NEW FOR 2015

OCR AS and A level Science 2015

Resources Guide

Developing successful independent scientists for AS, A level and beyond

www.pearsonschools.co.uk/ocralevelscience2015
How is A level changing?

Our OCR AS and A level Science resources have been developed through extensive research to respond to the key changes of the new 2015 specifications and assessments.

Key changes include:
- AS and A level have become linear qualifications and exams will be taken at the end of the courses
- AS will be a stand-alone qualification meaning it won’t form part of a student’s full A level grade
- the inclusion of synoptic questions that may draw on two or more different topics at a time
- new requirements for the assessment of mathematics at Level 2 or above (Biology 10%, Chemistry 20%, Physics 40%)
- the assessment of core practical skills through written questions in exams with teacher assessment of techniques and competency that will count towards the Practical Endorsement at A level
- changes to subject content.

Why choose our OCR AS and A level Science resources?

Our brand-new editions of this popular series are written specifically to help you teach the OCR AS and A level Science specifications for 2015 and to develop independent scientists who are able to progress from GCSE and to further study at Higher Education and beyond. Our new A level resources have been developed by experts to tackle the demands of A level study, and focus on:

Developing a deep subject understanding
Whether in the classroom or working independently, your students will need to understand the bigger picture and recognise connections across topics. We’ve worked with various experts to design approaches that help students to embed their learning of scientific concepts and skills, over two years of study.

Removing the barriers to learning
Understanding the core concepts and acquiring key scientific skills are essential to removing any barriers to learning. Our resources are designed to help overcome these barriers to develop confident and independent scientists.

Synoptic learning and exam preparation
Our OCR AS and A level Science resources approach whole-course learning, consolidation and revision.

Turn the page now for more on how our OCR A level Science resources meet the changes to the specifications
## How do our OCR AS and A level Science resources address the changes to the new specifications?

<table>
<thead>
<tr>
<th>Change to specification</th>
<th>Where addressed</th>
<th>How addressed</th>
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| A level exams sat at end of two-year course. | **Student Book** | • A cumulative approach to learning continually builds on what has previously been taught.  
• Chapter openers highlight prior learning requirements and links to future learning.  
• Exam-style questions provide opportunities for students to regularly check their understanding using questions written in the style of the new exams.  
• Preparing for your exams sections explain the format of the new exam papers and question types and give guidance on exam strategy. |
| | **Teacher Resource Pack** | • Assessments provide additional practice in the style of the new exam papers.  
• Teaching plans highlight prior and future learning for each section. |
| | **ActiveLearn Digital Service - Homework and Practice** | • Knowledge Check questions consolidate, confirm and test knowledge throughout the course.  
• Mastering Biology, Mastering Chemistry and Mastering Physics activities help students to revisit and develop a secure understanding of topics core to the specification that students typically find difficult. |
| Paper 3 will include synoptic questions that may draw on two or more different topics. | **Student Book** | • Thinking Bigger spreads require students to use their knowledge in new contexts.  
• Chapter openers highlight prior learning requirements and link to future learning.  
• Exam-style questions include questions that draw on prior learning. |
| | **Teacher Resource Pack** | • Teaching plans include wider reading suggestions.  
• Guidance on Thinking Bigger spreads provides support and ideas for delivering the content. |
| New requirement for assessment of mathematics at Level 2 or above (Biology 10%, Chemistry 20%, Physics 40%). | **Student Book** | • Chapter openers highlight the maths skills required at the start of each chapter, providing the opportunity for students to check understanding and remedy gaps.  
• Worked examples included throughout for topics requiring mathematical skills (especially in Physics).  
• Maths reference sections provide targeted guidance on key maths skills that students can refer to throughout the course. |
| | **Teacher Resource Pack** | • Maths requirements are highlighted and matched to the specification. |
| | **ActiveLearn Digital Service - Homework and Practice** | • Maths for Biologists, Maths for Chemists and Maths for Physicists takes students through some of the key maths concepts required. These courses use a scaffolded method to introduce concepts students often struggle with, and help them to apply them in a scientific context. |
| Assessment of practical skills through examinations and Science Practical Endorsement. | **Student Book** | • Exam-style question spreads include questions that target understanding of experimental methods.  
• The first chapter of each book covers the new Practical Skills module in the specification, including Thinking Bigger spreads specifically aimed at practical skills.  
• Practical activity boxes are integrated throughout the text to ensure students link the practical requirements with the theoretical requirements. |
| | **Teacher Resource Pack** | • Student, Teacher and Technician practical sheets are provided for all core practicals plus additional practicals. These are chosen to provide further opportunities for students to demonstrate practical competencies and techniques.  
• Teaching plans highlight practical opportunities with mapping to practical competencies and techniques.  
• Practical competency tracking sheets enables teachers and students to track progress towards achieving practical endorsement. |
| Co-teaching of AS and A level. | **Student Book** | • Simple division of content: Student Book 1 supports a standalone AS course and provides the first year of a two-year A level course; Student Books 1 and 2 together support the full A level course.  
• Preparing for your exams sections highlight the key differences between preparing for an AS and full A level exam. |
| | **Teacher Resource Pack** | • Teaching plans highlight any requirement for differentiation between AS and A level learning. |
Student Books

Created to meet the new 2015 OCR AS and A level specifications, our Student Books provide comprehensive coverage of the modules, developing your students’ scientific thinking, providing them with a deep understanding of the subject and creating confident, independent scientists.

2.1 Slides and photomicrographs

By the end of this topic, you should be able to demonstrate and apply your knowledge and understanding of:
- the preparation and examination of microscope slides for use in light microscopy
- the use of staining in light microscopy
- the use and manipulation of the magnification formula
- the representation of cell structure as seen under the light microscope, using drawings and annotated diagrams of whole cells or cells in sections of tissue

Student Books

Covering both AS and A level

Resources are available for Edexcel AS and A level Biology, Chemistry and Physics.

AS Student Books
- OCR AS/A Level Biology Student Book 1
- OCR AS/A Level Chemistry Student Book 1
- OCR AS/A Level Physics Student Book 1

A level Student Books
- OCR AS/A Level Biology Student Book 2
- OCR AS/A Level Chemistry Student Book 2
- OCR AS/A Level Physics Student Book 2

Teacher Resource Packs
- OCR AS/A Level Biology Teacher Resource Pack 1
- OCR AS/A Level Chemistry Teacher Resource Pack 1
- OCR AS/A Level Physics Teacher Resource Pack 1

ActiveLearn Digital Service

Comprehensive coverage of the modules, developing your students’ scientific thinking, providing them with a deep understanding of the subject and creating confident, independent scientists.

A clear set of objectives shows what will be covered on each page.

Investigation boxes are integrated throughout the text to ensure students link the practical requirements with the theoretical requirements.
Student Books

Chapter openers highlight the maths skills required and provide the opportunity for students to check understanding and remedy gaps

Chapter opensers highlight prior learning requirements and link to future learning.

**MODULE 2**

**CHAPTER 2.1**

**FOUNTAIN IN CHEMISTRY**

**ATOMS AND REACTIONS**

**Introduction**

Chemists have wondered for centuries about what matter is made from and how substances behave. We now have an excellent understanding of atoms, what they are made from and what governs how they behave. Atoms and the particles they are made from, particularly electrons, dictate everything in the world around us, from how plants grow to how we generate the electricity we use every day.

A knowledge of atoms and reactions is essential for studying chemistry. People working in the field of chemistry and indeed many other areas, will use the knowledge covered in this chapter throughout their working lives. A pharmacist needs to know the chemical formulae and behaviour of drugs, a farmer needs to know how to neutralise excess acid in their fields to optimise plant growth, and an industrial chemist needs to know how much reactant to use and how much product to expect when making substances such as ammonia. The clothes you wear, the bricks your home is made from and the food you eat are all made up from atoms. Even the essential process of breathing comes down to atoms and gas volumes. An understanding of atoms and reactions underpins everything!

**All the maths you need**

To unlock the puzzles of this chapter you need the following maths:

- Units of measurement (e.g. the mole)
- Use of standard form and ordinary form (e.g. representing Avogadro’s number)
- Using an appropriate amount of standard figures (e.g. the number of moles of a substance)
- Changing the subject of an equation (e.g. finding a molecular mass)
- Substituting numerical values into algebraic equations (e.g. using $n = cV$)
- Solving algebraic equations (e.g. finding a gas volume using $n = cV$)

**Things you have studied before**

- What atomic elements, compounds and mixtures are
- What protons, neutrons and electrons are and where they are found in the atom
- The differences between solids, liquids and gases
- The signs of chemical reactions
- How to represent chemical reactions using word and formulae equations, identifying which substances are reactants and which are products
- What acids and alkalis are and what happens when they react together
- Typical reactions of acids with metals, metal oxides and metal carbonates

**Things you will study in this chapter**

- How our understanding of the atom has changed over time
- How the atomic mass of a substance can be determined and how the presence of isotopes affects this
- How to predict the formulae of chemical compounds and ions and how to use these in balanced equations
- How to determine the number of moles in weighed substances, solutions and gases
- Why acids and bases behave as they do and how their behaviour is useful to us
- The use of oxidation numbers to describe what happens to electrons during reactions
- How percentage yields and atom economies are used to consider the efficiency of chemical reactions
- How chemical reactions, such as polymerisation, can be made more efficient and sustainable

**Things you will study later**

- How properties of elements change across periods and down groups
- How molecules and compounds can be classified according to the functional groups they contain and the typical reactions these will undergo
- How chemical reactions, such as polymerisation, can be made more efficient and sustainable
- How rates can be determined for chemical reactions and the factors that influence these
- How the strength of acids is calculated
- How neutralisation reactions are investigated through titrations and the use of indicators
- The loss and gain of electrons in electrodes and the use of electrode potentials to consider the feasibility of reactions

**ActiveBook included with every Student Book**

An ActiveBook gives your students easy online access to the content in the Student Book. Students can make it their own with notes, highlights and links to their wider reading. Perfect for supporting their course work and revision activities.
Let's start by considering the nature of the writing in the article.

1. Do you think the article is written to scientists, the general public, or people who are not scientists? Explain your answer. 
2. Explain how this text is supported by the extract.

Now we will look at the chemistry in the extract, so think carefully if you are not really sure about answers to these questions yet. You may like to compare the answers with other students.

1. Describe the structure of the sodium atom in terms of protons, neutrons and electrons.
2. Give the electronic structure of a sodium atom using s, p, d notation.
3. What is the electronic structure of a sodium atom in terms of its electron configuration?
4. Describe the orbital of an atom in terms of its sub-shells and shells.
5. What is the difference in the energy or charge of an atom?
6. Explain your answer.

Activity

1. What is the activity of a sodium atom in terms of its ionisation energy?
2. What is the activity of a sodium atom in terms of its electron affinity?
3. What is the activity of a sodium atom in terms of its electron configuration?
4. Explain your answer.

Exam-style questions

1. Which of the following statements about Mg is true?
   A. It has the same number of neutrons and protons
   B. It can be oxidised to form a Mg²⁺ ion
   C. It has the same number of electrons as potassium
   D. It has a higher ionisation energy than Mg²⁺

2. Which of the following values for the ionisation energy of Mg is true?
   A. 12.25 cm⁻¹
   B. 12.52 cm⁻¹
   C. 12.75 cm⁻¹
   D. 12.92 cm⁻¹

3. What is the electronic configuration of a sodium atom in terms of its electron configuration?

Practice question spreads

- Provide opportunities for students to regularly check their understanding using questions written in the style of the new exams from day one.
- Include questions that target the understanding of experimental methods.

Student Books

- Thinking Bigger pages require students to read real-life material that’s relevant to the course and apply knowledge to new contexts.

Homework, practice and support

- The homework and practice service for AS and A level Science provides online learning that helps support your students where they need it most. It provides independent student learning, which helps your students develop and master the core concepts and essential maths required.

Promote student independence

- A personalised learning programme that enables students to work independently or guided by the teacher.
- Students work through core subject concepts in clear, contextualised step-by-step activities allowing them to reach the correct solution without additional teacher intervention.
- Detailed, structured activities that help students practise essential skills and knowledge, so they can progress at their own pace through every part of the question.
- Guided hints and instant feedback that help guide students to the correct answer and understand why answers are correct or incorrect.
- Knowledge Check questions that consolidate, confirm and test knowledge throughout course.
- Provides a scaffolded method to work through the maths required, taking learners through three levels of each skill.
- Effective reporting that allows you to track student progress – both at-a-glance, and in depth when required.
Master the essential maths
Exercises covering the essential maths required for each subject.

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**Revision Guides and Workbooks**

The UK’s best-selling revision guides are now available for OCR AS and A level Science.

- Designed for hassle-free classroom and independent study, our Revision Guides are designed to complement the Student Books with a range of specially designed features such as the one-topic-per-page format, practice questions, knowledge checks and skills checks.

- Our Revision Workbooks are designed to help students develop vital skills throughout the course and build their confidence in preparation for the exam, with guided questions, unguided questions, practice papers and a full set of answers.

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**Teacher Resource Pack**

The Teacher Resource Pack is designed to give you maximum support for new OCR AS and A level Science courses.

- Teaching plans also highlight any requirement for differentiation between AS and A level learning, and include suggestions for wider reading.

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From a teacher point of view I think it is an excellent resource for revision on self-testing of topics as the students study them and I would definitely incorporate it into a scheme of work.

Jon Gent, Norwich School (Teacher)
### 2015 Price List
OCR AS and A Level Science 2015

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<th>Product</th>
<th>ISBN</th>
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<td><strong>REVISION GUIDES AND WORKBOOKS</strong></td>
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* All prices are provisional until publication.

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**Next Steps**

**FREE Evaluation**
If you haven’t already, be sure to order your FREE Evaluation Pack.
Including an AS/A level Student Book 1, they are available for:
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- Chemistry
- Physics
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