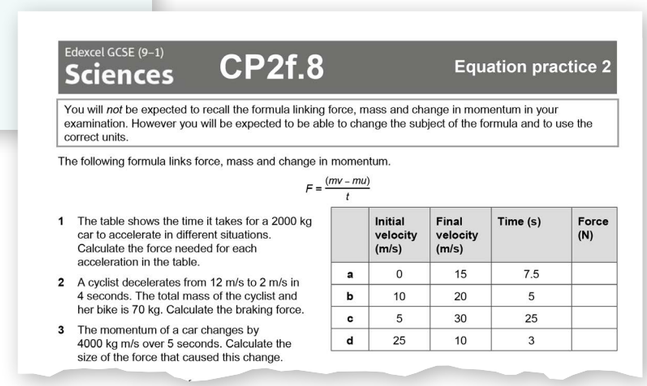
A 2000 kg car accelerates from 10 m/s to 25 m/s in 10 seconds. What resultant force produced this acceleration?

$$\text{force} = \frac{mv - mu}{t}$$

$$= \frac{2000\text{ kg} \times 25\text{ m/s} - 2000\text{ kg} \times 10\text{ m/s}}{10\text{ s}}$$

$$= \frac{50\,000\text{ kg m/s} - 20\,000\text{ kg m/s}}{10\text{ s}}$$

$$= 3000\text{ N}$$



Edexcel GCSE (9–1)

Sciences **CP2f.8** Equation practice 2

You will *not* be expected to recall the formula linking force, mass and change in momentum in your examination. However you will be expected to be able to change the subject of the formula and to use the correct units.

The following formula links force, mass and change in momentum.

$$F = \frac{(mv - mu)}{t}$$

1 The table shows the time it takes for a 2000 kg car to accelerate in different situations. Calculate the force needed for each acceleration in the table.

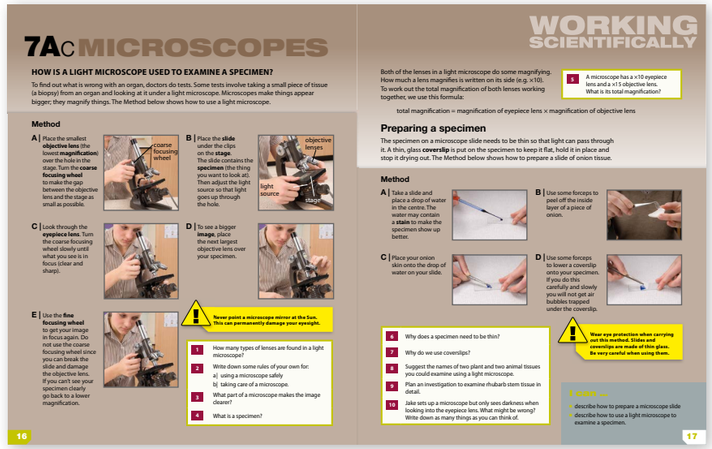
2 A cyclist decelerates from 12 m/s to 2 m/s in 4 seconds. The total mass of the cyclist and her bike is 70 kg. Calculate the braking force.

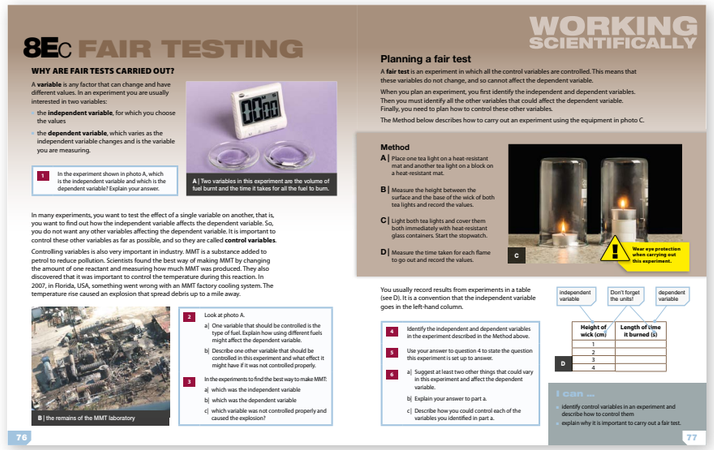
3 The momentum of a car changes by 4000 kg m/s over 5 seconds. Calculate the size of the force that caused this change.

	Initial velocity (m/s)	Final velocity (m/s)	Time (s)	Force (N)
a	0	15	7.5	
b	10	20	5	
c	5	30	25	
d	25	10	3	

Core Practical skills

For GCSE, students need to be able to complete a series of core practicals and answer exam questions.





Exploring Science outlines to students the key principles around scientific methods such as fair testing and controlling variables. This prepares students for the types of skills and analysis they will need for core practical assessments. At GCSE the course covers the core practicals in depth and provides practice answering exam-style questions.

Go to: **www.pearsonschools.co.uk/5yearCurriculum**

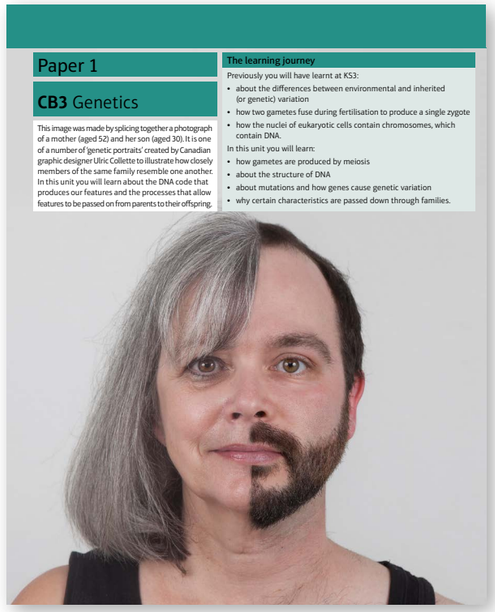
KS4 resources - **Edexcel GCSE (9-1) Sciences**

Building on the topics and skills introduced in Exploring Science, these **simple, inclusive and inspiring** resources help deliver the Edexcel GCSE (9-1) Scheme of Work to get students ready for their exams.

Simple: The resources, teaching approach and our digital service are simple to use and intuitive.

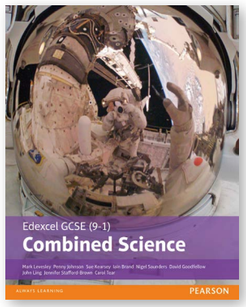
Inclusive: Lessons and activities support a full range of ability levels.

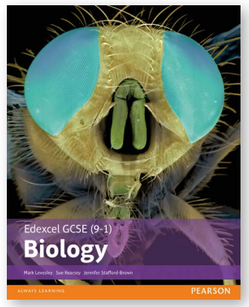
Inspiring: We go one step further to make our resources, lessons and activities truly engaging to motivate students.

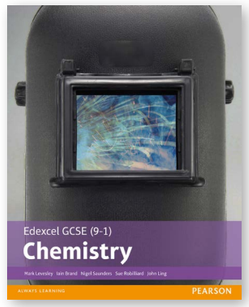


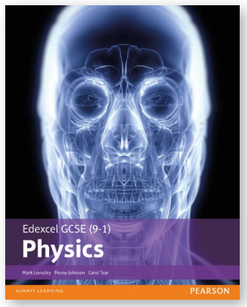
Student Books

Our GCSE (9-1) Science Student Books focus on helping students to develop the skills required for the new GCSE exams. They tie in seamlessly with our teaching resources and Pearson Progression Services.









ALDS teaching and learning resources.

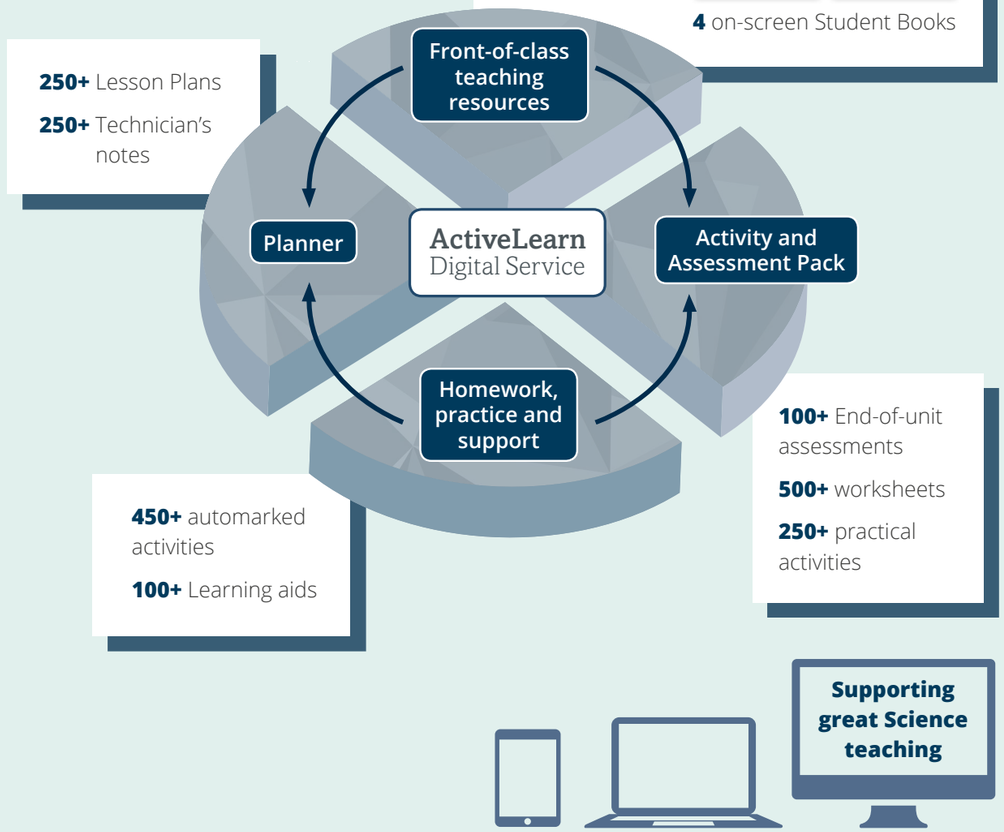
What's in the *Active*Learn Digital Service?

The subscription includes:

- access for all students in your school
- all content for Combined and Single sciences
- full support, including FREE initial training.

100+ Videos
50+ Animations
50+ Interactive activities
500+ Powerpoint presentations

4 on-screen Student Books



Go to: **www.pearsonschools.co.uk/5yearCurriculum**

Support for your lower-attainers

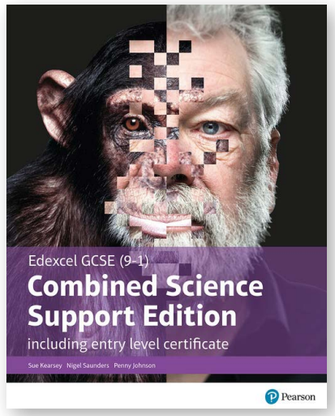
Our new **Edexcel GCSE (9-1) Combined Science Support Edition including entry level certificate** is more accessible for students targeting grades 1-3.

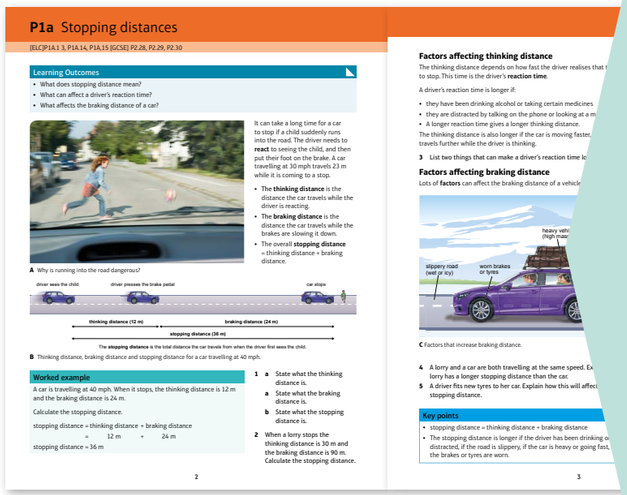
It helps you to co-teach Edexcel GCSE (9-1) Combined Science and the new Entry Level Certificate, allowing you to see how low attainers cope with the KS4 content and assessments before deciding whether to enter them for the GCSE or ELC.

Student Book

The questions and explanations in this book are simple and easy to read with examples that relate to everyday life and are easy to understand. The specially designed structure of the course allows for repetition to help students to memorise key concepts and words.

Try print and digital resources free at **www.pearsonschools.co.uk/BuySci11-16**





*Active*Learn Digtial Service

This online resource includes:

- 180 lesson plans
- 700+ worksheets
- 150+ presentations
- Front-of-class digital version of the Student Book
- 12 End of Unit tests to track progress against the Pearson Progression Scale.

Learning Support Books

Our brand new Learning Support Books accompany the new Edexcel GCSE (9-1) Combined Science Support route (including ELC). These write-in workbooks provide short formative assessment for each topic and helps you to ensure that you have covered the key concepts whilst being able to correct any misconceptions.

At only £3 each*
they are cheaper and easier than photocopying worksheets.

Entry Level Certificate - Flexibility for your lower-attaining students

If your students aren't ready to take **Edexcel GCSE (9-1) Combined Science**, you can enter them for the **Edexcel Entry Level Certificate in Science** and **Edexcel Further Entry Level Certificate**. The Entry Level Certificate (ELC) is co-teachable with GCSE (9-1) Sciences using our lower ability scheme of work.

Register your interest to access the assessments at: **qualifications.pearson.com/SciELC**

If you're not already with Edexcel, don't forget to check out our course planner for switching! **qualifications.pearson.com/SciPlanner**

*Prices accurate at time of publication - March 2017.

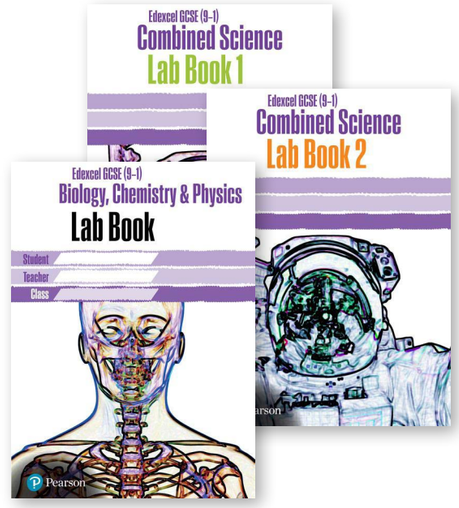
Go to: **www.pearsonschools.co.uk/5yearCurriculum**

Supporting Core Practicals

Support for Core Practicals is included throughout our resources, starting at KS3 and continuing throughout KS4 to give students the confidence and skills to succeed.

Teaching resources (delivered via ActiveLearn Digital Service)	Student Books	Lab Books (new!)
✓ Student worksheets ✓ Teacher guides ✓ Technician notes	✓ Practice in the types of skills and analysis they will need for the assessments ✓ Summaries of the method ✓ Sample exam-style questions	✓ Instructions ✓ Writing frames ✓ Practical based exam-style questions ✓ Practical Skills ✓ Checklist ✓ List of required equipment* ✓ Set of answers

Lab Books



The Edexcel GCSE (9-1) Science Lab Books are a new type of resource to support all of your GCSE Science students in completing the Core Practical requirements. They help students to keep a record of Core Practical work and they're cheaper and easier than photocopying.

They will help students to:

- develop a stronger understanding of the skills and knowledge for the assessment of Core Practicals
- create a record of all of the Core Practical work they will have done in preparation for revision
- practise answering practical based exam-style questions, in a similar format to the exam.

They will help teachers to:

- save time and money - we have been able to price the Lab Books so that they are cheaper and easier to use than photocopying worksheets
- maintain records of what students have done in their Core Practicals.

Each Lab Book includes:

- ✓ all the instructions students need to perform the Core Practicals, consistent with our best-selling Edexcel GCSE Online Teaching Resources
- ✓ writing frames for students to record their results and reflect on their work
- ✓ a selection of practical based exam-style questions, taken from our Edexcel GCSE Student Book
- ✓ a Practical Skills Checklist, so that students can track the practical skills they have learned in preparation for the exam
- ✓ an illustrated list of the equipment students will use*
- ✓ a full list of equations that students need to learn
- ✓ a full set of answers at the back.

*Combined Science books only.

Go to: **www.pearsonschools.co.uk/5yearCurriculum**

Brand new support resources

Checklist Book

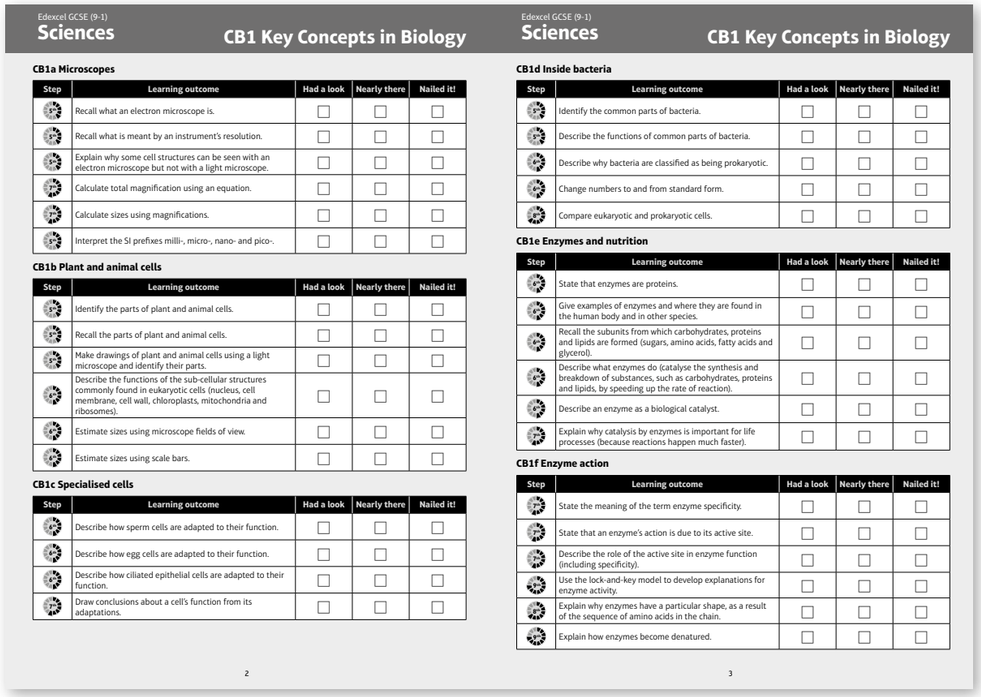
Our new Checklist Books are workbooks that give you all the Learning Outcomes collated into one book.

Helping students to:

- self-assess their own learning
- keep a record of their progress
- develop plans for revision.

Each Learning Outcome is rated on a scale from 1 to 12 using the Pearson Progression Scale. Students will be able to see if they are able to master increasingly difficult concepts as they progress through the course.

Checklist 1 covers units CB1-5, CC1-8, CP1-6 from the Edexcel GCSE (9-1) Combined Science scheme of work.



Edexcel GCSE (9-1)
Sciences

CB1 Key Concepts in Biology

CB1a Microscopes

Step	Learning outcome	Had a look	Nearly there	Nailed it!
	Recall what an electron microscope is.	☐	☐	☐
	Recall what is meant by an instrument's resolution.	☐	☐	☐
	Explain why some cell structures can be seen with an electron microscope but not with a light microscope.	☐	☐	☐
	Calculate total magnification using an equation.	☐	☐	☐
	Calculate sizes using magnifications.	☐	☐	☐
	Interpret the SI prefixes milli-, micro-, nano- and pico-.	☐	☐	☐

CB1b Plant and animal cells

Step	Learning outcome	Had a look	Nearly there	Nailed it!
	Identify the parts of plant and animal cells.	☐	☐	☐
	Recall the parts of plant and animal cells.	☐	☐	☐
	Make drawings of plant and animal cells using a light microscope and identify their parts.	☐	☐	☐
	Describe the functions of the sub-cellular structures commonly found in eukaryotic cells (nucleus, cell membrane, cell wall, chloroplasts, mitochondria and ribosomes).	☐	☐	☐
	Estimate sizes using microscope fields of view.	☐	☐	☐
	Estimate sizes using scale bars.	☐	☐	☐

CB1c Specialised cells

Step	Learning outcome	Had a look	Nearly there	Nailed it!
	Describe how sperm cells are adapted to their function.	☐	☐	☐
	Describe how egg cells are adapted to their function.	☐	☐	☐
	Describe how ciliated epithelial cells are adapted to their function.	☐	☐	☐
	Draw conclusions about a cell's function from its adaptations.	☐	☐	☐

2

Edexcel GCSE (9-1)
Sciences

CB1 Key Concepts in Biology

CB1d Inside bacteria

Step	Learning outcome	Had a look	Nearly there	Nailed it!
	Identify the common parts of bacteria.	☐	☐	☐
	Describe the functions of common parts of bacteria.	☐	☐	☐
	Describe why bacteria are classified as being prokaryotic.	☐	☐	☐
	Change numbers to and from standard form.	☐	☐	☐
	Compare eukaryotic and prokaryotic cells.	☐	☐	☐

CB1e Enzymes and nutrition

Step	Learning outcome	Had a look	Nearly there	Nailed it!
	State that enzymes are proteins.	☐	☐	☐
	Give examples of enzymes and where they are found in the human body and in other species.	☐	☐	☐
	Recall the subunits from which carbohydrates, proteins and lipids are formed (sugars, amino acids, fatty acids and glycerol).	☐	☐	☐
	Describe what enzymes do (catalyse the synthesis and breakdown of substances, such as carbohydrates, proteins and lipids, by speeding up the rate of reaction).	☐	☐	☐
	Describe an enzyme as a biological catalyst.	☐	☐	☐
	Explain why catalysis by enzymes is important for life processes (because reactions happen much faster).	☐	☐	☐

CB1f Enzyme action

Step	Learning outcome	Had a look	Nearly there	Nailed it!
	State the meaning of the term enzyme specificity.	☐	☐	☐
	State that an enzyme's action is due to its active site.	☐	☐	☐
	Describe the role of the active site in enzyme function (including specificity).	☐	☐	☐
	Use the lock-and-key model to develop explanations for enzyme activity.	☐	☐	☐
	Explain why enzymes have a particular shape, as a result of the sequence of amino acids in the chain.	☐	☐	☐
	Explain how enzymes become denatured.	☐	☐	☐

3

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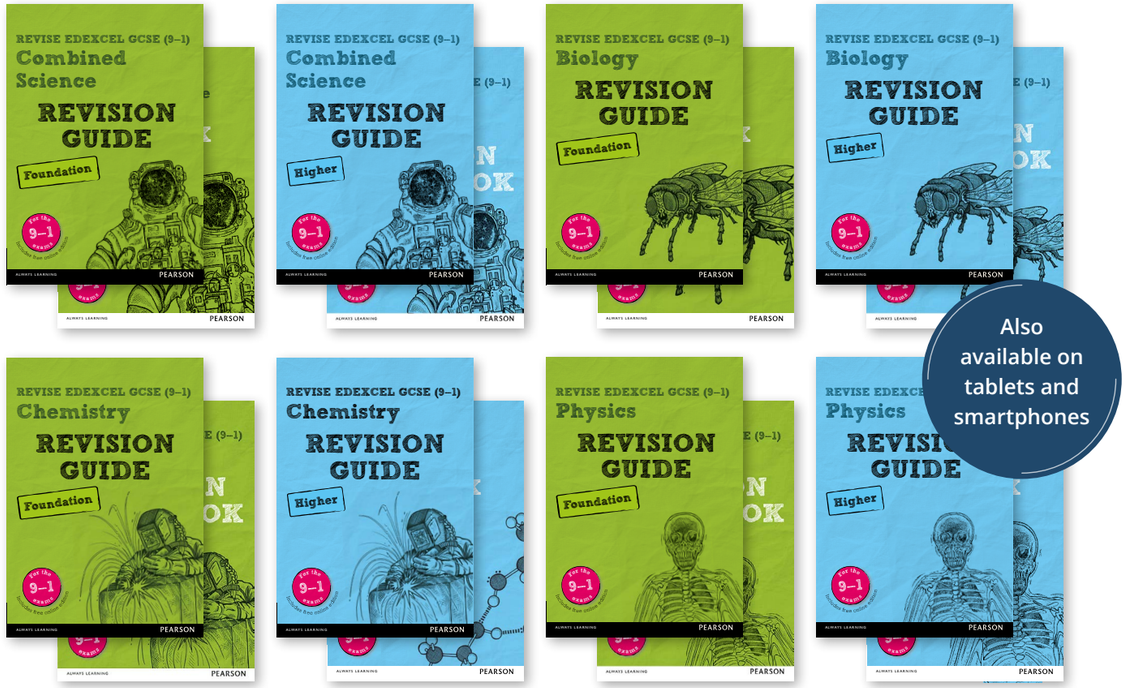

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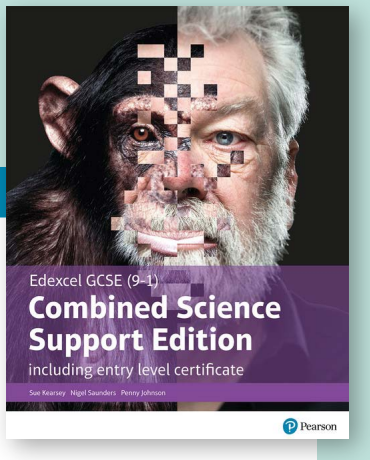

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