

EXPLORING SCIENCE

WORKING SCIENTIFICALLY

Course Guide

New
features
for 2019!



Engage KS3 students in science and build
key skills for GCSE (9–1) success

Build key science skills for GCSE (9–1) success

Now is a great time to take a fresh look at Exploring Science as your KS3 course. Already popular with hundreds of schools, it provides an engaging and inspiring way to develop students' love of science, while building skills that are critical to GCSE (9–1) success. With your help, it's just got even better!

New features for 2019:

- ✓ **NEW** KS3 Lab Books: develop practical skills for GCSE (9–1) success
- ✓ **NEW** interactive Scheme of Work: a flexible online 11–16 planning tool
- ✓ **NEW** Assessment Builder: create customised assessments to fit your teaching
- ✓ **NEW** curriculum mapping: for Pearson Edexcel and AQA.

Personalised progression to GCSE (9–1)

- Deliver the course over 2 or 3 years.
- Suitable for all awarding organisations, with mapping provided for **Pearson Edexcel** and **AQA** KS3/11–16 pathways, Entry Level Certificates and GCSE (9–1).

Learn more and start your free trial:
www.pearsonschools.co.uk/ks3exploringscience

Suitable for
all awarding
organisations



Practical skills

- Over 150 practicals to introduce the full range of skills and techniques.
- **NEW** KS3 Lab Books: write-in lab books for 12 key practicals.
- Great preparation for the GCSE (9–1) Core/Required Practical.

More on
page 13.

GCSE-style questions

From the start of Year 7, Exploring Science encourages students to:

- apply knowledge to unfamiliar contexts (AO2)
- develop evaluation skills (AO3)
- recognise and respond to GCSE-style command words.

Maths skills

- Explanations and worked examples in the Student Books.
- 1000s of activity sheets on ActiveLearn.
- Terminology and approaches consistent with those used in maths teaching.

Revision

- Summary sheets.
- Word sheets.
- Quick quizzes.

What's in Exploring Science?

Student Books

The Student Books present KS3 science in the series' well-loved style, packed with fascinating real-world examples, photos and facts to encourage all students to connect what they're learning to their world. Online versions of the Student Books - ActiveBooks - are also available.

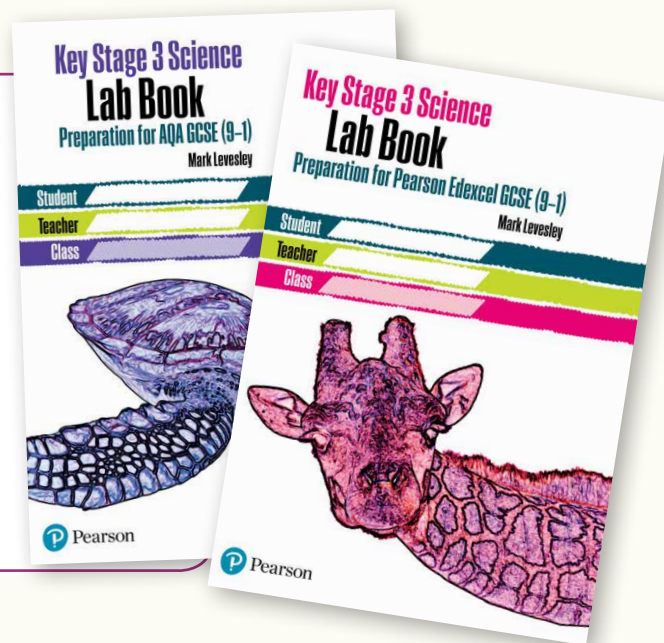
[More on page 6](#)



NEW Lab Books

Focused support for 12 KS3 practicals, designed to introduce the full range of skills required for the GCSE (9-1) Core/Required Practicals. This support extends to teachers too – we provide full teacher and technician guidance including a skills mapping grid.

[More on page 13](#)



What's in Exploring Science *ActiveLearn*?

- 1000s of teaching and learning resources
- Access for all teachers and students in your school

Teaching resources

- 3 front-of-class Student Books
- 200+ world-class videos and animations
- 300+ interactive activities
- 650+ PowerPoint presentations
- 1000+ activity worksheets

[More on page 8](#)

Planning

- **NEW** interactive Scheme of Work
- Differentiated routes
- 150+ lesson plans
- 150+ technician notes

[More on page 12](#)

ActiveLearn

Student resources

- 800+ auto-marked homework activities
- Summary Sheets, Word Sheets and Quick Quizzes for every unit

[More on page 10](#)

Progress & Assess

- Baseline tests for KS3 and KS4
- End-of-unit and end-of-year tests
- **NEW** Online Markbooks
- **NEW** Assessment Builder

[More on page 11](#)

Learn more and start your free trial:
www.pearsonschools.co.uk/ks3exploringscience

Student Books and ActiveBooks

Inspire budding scientists from the start of Year 7 with Exploring Science Student Books. Take a closer look...

ActiveLearn

Online versions of the Student Books are available as ActiveBooks for students to use at home.

Extraordinary photos encourage students to connect the things they're learning in the classroom to the real world.

Questions familiarise students with GCSE (9–1)-style command words.

Key words are in bold. A glossary is provided at the end of the book.

8Cd COMPARING GAS EXCHANGE

HOW DO WE DETECT GAS EXCHANGE IN DIFFERENT ORGANISMS?



A | HydroBOB underwater scooters

To spend long periods underwater, humans take oxygen with them to breathe. Water-living mammals, however, have adaptations so they can go for a long time without breathing. For example, elephant seals have an organ in their bodies that stores blood that is full of oxygen.



B | Elephant seals can stay underwater for 2 hours.

- 1 a) What adaptation do elephant seals have to help them go for a long time without breathing?
b) Explain how this adaptation works.
- 2 Allan is diving and uses a tank of air in 30 minutes. Will the same tank of air last for more or less time if Allan uses a HydroBOB? Explain your reasoning.

Not all the oxygen in a breath of air goes into the blood, so exhaled air still contains a lot of oxygen (table C). This means that most of the oxygen in a diver's air tank is lost in exhaled bubbles. Some divers, though, use rebreather apparatus. This contains calcium hydroxide, which removes carbon dioxide from their exhaled air and recirculates the remaining air for them to breathe.

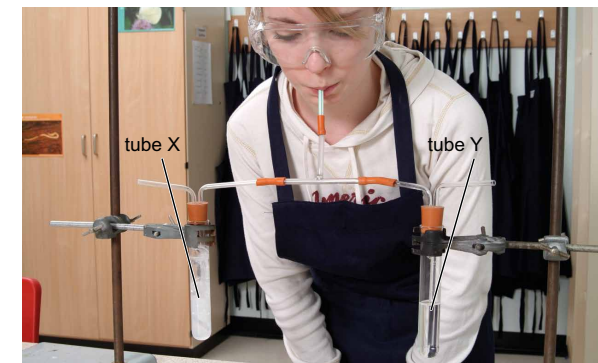
A solution of calcium hydroxide is called **limewater**. It is a clear and colourless liquid that turns cloudy as it absorbs carbon dioxide, so is used to test for this gas.

Carbon dioxide dissolves in water to form an acidic solution. This means that respiration can also be detected using an **indicator**. For example, **hydrogen carbonate indicator** is pink in water but turns yellow as carbon dioxide is added and the **pH** drops.

Another way of detecting respiration is to look for a temperature rise, because some of the energy released by respiration warms up a cell's surroundings.

- 3 Explain why the percentages of each of the five items in table C are or are not different between inhaled and exhaled air.

C	Inhaled air (%)	Exhaled air (%)
nitrogen	78	78
oxygen	21	16
carbon dioxide	0.04	4
water vapour	variable	more
temperature	variable	warmer



D | Inhaled breath bubbles through limewater in one tube and exhaled breath bubbles through limewater in the other.

- 4 Look at photo D.
a) Through which tube is the girl's exhaled breath flowing?
b) How can you tell?
c) If the contents of tubes X and Y are replaced with water containing hydrogen carbonate indicator, explain what will happen as the girl breathes in and out.

Fascinating facts for students to think about.

FACT

It has long been a dream to develop an artificial gill for divers to use. This photo shows what one might look like, but it is not a reality ... yet.



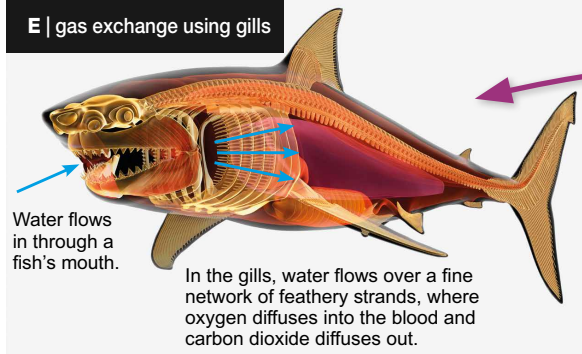
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Clear illustrations to aid understanding.

Gills

Mammals use lungs to get oxygen and so must breathe air. However, some animals never breathe air because they can extract oxygen from water, often using **gills**.

E | gas exchange using gills



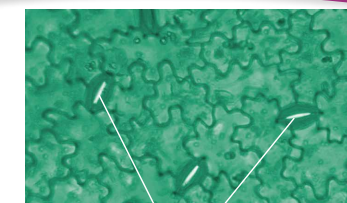
Water flows in through a fish's mouth.

In the gills, water flows over a fine network of feathery strands, where oxygen diffuses into the blood and carbon dioxide diffuses out.

Plants

Using **photosynthesis**, plants make glucose to store energy. Plant cells release the energy again using aerobic respiration, which happens in all cells, all the time. To allow gases in and out, land plants have tiny holes in their leaves called **stomata**.

- 5 a) What substances do plants need for aerobic respiration?
b) How do they get these substances?
- 6 Explain why fish tanks often become more acidic with time.
- 7 What are the similarities and differences between gas exchange in mammals and fish?



Stomata allow gases (such as oxygen, carbon dioxide and water vapour) to diffuse into and out of a leaf.

G | stomata (the singular is stoma) on a geranium leaf (magnification × 200)

I can ...

- recall how to detect aerobic respiration
- describe how gas exchange occurs in different organisms

7La ANIMAL SOUNDS

Sounds are all around us. We use sound to communicate, to warn others of danger and for enjoyment. Animals also use sounds to communicate, to warn others of danger and for enjoyment. Some animals, even use sound to help them to find their way around or to find prey when they cannot see. Other animal sounds do not seem to have a purpose.



A | This stag is trying to attract the attention of female deer and to warn other males to keep away.

Sounds are made by something **vibrating** (moving backwards and forwards).

- 1 Write down two ways that humans use sound:
a) for communication
b) for warning.
- 2 How is the sound made by the hummingbird different from the sounds made by the bee and the stag? Give as many differences as you can.
- 3 Write down two different ways that you can make sounds with your body.

Sound can be used to make different notes. How do you make a guitar produce sounds? Can you make high and low notes on a guitar? Can you make loud or quiet notes on a guitar? How do you expect an elephant or a mouse to make the lowest notes? Explain your answers.

Each unit starts and ends with a page that asks students to apply what they are learning to real-life situations.

Clear learning outcomes ensure students understand their own learning journey.

Download your free samples at
www.pearsonschools.co.uk/KS3ExploringScience

ActiveLearn teaching resources

Interactive front-of-class teaching resources that boost engagement and inspire.

Access everything you need for a lesson by clicking the blue hotspots, including videos, interactive activities, and customisable PowerPoint presentations.*

Editable PowerPoint presentations help you explain key concepts in lessons.

Click on any question to reveal the answer.

Hundreds of interactive activities and animations for use on the board.

World-class videos, including stunning BBC and Sky News clips, are integrated throughout to bring learning to life.

A zoom feature helps you focus on individual artworks, photos or any piece of text.

8Be GERMINATION AND GROWTH
HOW DOES GERMINATION OCCUR?

A seed needs **resources** for germination to occur.

- What is germination?
- Describe the stages of germination. Include at least three stages.

Water allows the cells in the embryo to swell up and start cell division. It softens the seed coat too, allowing the embryo to grow through it. Water also lets substances called enzymes start breaking down the food store. The food is turned into smaller molecules, such as glucose, that the plant uses for growth. The energy for growth comes from **respiration**, a process in which oxygen is used to release energy from glucose. We can summarise respiration as follows:

$$\text{glucose} + \text{oxygen} \rightarrow \text{carbon dioxide} + \text{water}$$

Germination needs warmth. Chemical reactions, such as those in respiration, are very slow if it is too cold. Life processes, such as respiration, occur extremely slowly in a seed. It is still alive but it is **dormant**. Most seeds remain dormant until the resources for germination are available. Some seeds must be frozen before they will germinate. This makes sure that they only germinate after winter, when more resources are available in the spring.

- What are the raw materials needed for respiration?
- What are the products of respiration?
- List three resources that seeds need for germination.
- Suggest why some plants make many fruits.
- Explain how an embryo grows.
- Why does the mass of a seed decrease during germination?

FACT
Some seeds can remain dormant for a very long time. In 2005, a Judean date palm was grown from a seed found in a dry pot in Roman ruins that were being excavated. The seed was 2000 years old.

B Some plants have seeds that lie dormant in the soil until after a fire. They then grow quickly when there is little competition from other plants.

After germination, leaves make food for the plant by **photosynthesis**; carbon dioxide and water are used to make glucose (a type of sugar). The plant then converts the glucose into **starch**, to store it. Oxygen is a **byproduct** of this process, which we can summarise as follows:

$$\text{carbon dioxide} + \text{water} \rightarrow \text{oxygen} + \text{glucose}$$

Photosynthesis needs energy, which is transferred by light from the Sun. **Chloroplasts** trap the energy and transfer it to glucose molecules, which store it. Plants need small amounts of nutrients called **mineral salts** from the soil. The most important are compounds containing the elements nitrogen, phosphorus and potassium. They help the plant to grow. A fully grown plant can reproduce; its **life cycle** starts again.

- What gases from the air does a plant need?
- Why does it need them?
- What additional resources does a seedling need compared with a germinating seed?
- Why does it need these extra resources?

Interdependence
Many plants depend on insects for pollination and the insects depend on the plants for food, such as nectar. We say that they are **interdependent**. Humans also depend on the insects and the plants, because many plants do not form seeds and fruits for us to eat if they are not pollinated. Plants and animals rely on one another in other ways. Many animals use plants for shelter. The seedlings from seeds dispersed through being eaten by animals also gain from a supply of mineral salts from the animals' droppings.

- How are animals and plants interdependent for the gases they need?
- Numbers of honeybees have been declining recently. Explain how this might affect humans.
- How does seed dormancy help a species to survive?

D life cycle of a tomato plant

I CAN

- describe what happens in germination
- explain why seeds and plants need certain resources
- describe how organisms are interdependent.

35

Labelling a plant cell
Drag the labels onto the diagram to show the names and function of each part of a plant cell.

Part	Function

many chemical reac... cell wall genetic information l... cytoplasm

Attempt: 1 of 3 Submit 1 of 1

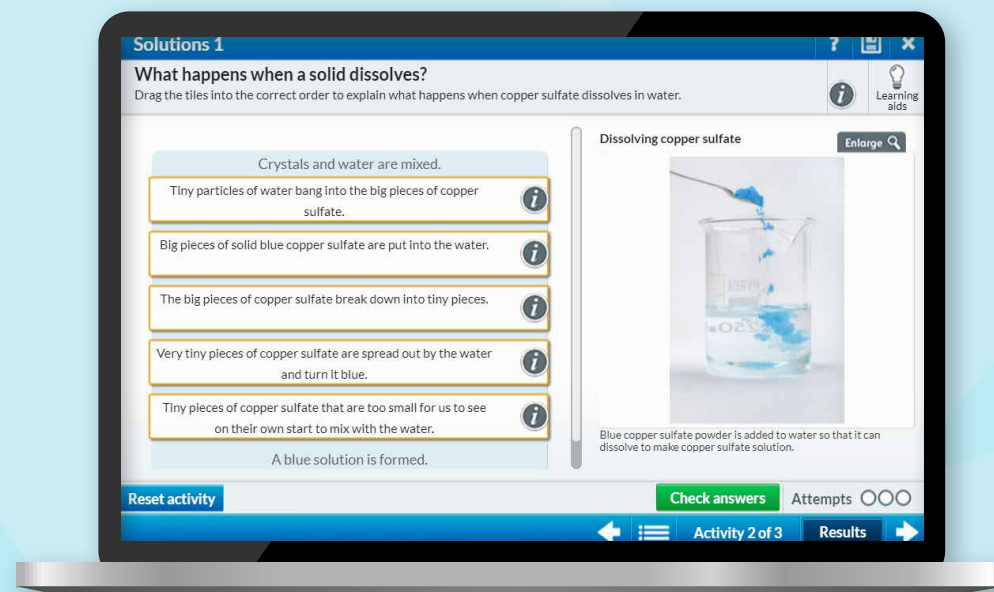
Learn more and request your free trial at www.pearsonschools.co.uk/KS3exploringscience

ActiveLearn

Student resources

Homework and Practice exercises

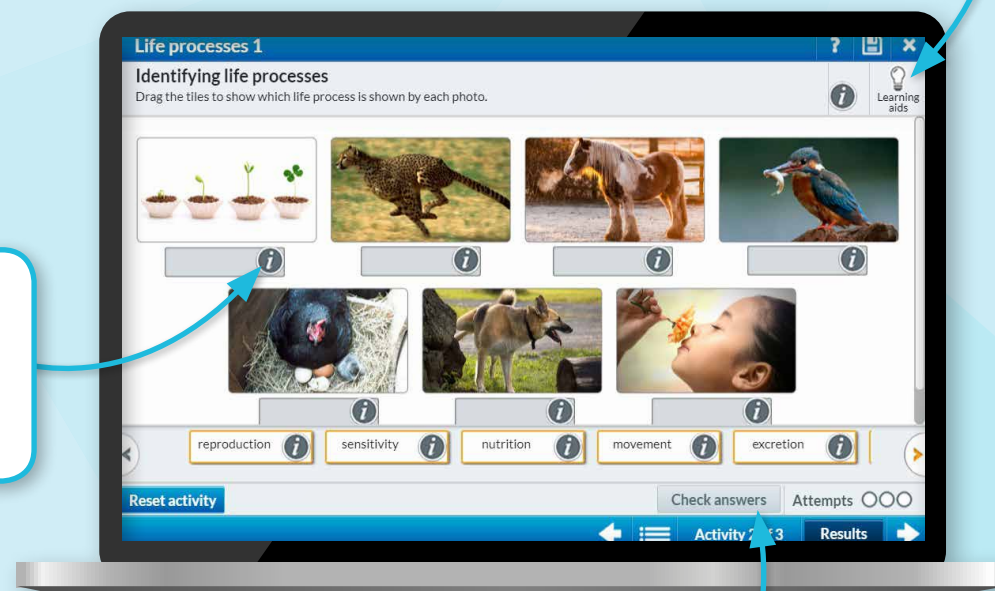
ActiveLearn includes hundreds of auto-marked activities for your students to use in lessons or at home, to cement their knowledge and skills.



Students can work at the best level for them with differentiated activities for each topic.

Stuck or in need of inspiration? Learning aids contain extra information.

On-screen hints and feedback help students work independently.



All activities are self-marked and results are tracked; students get instant feedback and you can see how they are progressing.

ActiveLearn

Progress & Assess

ActiveLearn Progress & Assess* is a reliable, easy-to-use system to track students' progress from KS3 to GCSE. It can work alongside your own system, will give you confidence in your data, helps you plan appropriate interventions, and saves you time.

It includes:

- ✓ 12-Step Progression Scale with mapping to indicative GCSE (9–1) grades
- ✓ Progression Map for KS2 to KS4
- ✓ Baseline, end-of-unit and end-of-year assessments for KS3 and KS4
- ✓ **NEW** Assessment Builder
- ✓ Mark schemes
- ✓ **NEW** Online Markbooks that provide analysis of students' results.

NEW Online Markbooks

Online Markbooks are aligned with your ActiveLearn assessments. Use these to record your students' results throughout the year, predict future performance, quickly identify problems, and take the most effective actions.

NEW Assessment Builder

Create assessments to match your teaching, choosing questions that test the skills and topics you have covered. Assessment Builder can be used alongside your personal lesson plans or with our Schemes of Work.

ActiveLearn Progress & Assess is included as part of the Exploring Science ActiveLearn subscription, or can be purchased as a separate subscription for 11-16, KS3 or KS4 science.

www.pearsonschools.co.uk/ScienceProgressAndAssess

ActiveLearn Planning and guidance

Complete support for planning and teaching, including:

- ✓ detailed teacher and technician notes
- ✓ lesson ideas to suit a range of teaching and learning styles
- ✓ mapping to Pearson Edexcel and AQA KS3/11-16 pathways, Entry Level Certificates and GCSE (9–1)s
- ✓ answers to questions in the Student Books and Lab Books.

NEW Interactive Scheme of Work

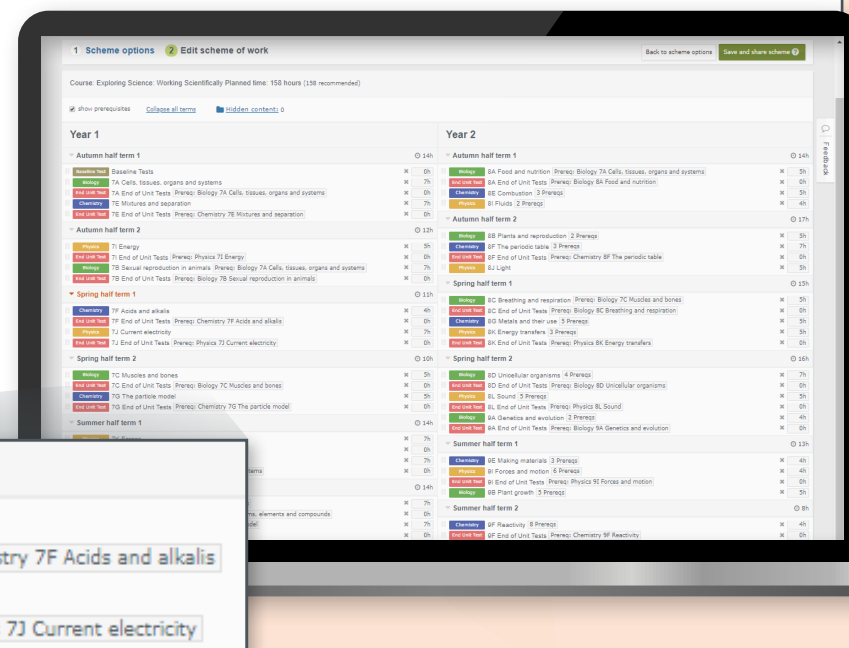
A fantastic new online planning tool for a seamless 11–16 science learning pathway (KS3 and GCSE 9–1), and you can start using the iSoW straight away for free!

What is it?

Like a traditional scheme of work, our digital iSoW helps you cover the full curriculum and qualification requirements over 5 years. You can choose a 2 or 3-year Key Stage 3.

Teach the topics in the order you choose; the iSoW will automatically highlight any prerequisite topics first.

The iSoW works seamlessly with your existing ActiveLearn resources; they will be integrated into your personalised iSoW.



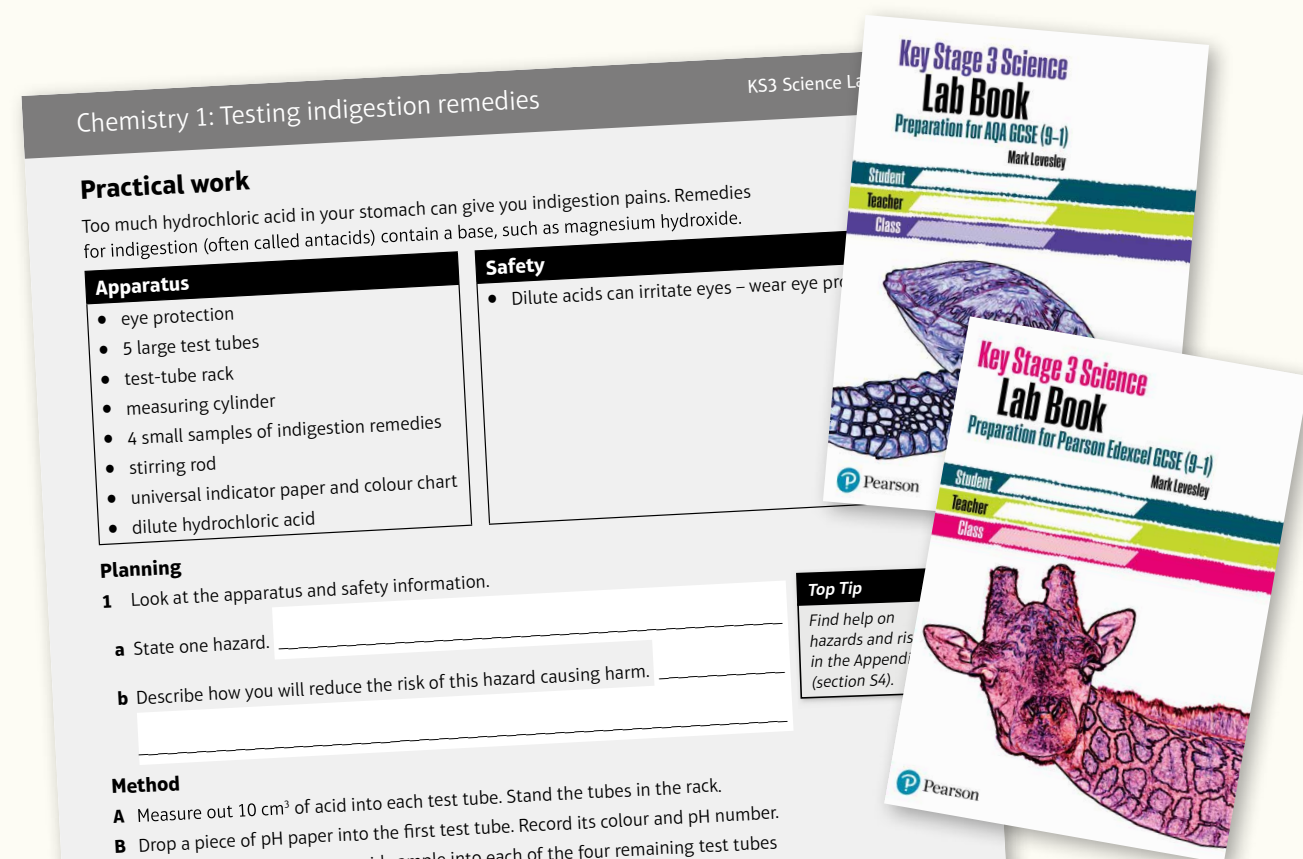
Learn more at
www.pearsonschools.co.uk/KS3isow

NEW Lab Books

Developing practical skills at KS3 in preparation for GCSE (9–1)

The framework students need to perform practicals with confidence, with versions available to prepare students for Pearson Edexcel or AQA GCSE (9–1) specifications.

- ✓ 12 engaging, enjoyable KS3 practicals designed to introduce the full range of skills required for the GCSE (9–1) Core/Required practicals.
- ✓ Writing frames and questions to develop students' scientific skills and prepare them for GCSE-style assessment.
- ✓ A skills grid and skills appendix, which students can refer to as needed.
- ✓ Affordable support that's cheaper than photocopying (RRP only £2.00).
- ✓ A free online Teacher and Technician Guide to help with the delivery of each practical, including a full set of answers and links to Exploring Science Working Scientifically.
- ✓ A skills mapping grid so you can see how the 12 practicals link to the KS3 Curriculum, Exploring Science, Pearson Edexcel's 11–16 Science Learning Pathway, AQA's KS3 Syllabus and the GCSE (9–1) Core/Required Practicals.



"These build good routines for GCSE"

Matt Squire, Head of Science, Winchcombe School

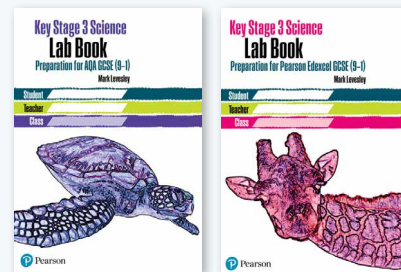
Seamless support from KS3 to GCS E (9–1)

Exploring Science Working Scientifically provides a seamless progression to Pearson Edexcel and AQA GCSE (9–1) Science qualifications. Topics are mapped to Pearson Edexcel's 11–16 Science Learning Pathway, Entry Level Certificates and GCSE (9–1) specifications, and AQA's KS3 Syllabus, Entry Level Certificates and GCSE (9–1) specifications.

11–14



Student Books



Lab Books

11–16

**Teaching
resources**

**Planning
materials**

ActiveLearn

**Student
resources**

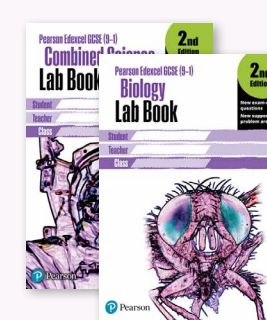
**Progress
& Assess**

Find out how you can save 15% on a subscription at
www.pearsonschools.co.uk/KS3ScienceActiveLearn.

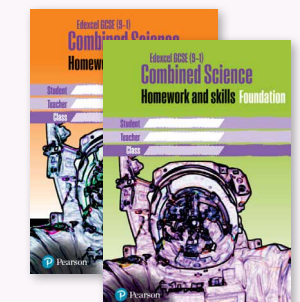
14–16 Pearson Edexcel



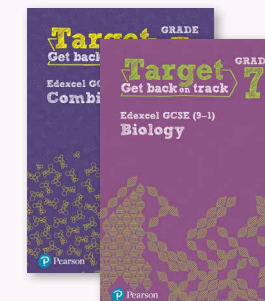
Student Books, including
Support Edition



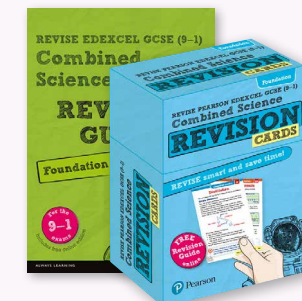
Lab Books



Homework
Books

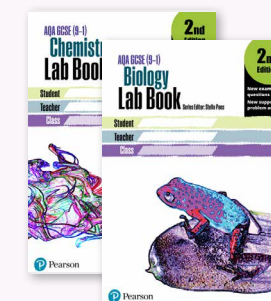


Target Intervention

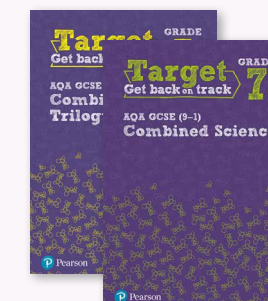


REVISE

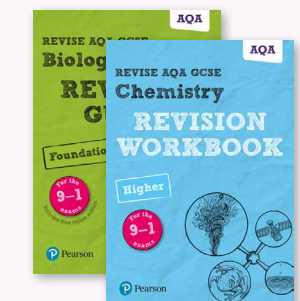
14–16 AQA



Lab Books



Target Intervention



REVISE

EXPLORING SCIENCE

WORKING SCIENTIFICALLY

Next steps:

Request a free trial or buy online

It's easy to download samples, request a free trial, and personalise your order. You can also speak to a consultant online with our Live Chat service.

Visit: www.pearsonschools.co.uk/KS3exploringscience

If you would prefer to place your order over the phone, call 0161 855 7561.
We're open Monday to Friday 8.00am - 5.00pm.



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