Collins OCR Gateway Biology

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Introduction

For the Year 10 students (age 15) in September 2016 and those that follow, the revised GCSEs present new challenges in content, working scientifically, practical work and mathematical skills. This textbook supports the more traditional of OCR's two new offerings for GCSE Biology – Gateway.

Structure

The traditional approach of having a double-page spread for each chunk of learning is used in this book. The spreads on practicals and key concepts have their own consistent colour coding for the header boxes throughout the book and contribute to fairly comprehensive support for the student. The six chapters of the book exactly match the titles and order of the subject content in the OCR specification, so it is easy to relate the two. Within each chapter there has been some re-ordering by the Collins team from the specification. For example, in Chapter 1, '*Cell Level Systems'*, the section covering cell organelles has been moved to appear after the electron microscope. This seems to work well and provides a sensible progression. Terminology seems consistent with the specification and this should help avoid unnecessary confusion.

Each chapter is rounded off with a differentiated checklist, worked examples for answering exam-style questions and a set of wider-reaching questions.

A good balance is struck between accessibility and interest for talented students. The photographs and illustrations are well chosen to spark interest, although bigger ones would enhance the effect further! Once having drawn the student in, there is plenty to stimulate further thinking.

Progression

Options on the best order of teaching topics will vary widely. The approach here is to start small and build up. Chapter 1 starts at the cellular level; subsequent chapters build up through organ level, organism and community levels, before finishing with global aspects. Highlighted '*Key Concept'* spreads are dotted throughout the book. For example, diffusion appears in Chapter 2 (which deals with organs and systems), so that students can see its relevance to a range of situations. The teacher will probably want to relate this back to photosynthesis, which is covered in Chapter 1. Diffusion is briefly met again later in the book in other contexts, although the teacher may wish to ensure that pupils have grasped the significance of the process.

Practical work and skills

The textbook sensibly takes the PAGs (Practical Activity Groups) from the OCR specification and places them as distinct double-page spreads into the relevant chapters. For example, sampling techniques appear in Chapter 6, '*Global Challenges*'. The learning objectives on each practical spread loosely reflect the apparatus and techniques in the OCR specification. However, the teacher will probably want to have a long-term plan and detailed medium plan, which map these across the course.

Rather than sticking rigidly to the PAGs, there are additional or alternative practicals. In Chapter 3, '*Organism Level Systems',* practicals on reaction times and seedling growth cover the PAG on Physiology Response and Respiration, rather than 'recovery from exercise' as in the OCR

specification. Whilst it is good to see the textbook encouraging the user to develop a wider understanding of practical aspects of science, many teachers would probably not feel comfortable omitting the example given in the specification. Each practical spread has the reminder to students (and teachers!) that it is not a step-by-step guide, but rather intended to make us think about the investigation. This probably reflects how most teachers will want to approach them; use extensive inquiry work throughout the GCSE to develop and inspire the students rather than jump through the hoops to perform each practical.

Working and thinking scientifically

Situated in boxes at the side of the main text are prompts that guide students to aspects of working scientifically. For example, in Chapter 6, students are reminded, *'Remember – be prepared to analyse and discuss negative aspects of genetic modification from information that you have been given'*. It is nice to see ethical issues covered. In the section covering IVF, different perspectives are considered and students are prompted to explore the issues in more depth. However, the skilled teacher will wish to supplement ethical issues that the textbook addresses with additional, well-chosen activities such as role-play, debates and student presentations.

Developing higher level thinking

The learning objectives at the start of each spread include command words such as '*recall*', '*describe*' and '*explain'*, and so remind the reader that there is more to biology than just '*knowing'*. The questions ramp up in difficulty and the teacher can easily direct students to others that offer appropriate challenge. Teachers may wish to supplement the questions with others to further develop wider skills such as '*evaluating'* and '*synthesising'*. Many of the photographs are captioned with a thought-provoking question. The *'Check your progress*' section in each chapter is a useful tool for students and teachers.

Development of maths skills

This book has maths skills liberally sprinkled throughout in a way that helps them not to be lost. Areas of maths that are seen as key are given a double-page spread, such as those in Chapter 6 covering *relationships in data and sampling*. They explain the ideas clearly and guide students on the vocabulary to use. In other cases, maths skills are dealt with as part of the content, such as *magnification* in Chapter 1. *Standard form* gets extra treatment within a double-page spread, as well as being met in context earlier in the chapter. The approach goes a long way to supporting the student. However, the teacher will still want to help them with the language differences they may encounter compared to their maths lessons, and also with the mathematical processes. The two recent ASE Language of Mathematics in Science publications, *A Guide for Teachers of 11-16 Science* and *Teaching Approaches*, should prove to be the perfect companions for teachers in these respects.

Conclusions

This book is a useful support for the teaching of OCR Gateway GCSE. It covers the content in a thorough, interesting and attractive way, for use in class or by students at home. As with all textbooks, it does not replace good planning or good teaching. This applies particularly to developing students' ability to work scientifically, and broader skills. There are plenty of different activities in the book that do not require extra preparation by the teacher and that alone is well worth having at your fingertips.

Collins OCR Gateway Chemistry

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A high quality textbook is an excellent tool to support high quality teaching and learning. Having a bespoke textbook dedicated to a specification is most useful, as it ensures that students cover the content and skills required for success without providing them with a large quantity of superfluous background knowledge. In our information-rich society, any additional information for enrichment or extension can easily be found from other sources such as the Internet. As with all textbooks, the Collins OCR Gateway textbook for Chemistry is not designed to be slavishly followed spread by spread, but is intended to complement good teaching and learning that meets the needs of learners.

The textbook is arranged into six chapters, which exactly match the six areas of the specification. In some cases chapters are subdivided, once again matching the specification. This makes it particularly helpful when using the specification for planning, because the content and order of the book are identical to those of the specification. Individual schools can choose the most appropriate progression route for their students, happy in the knowledge that it will be straightforward to match the progression order chosen to the textbook.

Each chapter broadly follows the same structure as others in this and other textbooks in the series. This makes it simpler for students and teachers to navigate through the book. Each chapter starts with a '*Check your progress*' spread, which reminds students of expected prior knowledge and introduces the new ideas that they will learn about in the coming chapter. Good use of the expected prior knowledge would support the identification of intervention needs in future teaching; the taster of new ideas could be used to engage students prior to new teaching. At the end of each chapter, there is an assessment section comprising '*Check your progress', 'Worked example'* and differentiated '*End of chapter questions'.* Spreads within each chapter consist of '*Content', 'Key concept', 'Maths'* and '*Practical'* spreads. All content spreads show progression across the spread, with more demanding content and questions appearing on the right hand page. This makes it easier for teachers to target students with the most appropriate ideas and questions.

The '*Check your progress'* section works well as a self-assessment tool and is differentiated into three levels, in a similar way to content spreads: green denotes more basic ideas, blue intermediate and pink advanced. The '*Worked example'* shows similar differentiation, except for the end of chapter questions, which are differentiated into four levels. This is particularly helpful, as students of all abilities can be targeted with questions that meet their ability, as well as some questions with greater challenge. The most demanding questions provide significant challenge for able students. For example, students may be challenged to explain complex ideas within abstract topics such as the Haber process. Questions are not

highly structured, which adds further challenge to the harder questions but provides good opportunity for examination preparation.

The content spreads follow a two-column format throughout the book. The wider left-hand column focuses on a combination of core information and questions, and the right-hand column provides images, additional diagrams and information boxes. Each spread begins with a title, learning objectives and key words. Learning objectives are ramped to match the differentiated content within the spread and use command words appropriate to the demand. Key words appear in a box and are emboldened when they appear in the text, emphasising their use in context. Information boxes display useful snippets for students, interesting facts and reminders of important information. At the bottom of the two-page spread, there are suggested Internet search strings, so that interested students can go away and find additional information around the topic. Language demand increases across the spread to match the differentiated content and, at all times, text is used precisely and concisely. This provides welcome white space, which, coupled with engaging images and information boxes, helps to make the spreads appealing and readable.

Content spreads are reinforced by *'Key concept'* spreads. These appear once or twice in all chapters and focus on core ideas addressed within the chapter. They often deal with topics that students are most confused by. For example, within Chapter 2, '*Elements, compounds and mixtures'*, one of the '*Key concept'* pages addresses 'pure substances', a common area for student misconception. Another is used to summarise electron share or transfer in bonding.

Maths spreads appear at relevant places within the book and cover all necessary maths skills for chemistry GCSE. Certain skills may be covered more than once; for example, '*order of magnitude calculations', 'standard form'* and '*ratios, fractions and percentages*' are covered at least twice. This is entirely appropriate, as these are key maths concepts within the chemistry curriculum that many students find particularly challenging. Maths spreads are always exemplified within the context of the chapter, reinforcing the importance of mathematics within chemistry.

The OCR Gateway specification has a total of eight PAGs (practical activity groups) that are addressed by '*Practical'* spreads in the textbook. The OCR specification is less prescriptive about practical work than other boards. This is reflected in in the specification, which identifies apparatus and techniques for each PAG and provides examples of suitable activities. Collins has mirrored this approach with the practical work suggested in the textbook. For example, the practical activities within the textbook always cover the apparatus and techniques required by a PAG, but may or may not match the example activities described in the specification. The approach of the practical work is not overly prescriptive; students are not provided with a 'recipe' to follow. Instead, they are given an outline for the practical, and thought-stimulating prompts. This approach encourages students to learn and apply '*working scientifically'* skills, techniques and procedures.

The Collins OCR Gateway Chemistry textbook is a good resource for supporting teachers in delivering well-planned lessons and is supportive of schools planning different routes through the specification. It provides good support for maths and '*working scientifically*' skills required by students for success at GCSE. It is readable and visually engaging for students, providing them with comprehensive chemistry content, subject skills and assessment.

Collins OCR Gateway Physics

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The GCSE specification changes herald a new era in which there is a greater emphasis on mathematical skills and assessment of scientific enquiry by examination paper. In these less certain times, a good quality textbook is an important tool in the teacher's arsenal. The Collins GCSE Physics textbook has been designed to match the OCR Gateway specification in content, terminology, the specification order and references.

The book is easily navigable by teachers and students. It is divided into eight chapters, which exactly match the eight topic areas of the specification. Each chapter begins with a two-page spread that recaps ideas that students have previously met, and introduces new ideas that they will meet within the chapter. This spread is quite visual in nature and the text is kept to a minimum to improve engagement for students.

At the end of each chapter there is a '*Check your progress'* page, a '*Worked example'* page and '*End of chapter questions'*. A key feature of the book is that both content and assessment are differentiated by colour, making it easier for students to identify concepts that are more difficult to master. Differentiation is also immediately apparent on the '*Check your progress'* pages, which support student self-assessment. Key content from the chapter is broken down into individual statements and these are presented in coloured text-boxes: green boxes identify the easiest statements, blue for intermediate difficulty and pink for the most demanding. In a similar way, '*Worked example'* questions, or part-questions, have their demand identified by the same colours. Interestingly, the '*End of chapter questions'* are differentiated into four levels. This is particularly useful for providing all students with questions targeted at their ability, and providing additional questions that provide greater challenge. The most demanding questions are just that; they require students to apply mathematical skills learnt during the chapter, apply abstract models and thinking, or demand complex, multi-stage explanations. Assessment is therefore addressed well at the end of each section and this is augmented by questions on the physics content two-page spreads.

Each chapter contains four different types of two-page spreads: physics content, '*Key concepts'*, '*Maths'* and '*Practical skills'*. Content spreads begin with learning objectives and key words. Learning objectives are ramped, using command words such as '*describe', 'explain',* '*apply'* and '*calculate'*. Both pages of the spread then follow a two-column format, the wider left column targeting content and information, and the right hand column displaying pictures, diagrams and information boxes. The information boxes give students key information reminders, and maths or other advice. Each spread begins with an interesting hook, followed by physics content differentiated into three levels, which becomes more demanding across the spread. The colours used are green, blue and pink, which match the differentiated assessment pages. Once again, this is particularly helpful for students to identify the level of demand of ideas. Higher tier content is also identified. The text is accessible for students, with the language demand matching the science demand. To support peer assessment, self-assessment and teacher assessment in class, there are differentiated and objective, comprehension-type questions within the text.

Maths skills are well supported throughout the book. For example, at relevant points on content pages there are information boxes supporting appropriate maths skills. Where there are more extensive demands for maths within a chapter, they are addressed by two-page maths spreads. They

draw upon contexts from the chapter, making them feel an integrated part of the chapter rather than an afterthought. For example, in Chapter 3, *Electricity*, there are two maths spreads. One spread supports algebra, for rearranging equations used in the electricity section, and the other supports graph interpretation, which is useful for interpreting voltage-current characteristics of circuit components. In common with other content pages, two-page maths spreads have differentiated learning objectives and content.

Separate two-page spreads support the development of students' practical and investigative skills. These are deliberately designed to encourage students to '*think scientifically'* rather than following a recipe-book type approach. The practical two-page spreads do not prescribe investigations, in the same way that the OCR specification does not. For example *'Practical Activity Group'* (PAG) P7 requires '*use of circuit diagrams to construct and check series and parallel circuits including a variety of common circuit elements'.* The example practical suggested by OCR is to investigate the brightness of bulbs in series and parallel circuits. To address the same practical skills, the two-page spread requires students to investigate the relationship between a wire and its resistance, and to investigate the effect of combining resistance in series and parallel. This investigation clearly addresses the required apparatus and techniques, but increases the physics and mathematics demand when compared with the OCR suggestion.

'Key concept' two-page spreads appear once or twice in all chapters. These focus on core ideas addressed within the chapter, often dealing with topics that students are most confused by. For example, within Chapter 3, '*Electricity'*, one of the '*Key concept'* pages addresses the differences between potential difference and current. In common with other content pages, *'Key concept'* two-page spreads follow a two-column format and are differentiated, but the text is a little denser by necessity and there are no questions within the spread. However, they are a most useful addition in helping students to make sense of the physics, highlighting common misconceptions and more demanding content for students and teachers.

In common with other quality textbooks, this is designed as a resource to complement good teaching and well-planned lessons rather than being followed slavishly, spread by spread. It is very supportive for schools that plan their own route through the physics course from the specification, because the content, references and terminology match the OCR specification exactly. In conclusion, the textbook is well thought-out and well designed. It has appropriate level of support for mathematics and for physics, and addresses many of the '*working scientifically'* skills that students will require for success. It is visually engaging and provides good opportunity for assessment within lessons and at the end of sections of work.