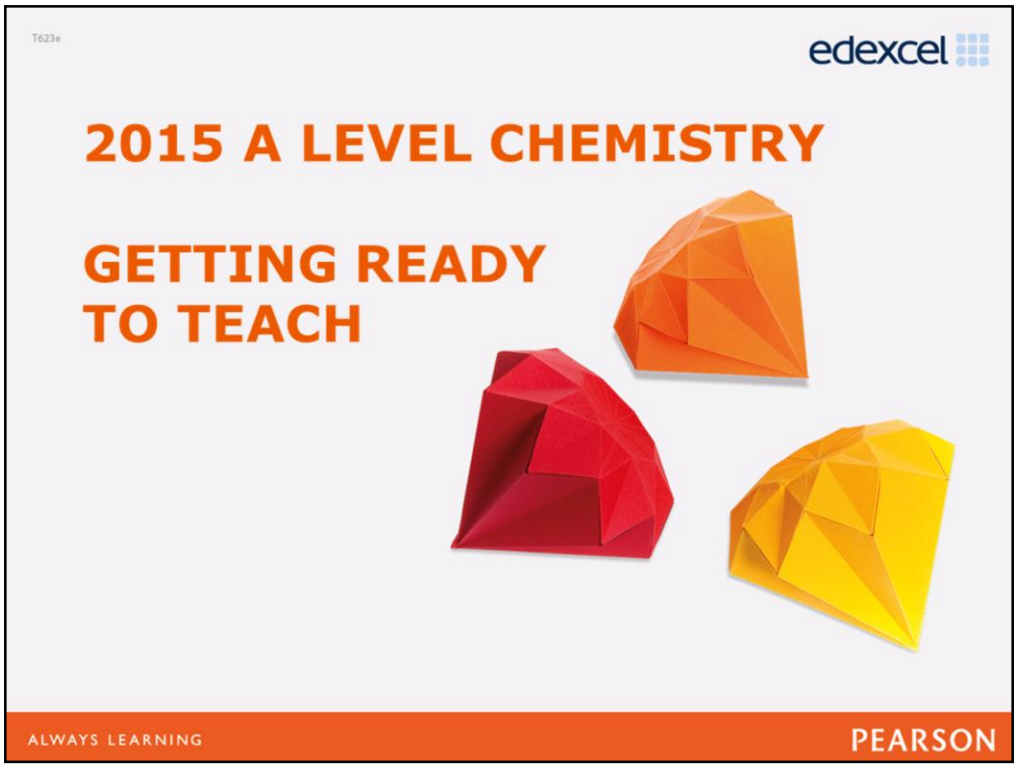
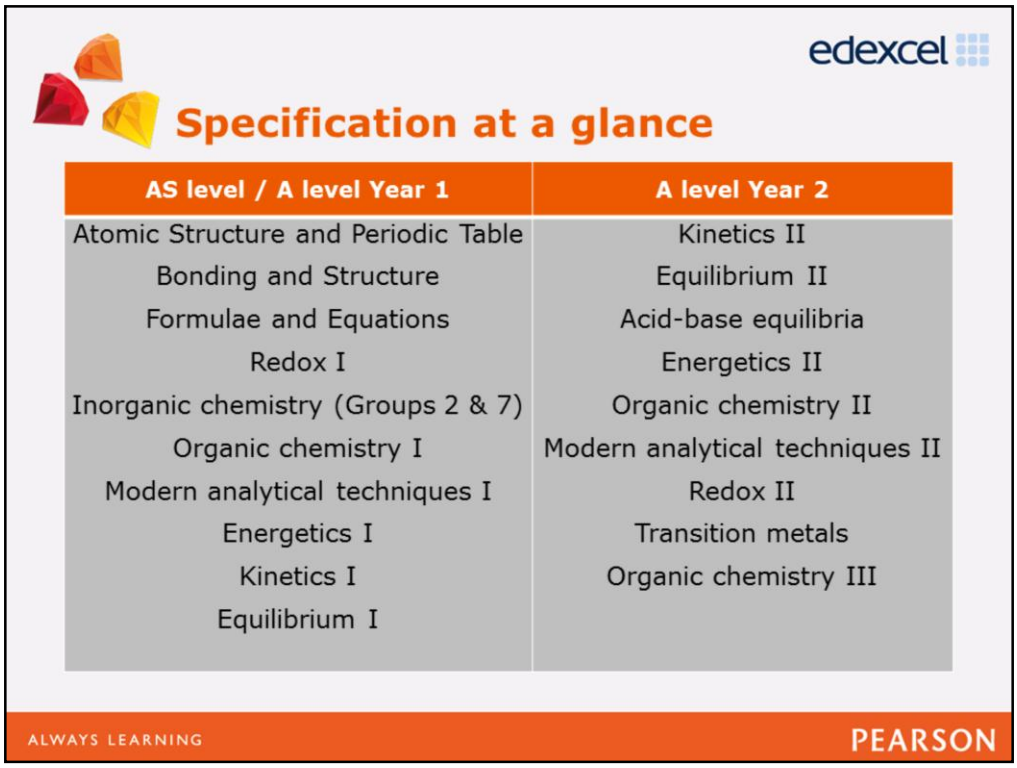


Our Getting Ready To Teach training looks at how the new specifications can be delivered in the classroom.

This is the presentation used in our events and there are embedded notes that will talk you through the specification content and assessment and will tell you what other documents you will need to access along the way. The presentation will go through:

- The structure, content and assessment of the new qualifications
- The support available to guide you through the changes
- Possible teaching and delivery strategies, including co-teaching AS and A level
- New topics and some activities to support teaching and delivery of these themes

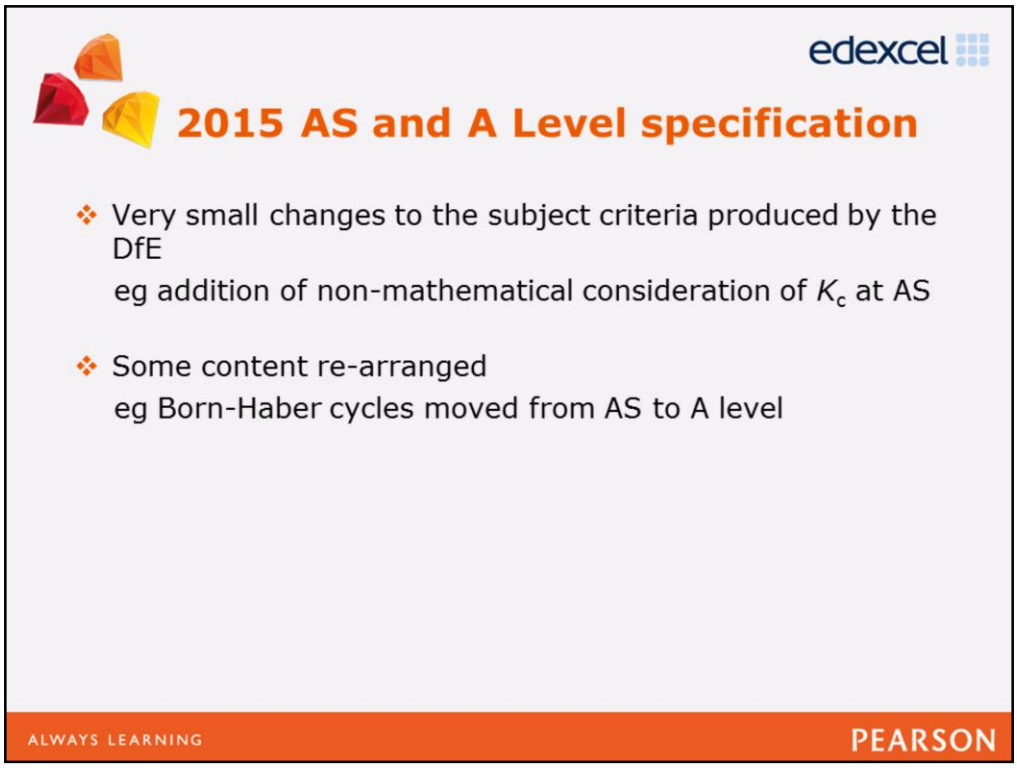
There are references to the specification and sample assessments throughout this presentation so make sure you have these to hand.



Please note that the ordering of topics within this table does not imply a particular teaching order: the topics may be organised in a variety of different orders. In particular, this table shows the topics that make up AS Chemistry as those covered in Year 1 of the A level course.

Teachers who plan a linear approach to A level over two years may, for example, choose to vary this presentation to allow related topics to be considered together.

Further information on planning a route through the specification appears in the planning section of the **'Getting Started Guide'.** You can find the Guide here: http://qualifications.pearson.com/content/dam/pdf/A%20Level/Chemistry/2015/teaching-and-learning-materials/AS_and_A_level_Chemistry_Getting_Started_Guide.pdf

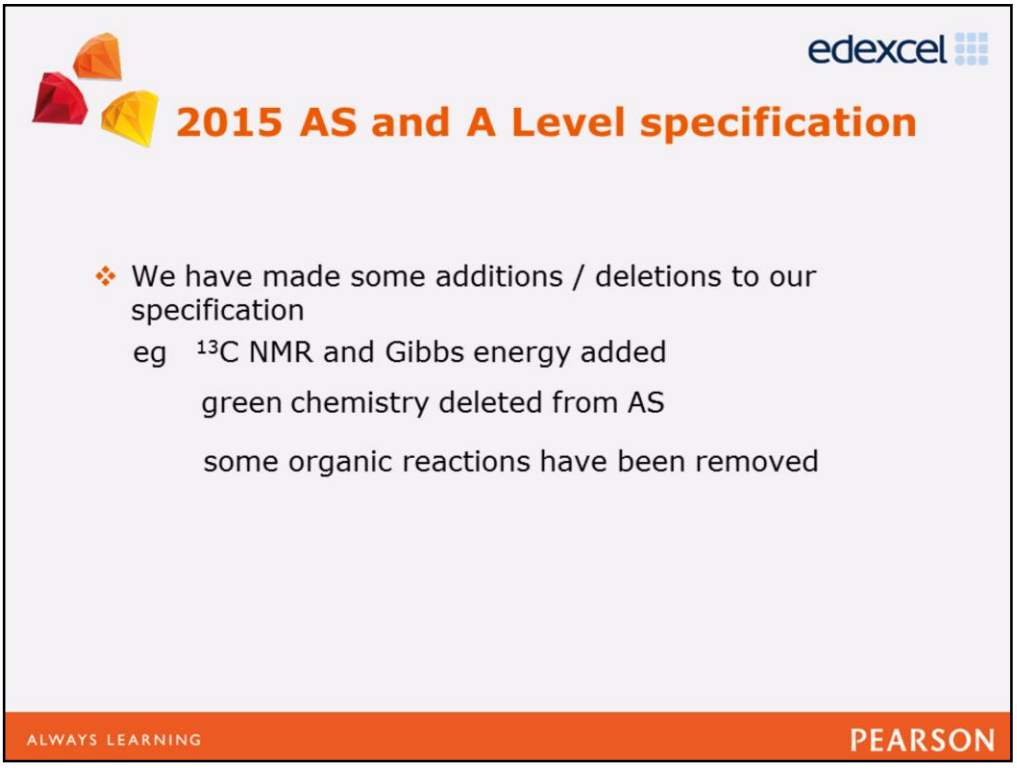


The final subject criteria, published by the Department for Education, show the core content that must be present in all A level Chemistry specifications. This core content makes up 60% of the course and is largely unchanged from the subject criteria for the GCE 2008 specifications.

In addition, the subject criteria also contain revised appendices for the delivery and assessment of practical and mathematical skills within Chemistry.

The following practical requirements apply to A level Chemistry specifications. A level Chemistry specifications must:

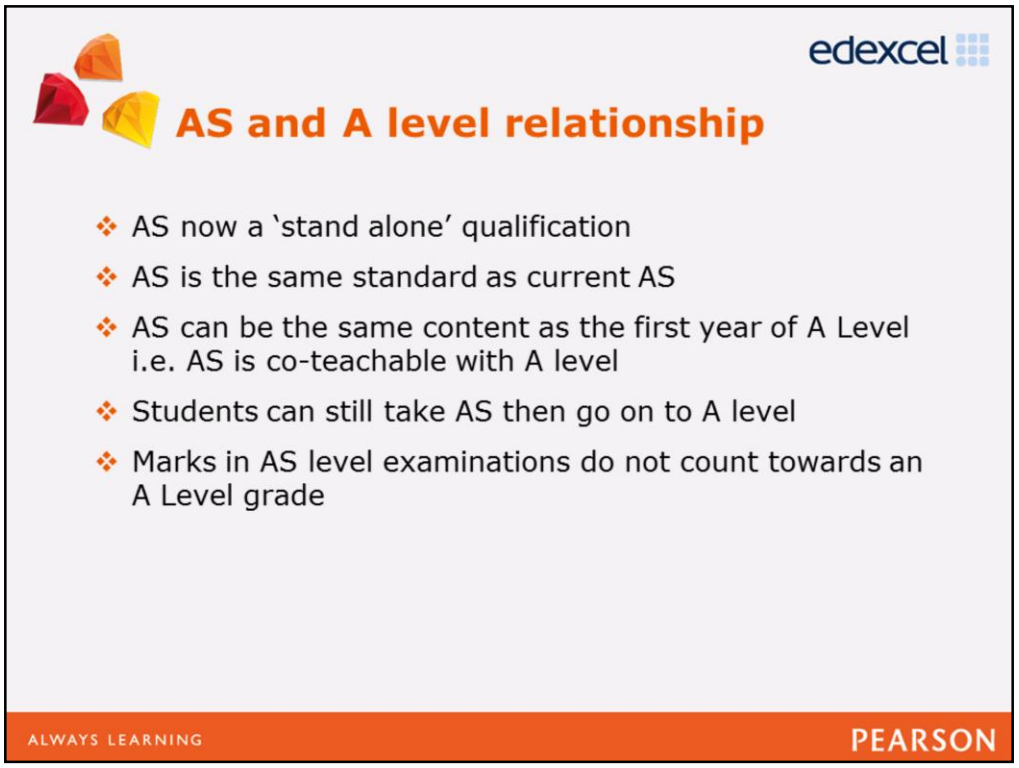
- contain a minimum of 12 core practical activities
- provide opportunities for students to use and develop the techniques listed in Appendix 5c
- assess practical skills within externally-assessed examinations
- provide opportunities for students to develop competency in practical work, which can be assessed by teachers.



The remaining 40% of the AS and A level specifications is at the discretion of each Awarding organisation. Using feedback from teachers, as well as taking into account the needs of students going on to study Chemistry or related subjects, we have taken the opportunity to alter, re-word and re-organise some of the discretionary content in the new Edexcel A level.

Some of the changes that you will notice include:

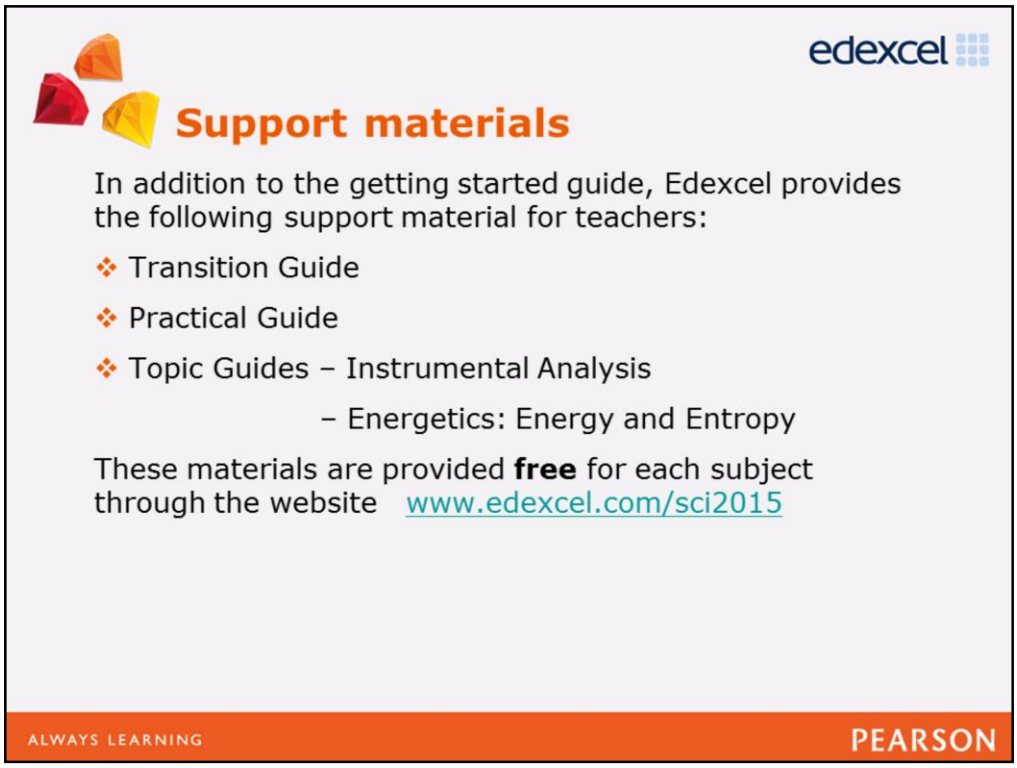
- the removal of the section called 'Green Chemistry' from AS
- an approach to thermodynamics which includes Gibbs energy changes as well as entropy changes
- the removal of some organic reactions, including the formation of diazonium ions and subsequent coupling reactions
- the inclusion of the use of Grignard reagents as part of organic syntheses
- a greater focus on principles of transition metal chemistry, with less emphasis on learning of colours and reactions.



AS and A levels have been decoupled, which means that the AS qualification will no longer 'count towards' the A level grade. Students can still take AS assessments and progress to A level, but they will need to sit all three A level papers at the end of the course to achieve an A level grade.

The specification has been designed to be co-teachable so you can, if you wish, continue to offer your students an AS qualification and enable them to progress to the full A level.

Activity 1.1 in the GRTT Delegate Booklet offers some suggestions of points to consider within your department.



Transition guide

To help you with planning and teaching your first few A-level lessons and to save you time, we have worked with practising teachers and examiners to develop these valuable, focused transition materials. These will help you reinforce key concepts from KS4 and KS5 and guide your students' progression.

These transition guide includes:

• mapping of KS4 Edexcel GCSE(s) to the new Edexcel A Level Chemistry specifications

• baseline assessments, summary sheets, student worksheets and practice questions.

Practical guide

This guide is designed to:

1. support you and your students through all elements of practical work in the new AS and A level specification. Although it will address assessment arrangements, its focus is to ensure good quality practical work is at the heart of teaching and learning in the subject,

2. explain how the new Ofqual requirements for practical skills can be developed throughout the course using both core practicals and other

specification content.

Topic guides

These guides are intended to help support teachers unfamiliar with this specification and to provide some background information on the parts of the topic that are new – both from a teacher's perspective to ensure clarity of what is expected, and from a student's perspective when discussing transition from GCSE and addressing misconceptions.

Each guide can be used as a reference document for teachers, and parts of it (such as the worked examples) could work as revision material for students.

Included in each guide are:

• some ideas on how to address common misconceptions in both new and previously included content

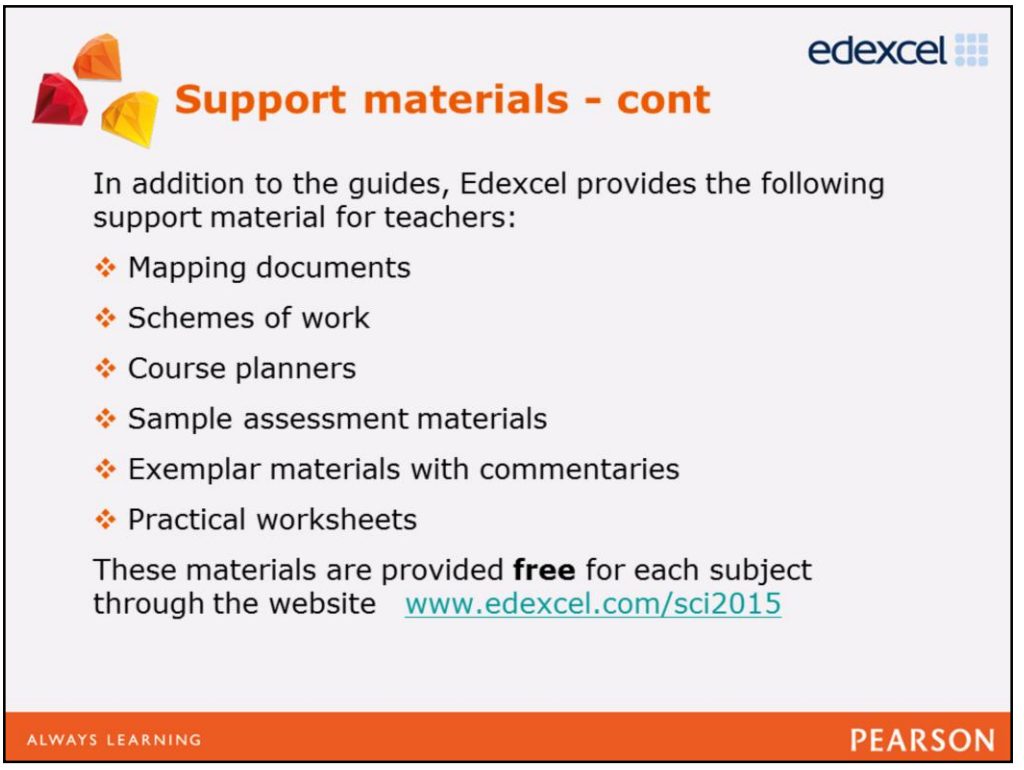
• possible teaching sequences for key specification points where there is new or challenging content

• worked examples that teachers could use to support students in developing their problem solving skills

• links to external websites that can be used to further students' understanding.

All these Guides can be found on the website:

http://qualifications.pearson.com/content/demo/en/qualifications/edexcel-a-levels/chemistry-2015.coursematerials.html#filterQuery=category:Pearson-UK:Category%2FTeaching-and-learning-materials&filterQuery=category:Pearson-UK:Document-Type%2FGuide



Mapping Documents
Mapping documents are available to support teachers who are both moving to Edexcel from other current Exam Board specifications, and also for existing clients of Edexcel..
These documents indicate what you will be teaching that is new to you and which topics/concepts you will no longer need to teach.

Schemes of Work
Two schemes of work are available – one based on a two year teaching route and the other for centres who wish to offer the opportunity for learners to take an AS level at the end of year 1 of the course.

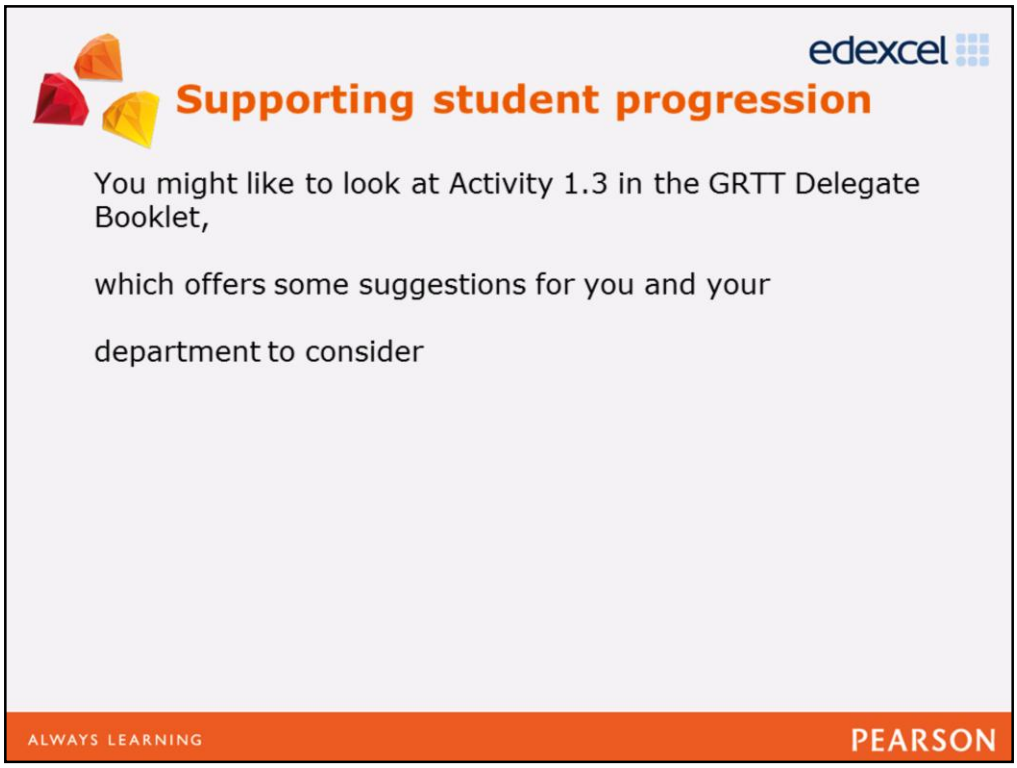
Course planners
The course planners can be used alongside the schemes of work. They give a week by week break down for the teaching of each topic.

Sample assessment materials
We have produced two sets of papers for AS and three sets of papers for A level. The initial sample assessment materials (SAMS) and will be available to both teachers and students. The extra assessment materials (EAMS) will be available on the secure website for access by teachers only. These papers can then be used as 'mock' examinations.

Exemplar materials with commentaries
Selected questions fro the SAMS were given to A level students to answer. Some of these answers, with commentaries from senior examiners, are provided in this document.

Practical worksheets
Each core practical has a student worksheet, a teacher worksheet and a technician worksheet.

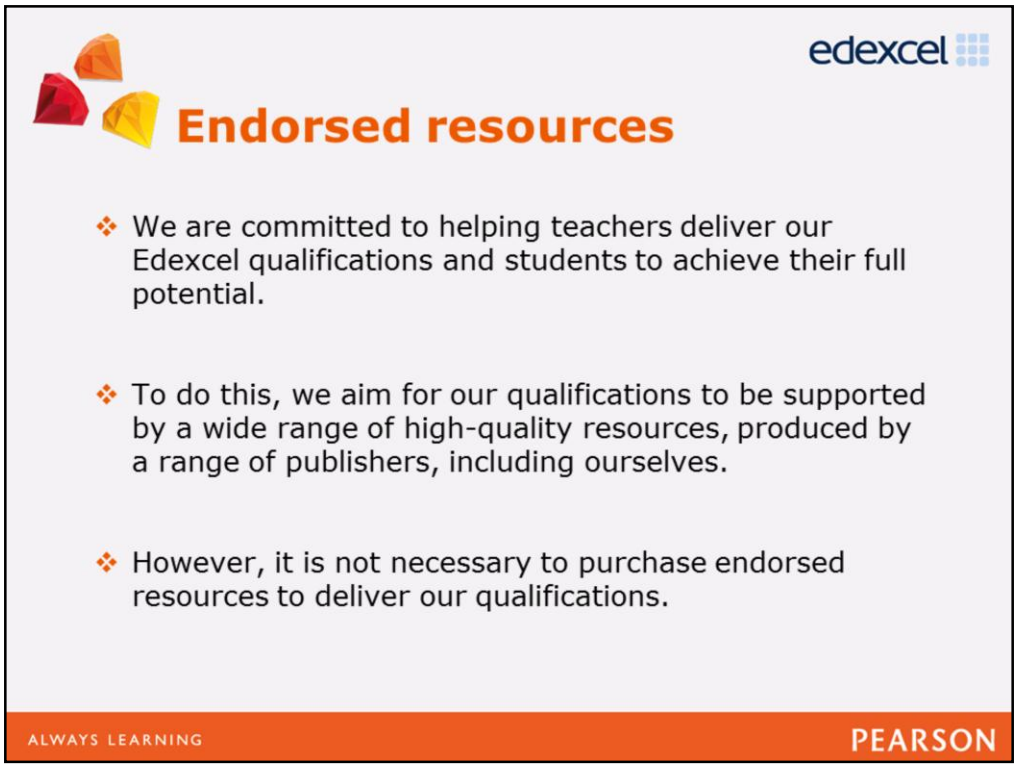
All support materials are provided **free** for each subject through the website: http://qualifications.pearson.com/en/qualifications/edexcel-a-levels/chemistry-2015/teaching-support.html



Possible challenges include:

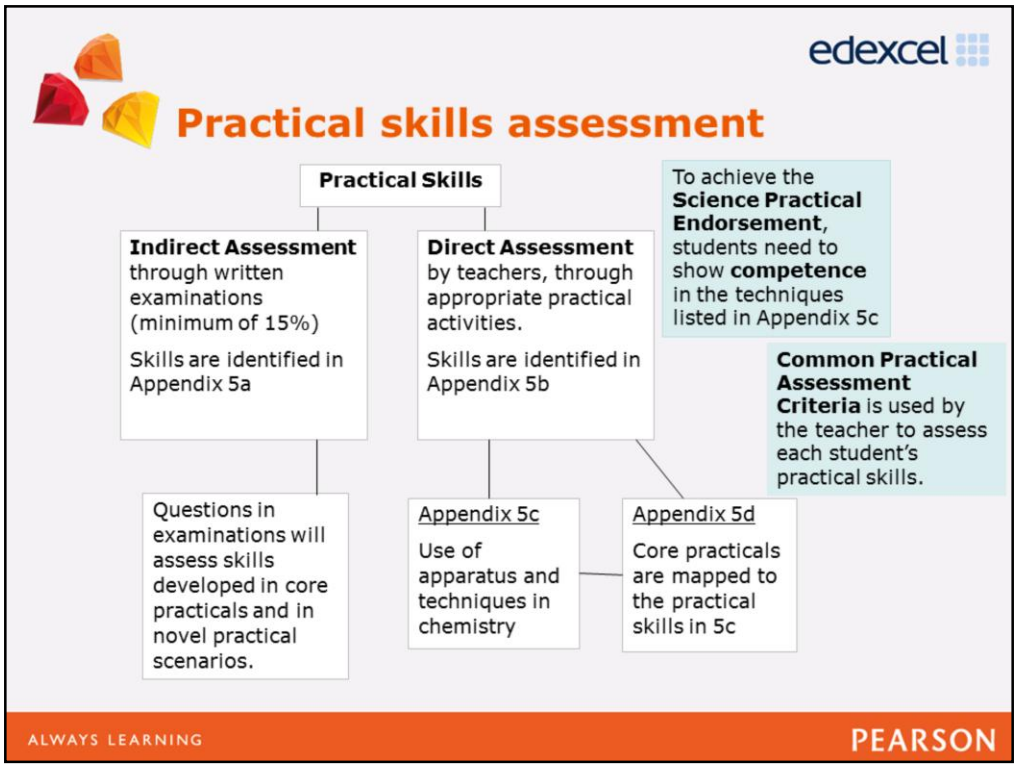
- the amount of content to learn
- the level of understanding required
- the increased level of independence and organisational skills required
- there are likely to be more unstructured questions, unscaffolded calculations, problem solving questions, and unfamiliar contexts for exam questions in both a theoretical and practical context

The Transition Guide offers support in the early stages of the first year of the A level/AS course



Pearson: Year 1 and 2 student books.
Authors: Cliff Curtis and Jason Murgatroyd.
Year 1 book has been endorsed and published.

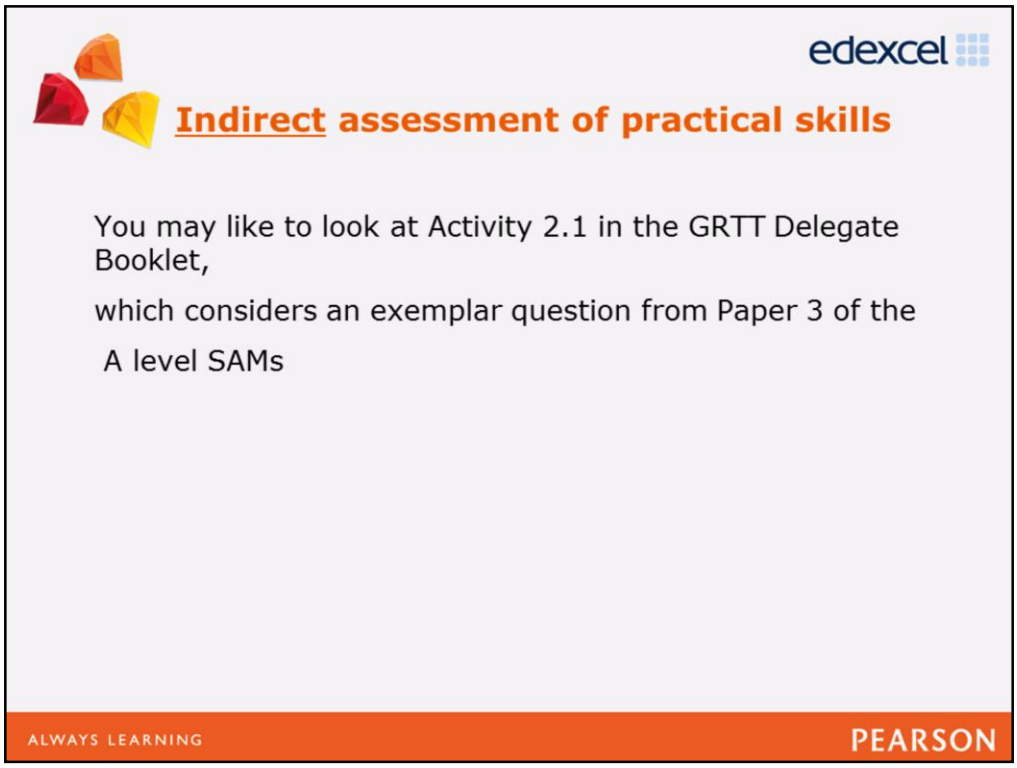
Hodder: Year 1 and 2 student books.
Authors: Graham Curtis, Andrew Hunt and Graham Hill.
Year 1 book has been endorsed and published.



Indirect assessment
Questions within written examination papers will assess knowledge and understanding that students gain within the context of the core practicals, as well as novel practical scenarios. Minimum of 15% across each of AS and A Level. The skills are listed in Appendix 5a – indirect assessment

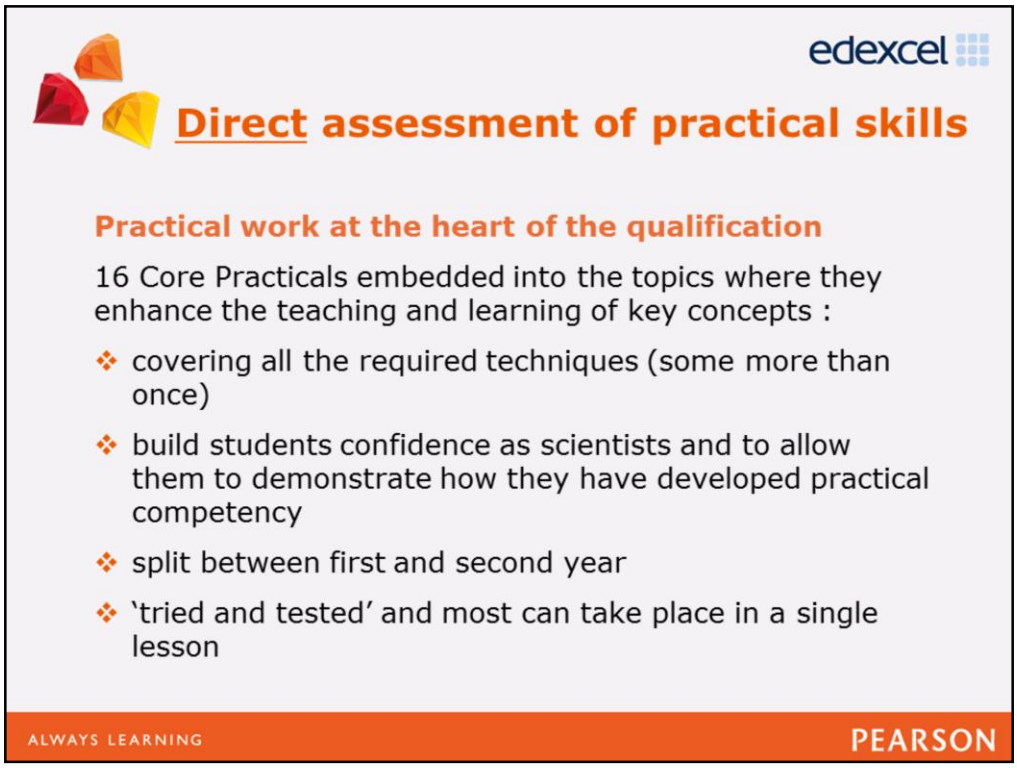
Direct assessment
Practical work carried out throughout the course will enable students to develop the skills in appendix 5b. Appendix 5c: lists the apparatus and techniques for chemistry. Skills are directly assessed by teachers.

The Common Practical Assessment Criteria (CPAC) will be used to assess students' skills as they demonstrate their competencies.



Use Appendix 5a in the A level specification

Consider how you could develop students' practical skills to be sure that they can be assessed indirectly



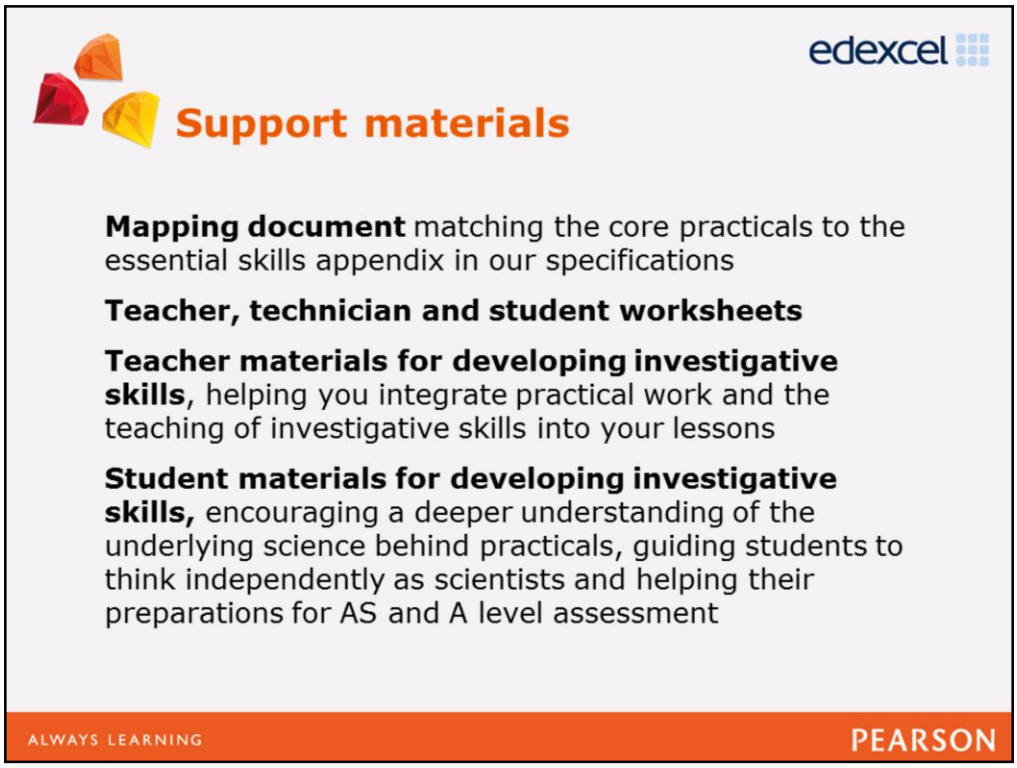
Appendix 5: Working Scientifically gives a detailed table of all the Core Practicals and where the required techniques are covered in each one.

We have chosen tried, tested and familiar practicals that fit naturally into the teaching and learning of topics within the specification.

Students may be asked questions in the practical papers on any of the skills in the core practicals or the questions could be asked within a different setting.

Our core practicals are seen as a minimum expectation so that students gain confidence in the investigative skills they need to be successful at A level and beyond.

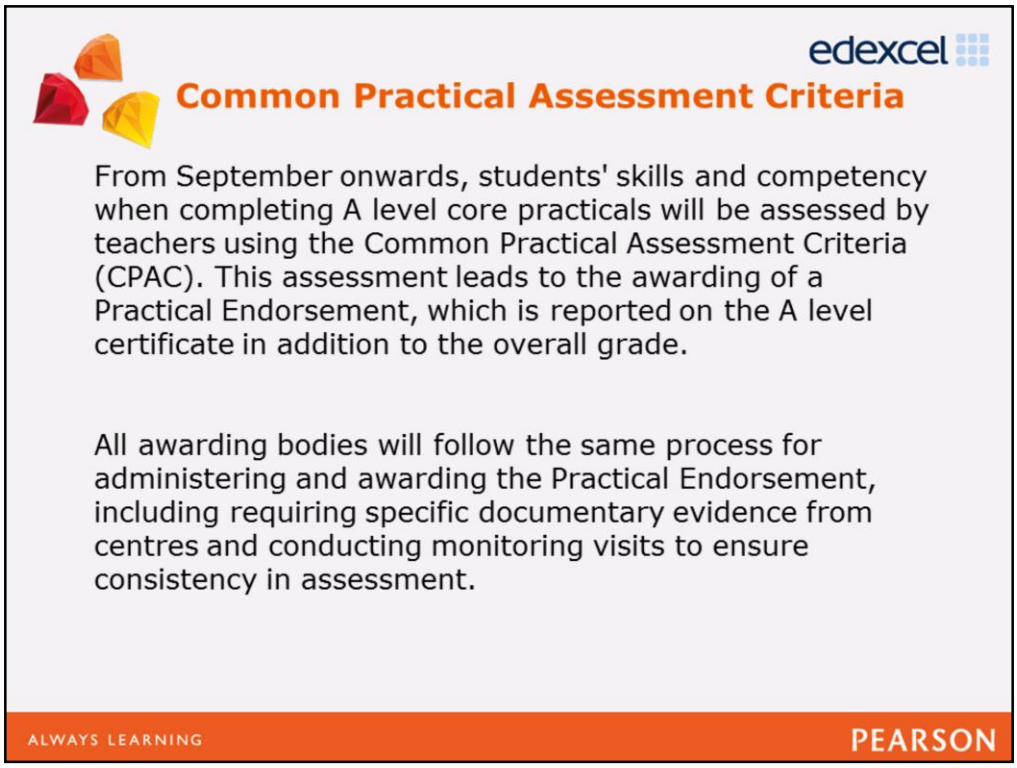
You might like to look at Activity 2.2 in the GRTT Delegate Booklet.



To make sure our courses can help your students become capable and confident chemists, we have put practical work at the heart of our specification. We have created many resources to help you and your students with each aspect of practical work – from planning and carrying out the experiment, to honing investigative skills.

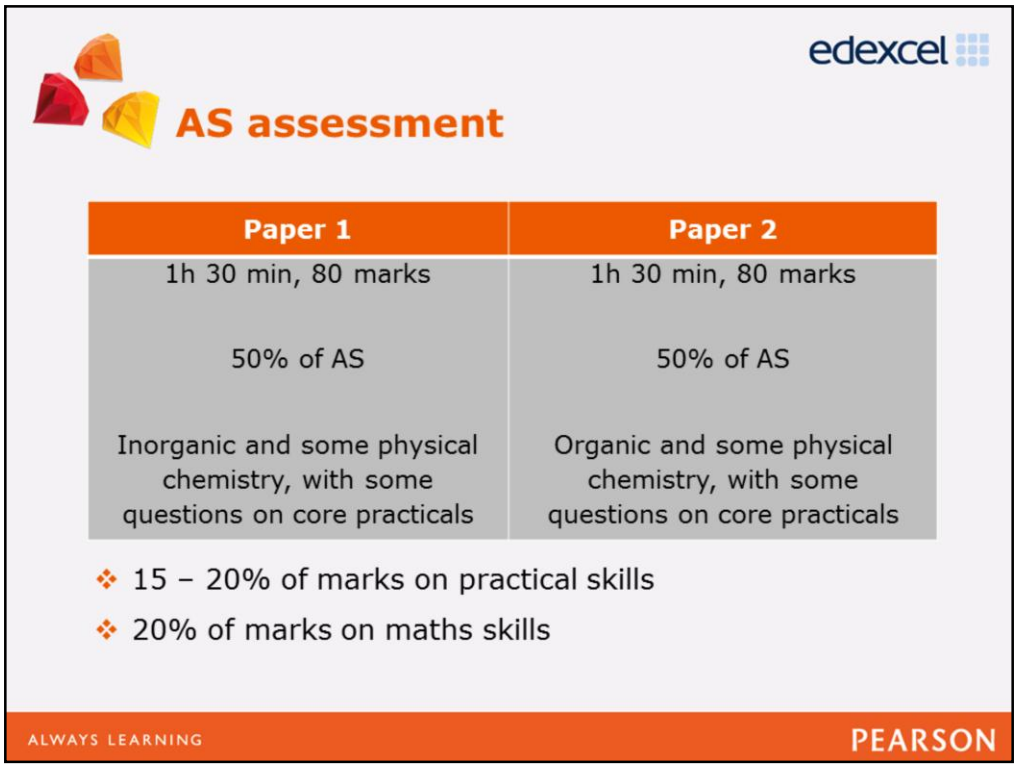
Mapping documents
These match the core practicals to the essential skills appendix in our specification.
Not only will they help you ensure that your students cover the required skills and techniques, but also highlight where you could replace or add a practical of your choice that develops the same skills.

Teacher, technician and student worksheets
These detail the procedure, apparatus and safety instructions for each core practical.



For more information read the letter sent to centres. This is available at:

http://qualifications.pearson.com/content/dam/pdf/News/A%20level%20news/Practical_Endorsement_Letter_June_2015.pdf



Paper 1 will examine the following topics:

- Topic 1: Atomic Structure and the Periodic Table
- Topic 2: Bonding and Structure
- Topic 3: Redox I
- Topic 4: Inorganic Chemistry and the Periodic Table
- Topic 5: Formulae, Equations and Amounts of Substance

Paper 2 will examine the following topics:

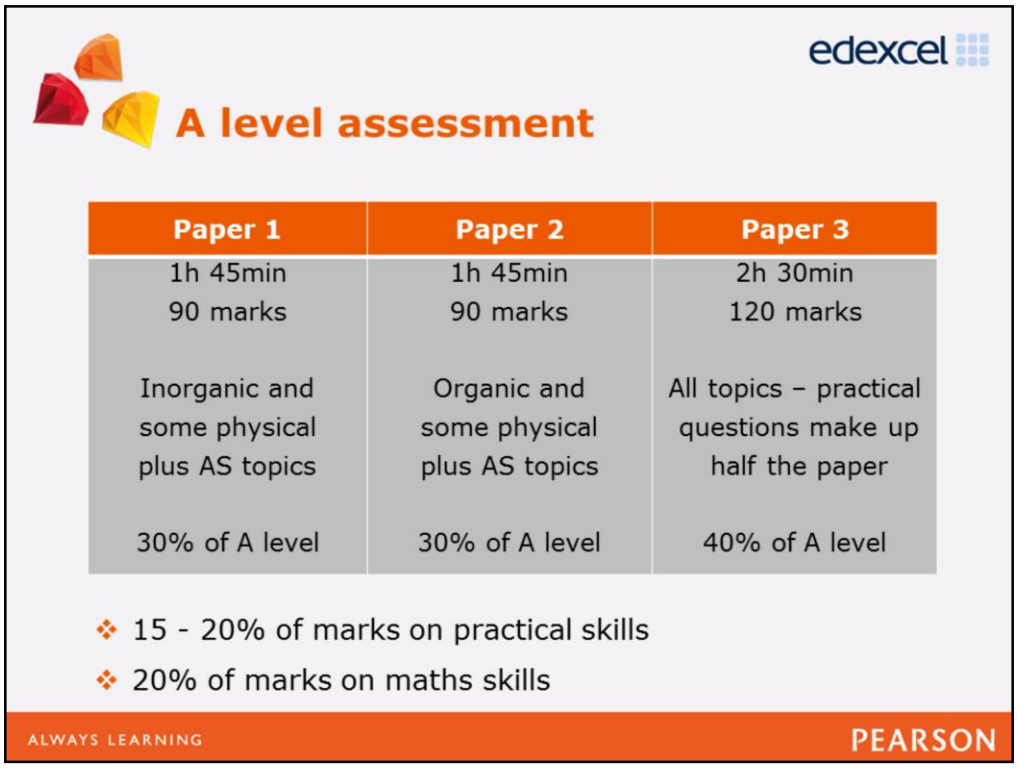
- Topic 2: Bonding and Structure
- Topic 5: Formulae, Equations and Amounts of Substance
- Topic 6: Organic Chemistry I
- Topic 7: Modern Analytical Techniques I
- Topic 8: Energetics I
- Topic 9: Kinetics I
- Topic 10: Equilibrium I

NOTE: Topics 2 and 5 will be examined on both papers.

Both papers will include questions that target mathematics at Level 2 or above

(see *Appendix 6: Mathematical skills and exemplifications).* Overall, a minimum of 20% of the marks across both papers will be awarded for mathematics at Level 2 or above.

Some questions will assess conceptual and theoretical understanding of experimental methods (see *Appendix 5: Working scientifically).*



Paper 1 will examine the following topics:

- Topic 1: Atomic Structure and the Periodic Table
- Topic 2: Bonding and Structure
- Topic 3: Redox I
- Topic 4: Inorganic Chemistry and the Periodic Table
- Topic 5: Formulae, Equations and Amounts of Substance
- Topic 8: Energetics II
- Topic 10: Equilibrium I
- Topic 11: Equilibrium II
- Topic 12: Acid-base Equilibria
- Topic 13: Energetics II
- Topic 14: Redox II
- Topic 15: Transition Metals

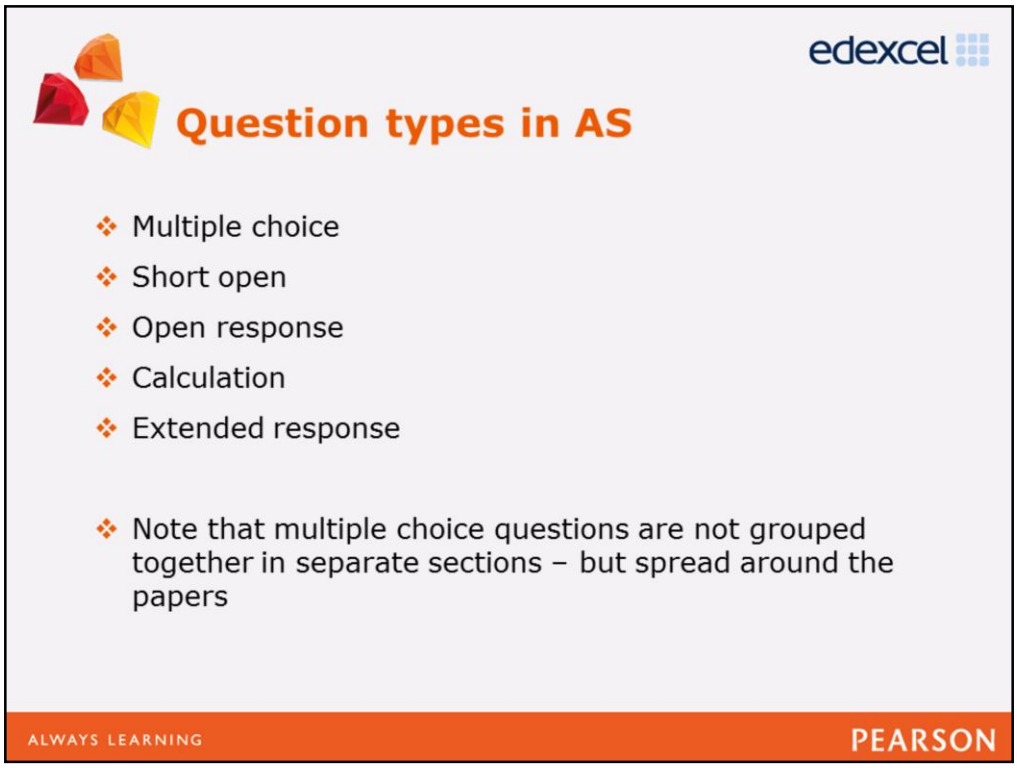
Paper 2 will examine the following topics:

- Topic 2: Bonding and Structure
- Topic 3: Redox I
- Topic 5: Formulae, Equations and Amounts of Substance

- Topic 6: Organic Chemistry I
- Topic 7: Modern Analytical Techniques I
- Topic 9: Kinetics I
- Topic 16: Kinetics II
- Topic 17: Organic Chemistry II
- Topic 18: Organic Chemistry III
- Topic 19: Modern Analytical Techniques II

NOTE: Topics 2, 3 and 5 will be examined in both papers 1 and 2

Paper 3 will examine all topics (1 – 19) from the specification.

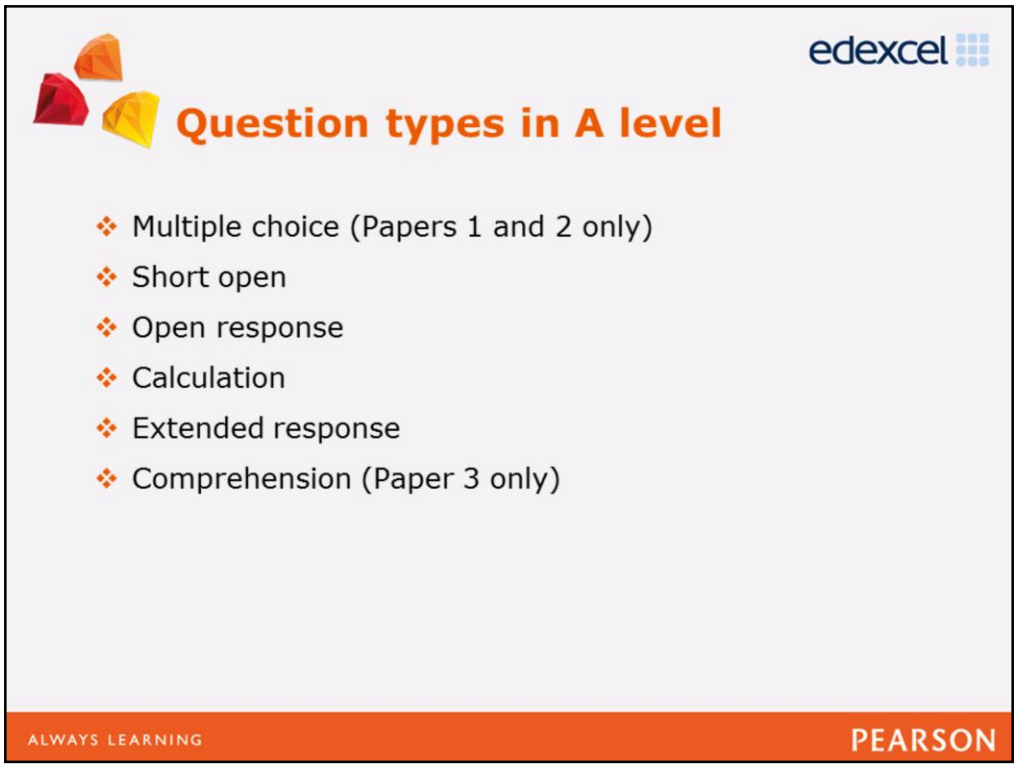


There will be 10 multiple choice questions in each paper.

Short open questions are usually worth 1 or 2 marks. Open response questions are usually worth 3 or 4 marks.

Calculations could be either scaffolded or unscaffolded.

Extended response questions will usually be worth 5 or 6 marks, or possibly even more. More about these types of questions later.



There will be 10 multiple choice questions in each of Papers 1 and 2, but none in Paper 3.

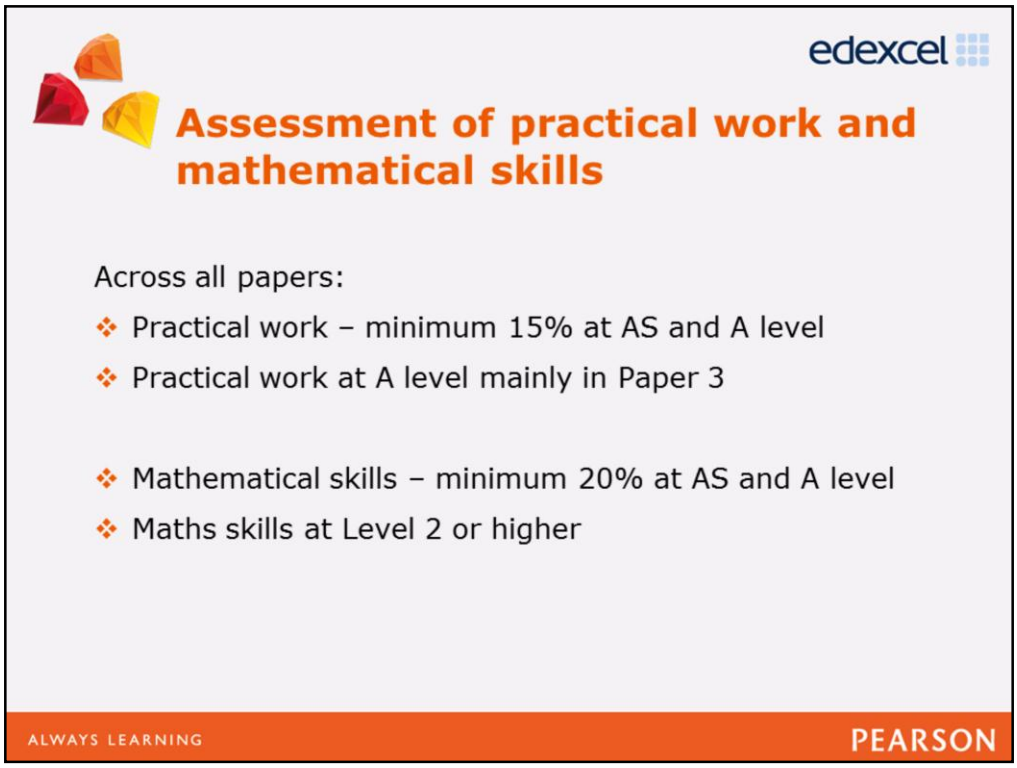
Short open questions are usually worth 1 or 2 marks. Open response questions are usually worth 3 or 4 marks.

Calculations are more likely to be unscaffolded A level, although there may be some scaffolded calculations targeted at AS.

Extended response questions will usually be worth 5 or 6 marks, or possibly even more. More about these types of questions later.

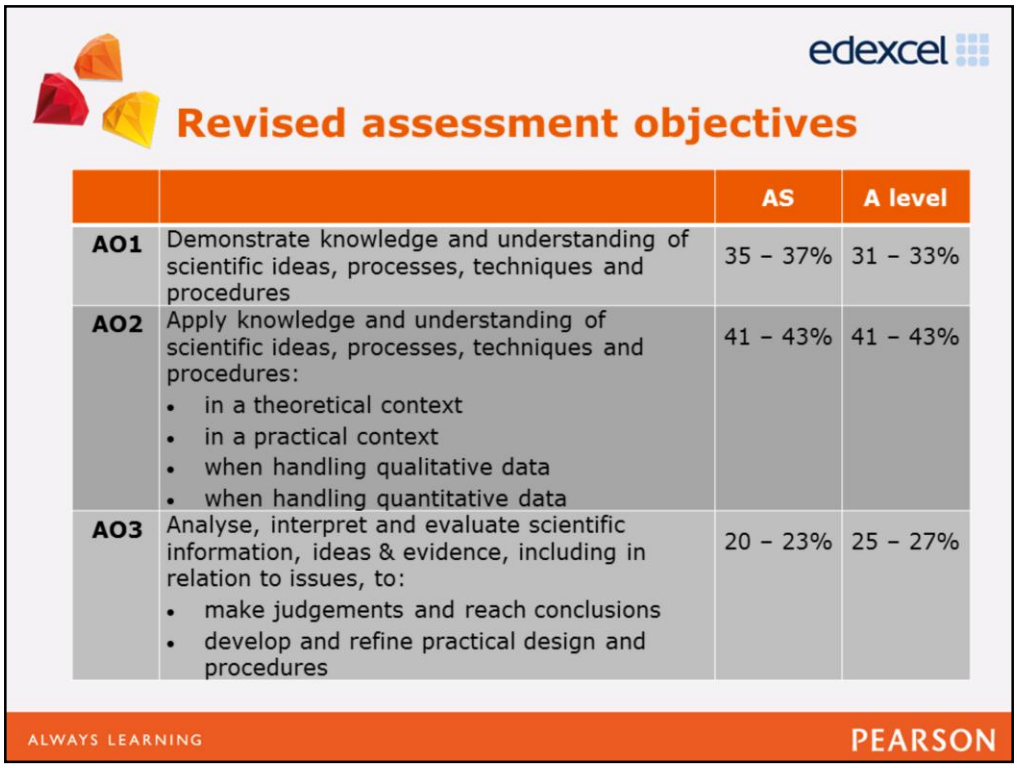
Activity 3.1 in the GRTT Delegate Booklet considers the demands of four multiple choice questions.

Activity 3.2 looks at the relative demands of scaffolded and unscaffolded questions.



Practical assessment has been dealt with earlier.

More about Level 2 maths later in this presentation.

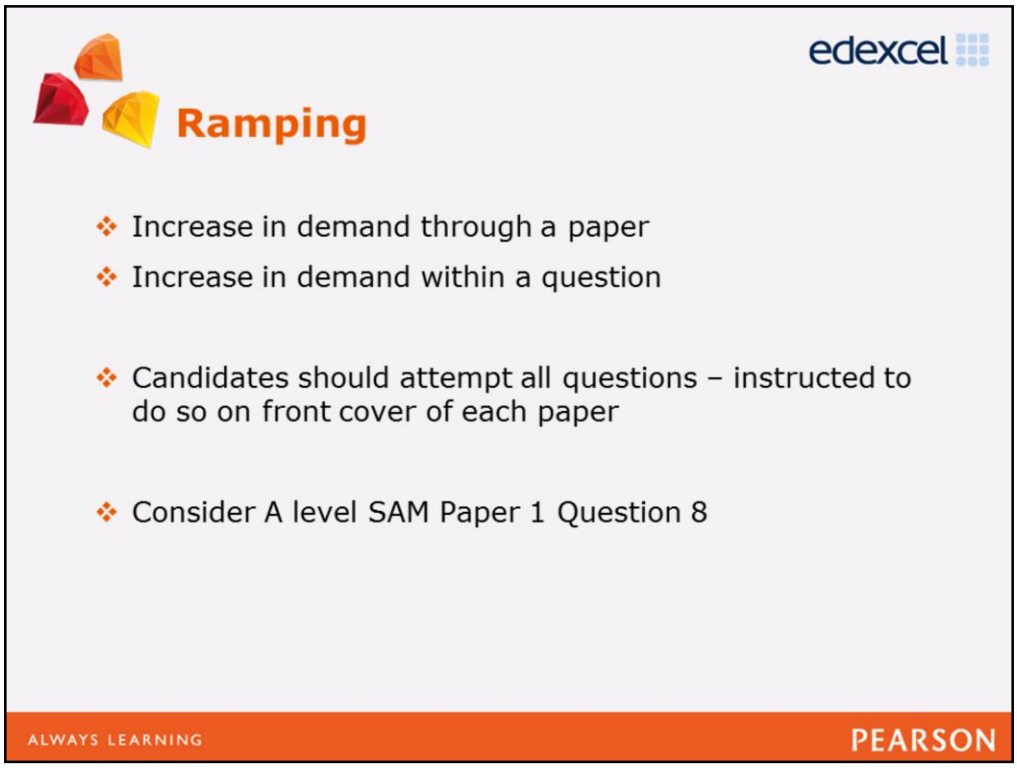


Comments on the changes:

- Percentages very little changed from current specification
- Percentages slightly different for AS and A level
- AO wording the same for both AS and A level
- AO1 now limited to 10% of total marks for recall
- AO1 and AO2 now also test practical work
- AO3 not limited to practical work (not HSW)

Note the lack of reference to How Science Works compared to current

specifications.



Purposes of ramping are:

1. to achieve a spread of marks that allows 6 grades (A* to F) to be awarded
2. to allow weaker candidates to attempt questions with confidence and to score marks

It is a good idea to encourage weaker candidates not to give up when questions later in the paper seem more difficult.

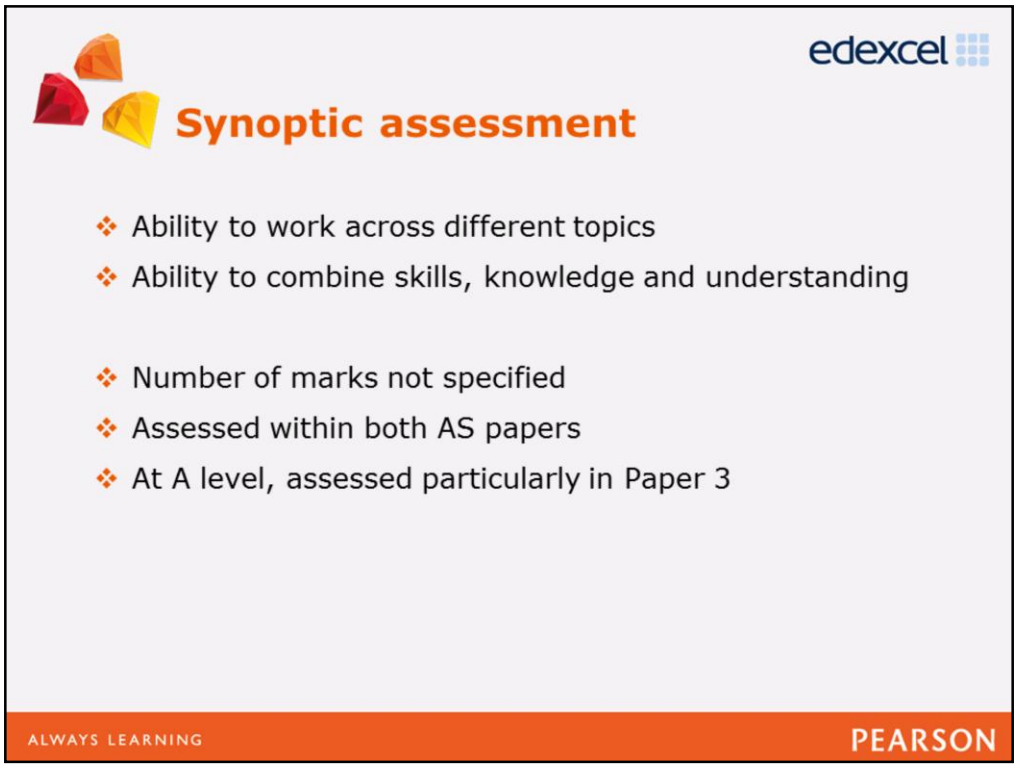
A good question to look at is in the A level SAMs: Paper 1, Question 8.

(a)– simple understanding of acid-base theory in a familiar situation

(b)(i) – understanding strong and weak acids

(b)(ii) – use of pH = -lg[H^+] rearranged ;not difficult after lots of calculator practice

(c) - more difficult multi-step calculation involving several pieces of numerical data



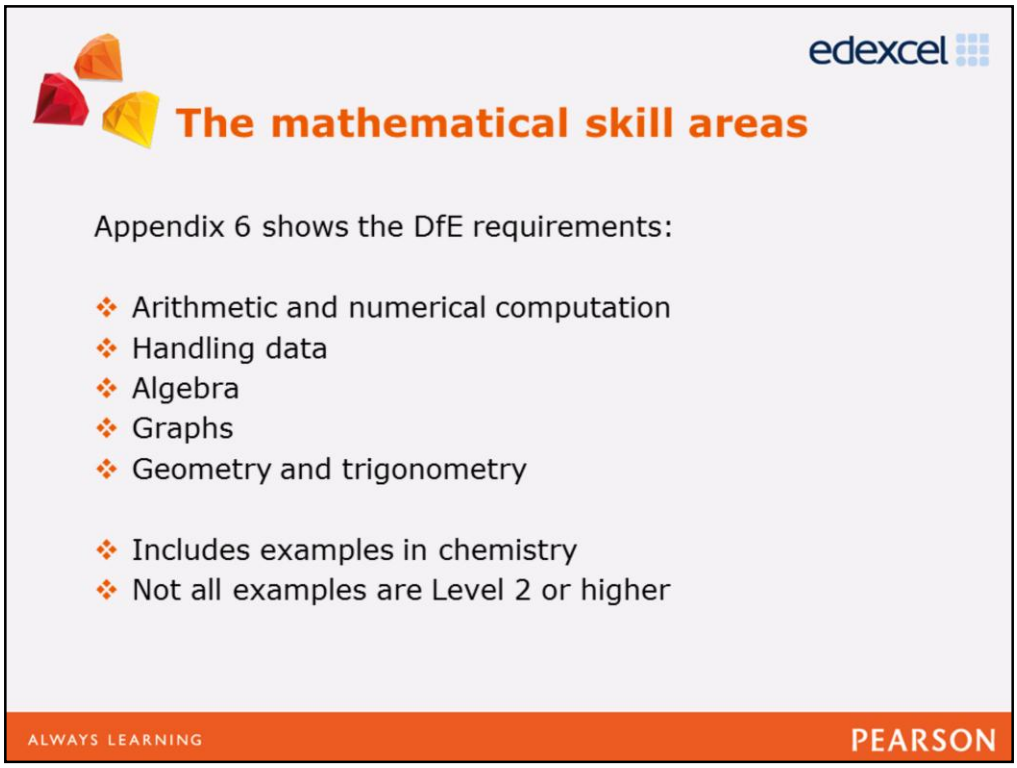
A good question to look at is in the A level SAMs: Paper 3, Question 8.

(a)(i) Requires knowledge of suitable apparatus (see appendix 5c, no 7)

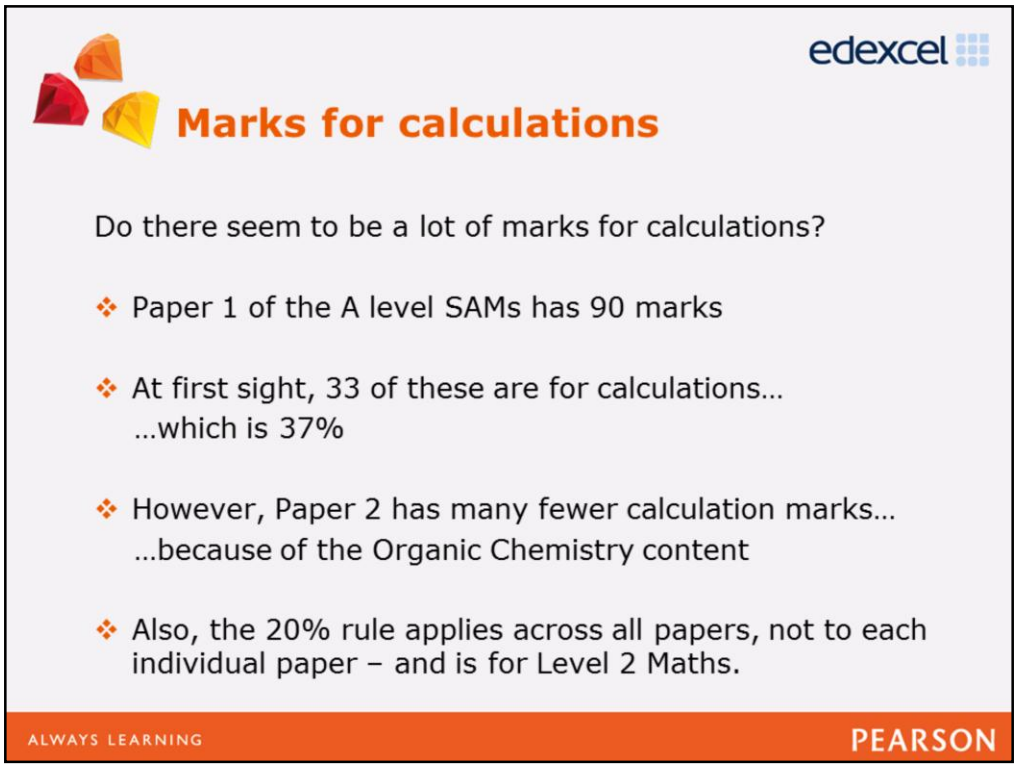
(a)(ii & iii) Drying - Topic 18C, spec. Point 22v

(b) Mass/volume/mole calculation of empirical formula – Topic 5, spec. points 5 & 7

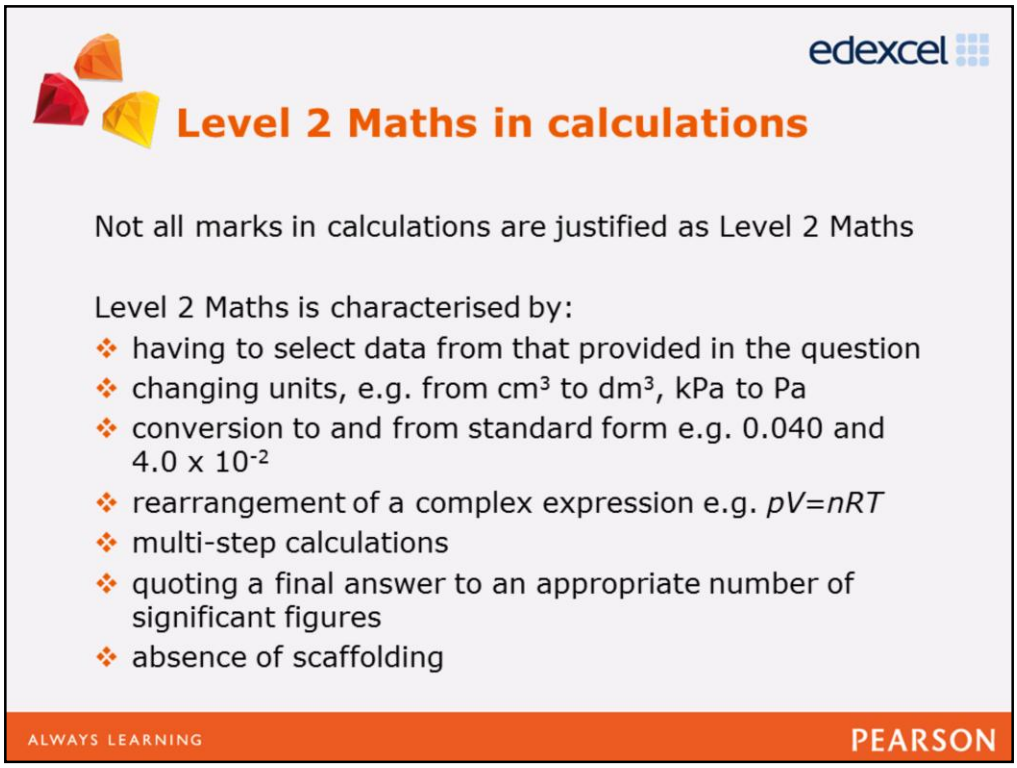
(c) Interpreting organic tests – Topic 6, spec. point 25 and Topic 17B, spec. point 8



There is more information on the mathematical skills in Appendix 6 (pages 85-89) in the A Level specification.



The same situation is likely to occur in the AS papers, since there is more scope to ask level 2 maths calculations on Paper 1 than on Paper 2.

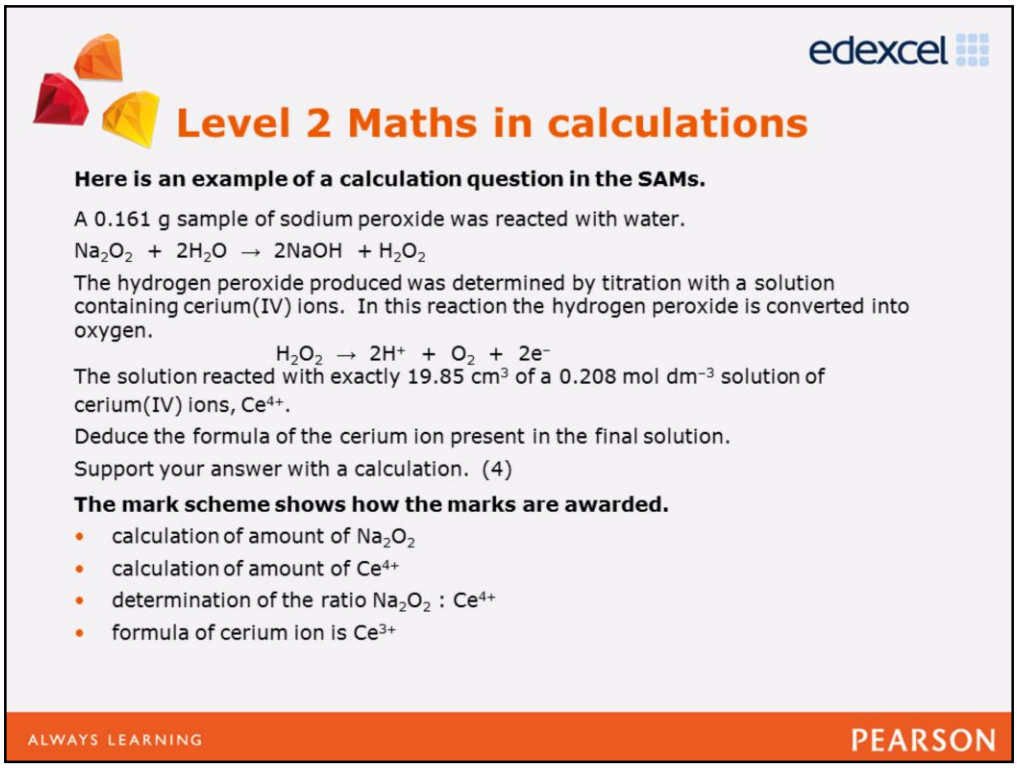


Some individual marks in calculations may not be Level 2 in isolation, but they might be if either:

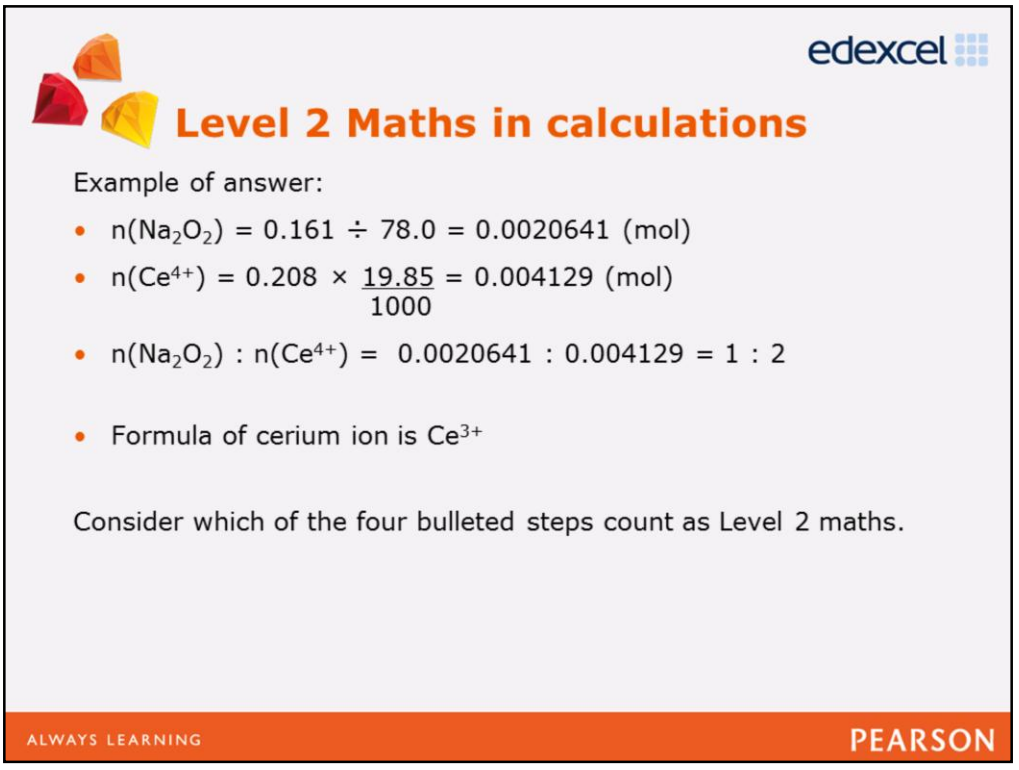
- there is repetition of a simple calculation for 1 mark – eg calculating an amount in moles for three substances

or

- the steps are part of a complex overall strategy



Look at Activity 3.3 in the GRTT Delegate Booklet.



It is not easy to be sure which marks in a given question are Level 2 maths because it depends on the context and the extent to which candidates need to consider a strategy. In this example, considering each mark in isolation:

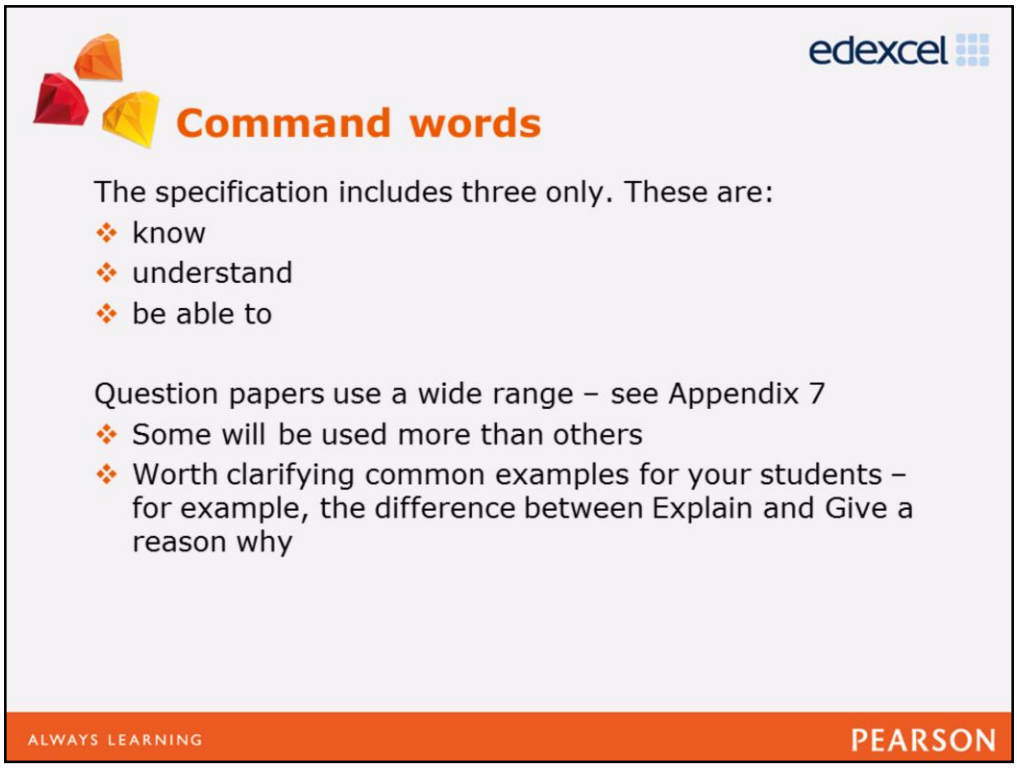
- 1st mark not L2M because it involves only substituting two numbers into a familiar expression and pressing the correct buttons on the calculator
- 2nd mark definitely L2M because of conversion of volume unit
- 3rd mark probably not L2M because of simple division of one number by another
- 4th mark not L2M because the maths needed is straightforward, even though the chemistry is challenging

The final step is chemically challenging but not mathematically demanding:

the equations show that $Na_2O_2 \equiv H_2O_2$ and $H_2O_2 \equiv 2e^-$ therefore as the electrons produced react with $2Ce^{4+}$ then each Ce^{4+} ion gains $1e^-$ so forms Ce^{3+} ion

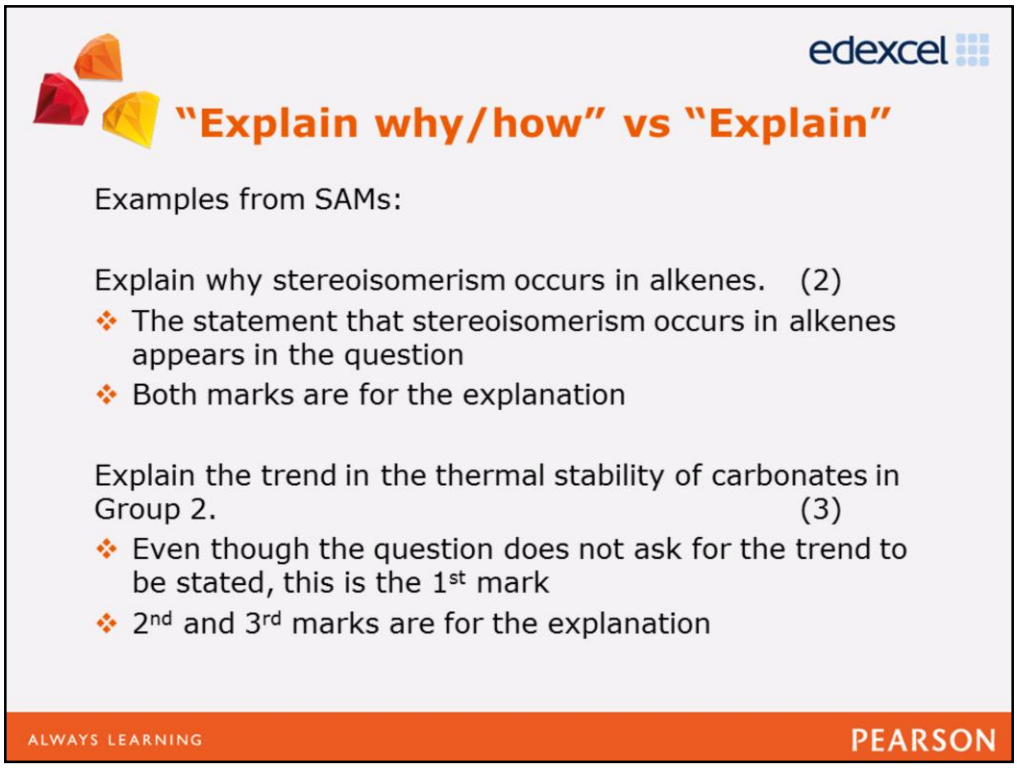
However, given the need for students to develop a multi-step complex strategy, it is likely that Ofqual would accept that more than the 2nd mark

as L2M



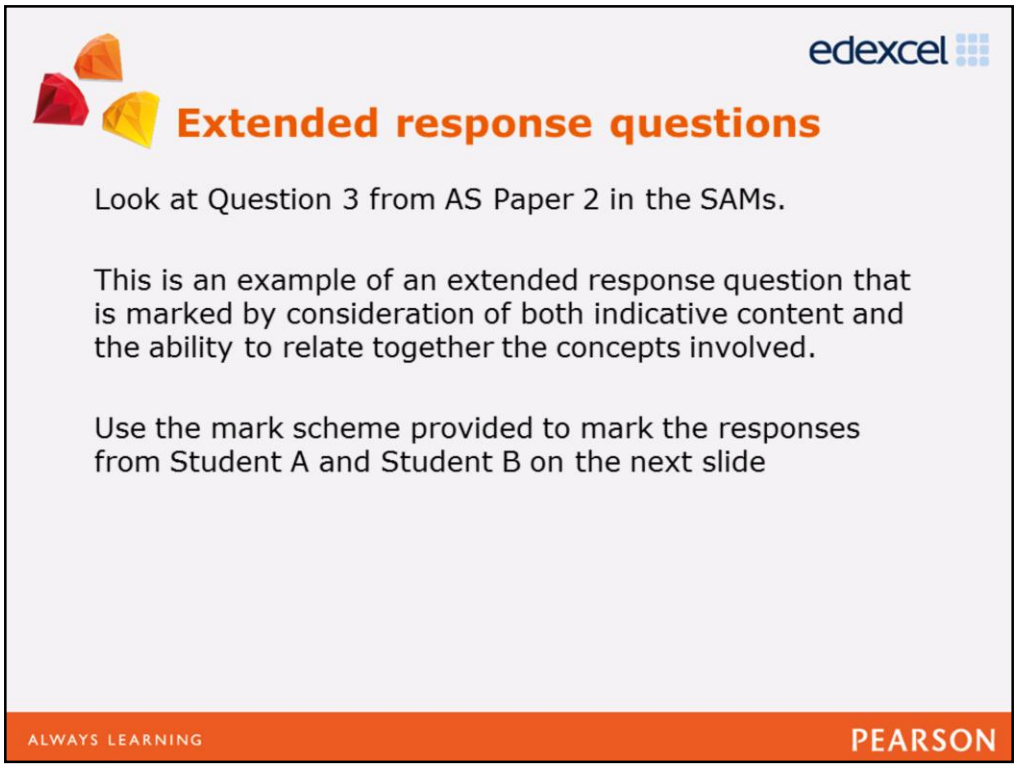
Some commands words are likely to appear very frequently, eg calculate, describe, explain, state

Some command words are likely to be used rarely, eg assess, criticise

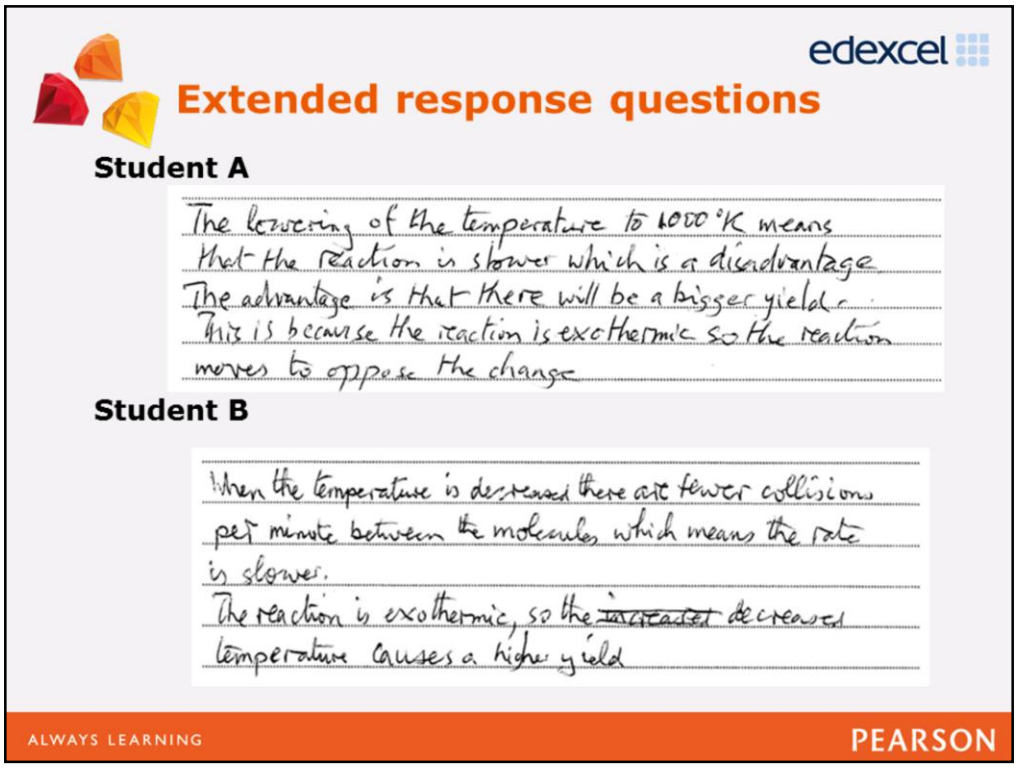


In the second example, in the current specification, the question might have included two command words (State and explain …), and these might have appeared as prompts on the answer lines.

NOTE: 'State and explain' are unlikely to be used in conjunction with one another in questions.



Look at Activity 3.4 in the GRTT Delegate Booklet



Sample Answer A

M1, M4 and M5 scored

3 indicative marking points = 2 marks

Structure/lines of reasoning marks:

M4 and M5 linked by 'because', but no linkage for reaction rate points

1 mark for structure/lines of reasoning

Total mark = 2 + 1 = 3

Sample Answer B

M1, M3, M4 and M5 scored

4 indicative marking points = 3 marks

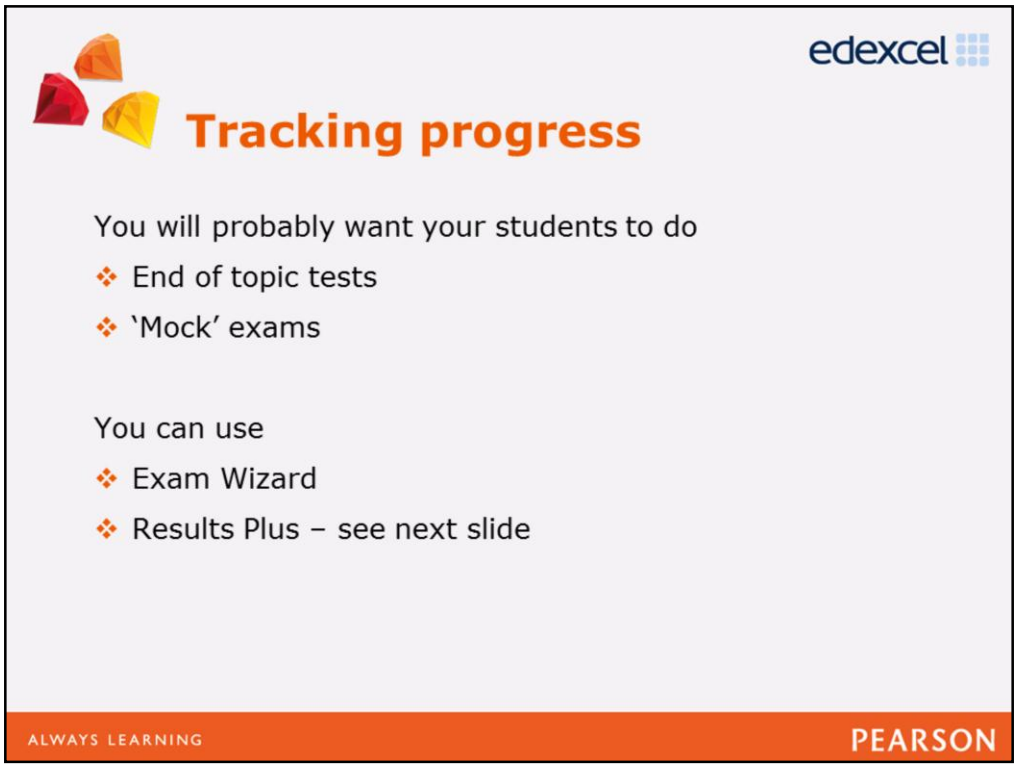
Structure/lines of reasoning marks:

M1 and M3 are linked

M4 and M5 are linked

2 marks for structure/lines of reasoning

Total mark = 3 + 2 = 5



You can find them via this link:

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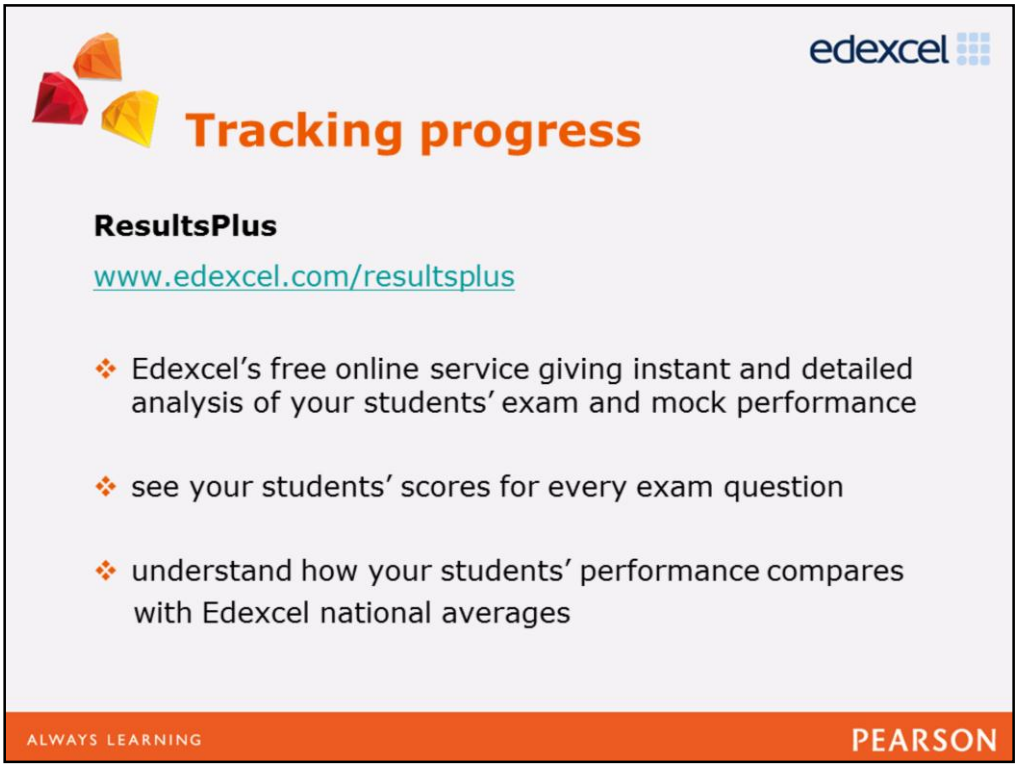

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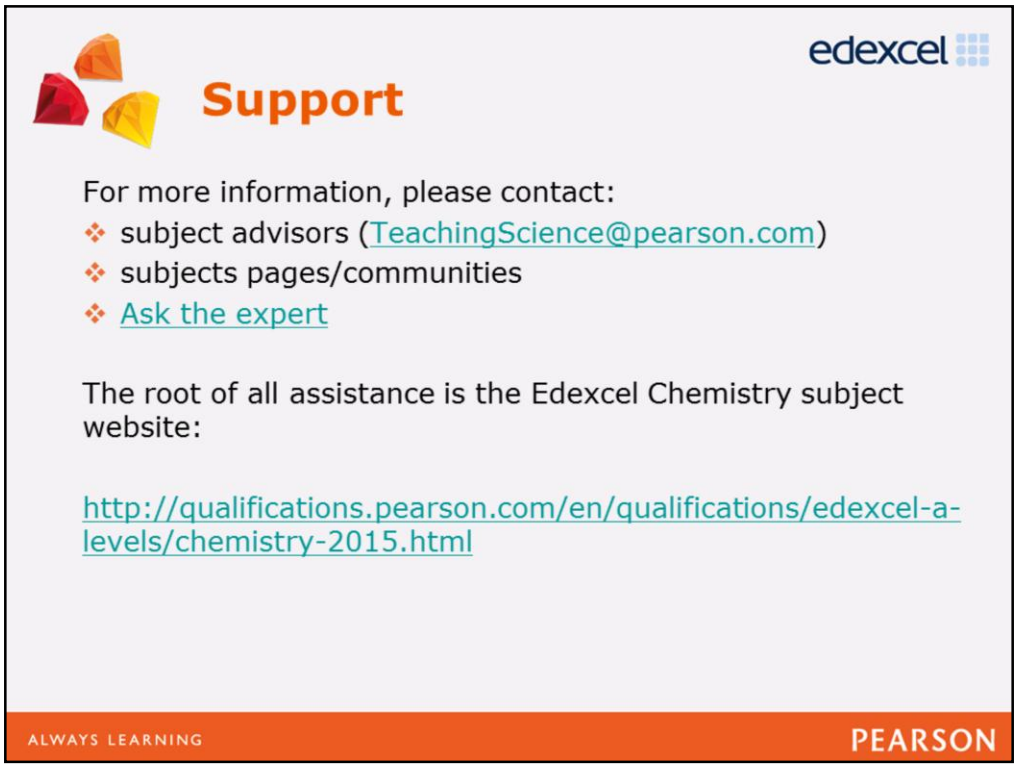
Here you can see your students' scores for every exam question and understand how your students' performance compares with Edexcel national averages.



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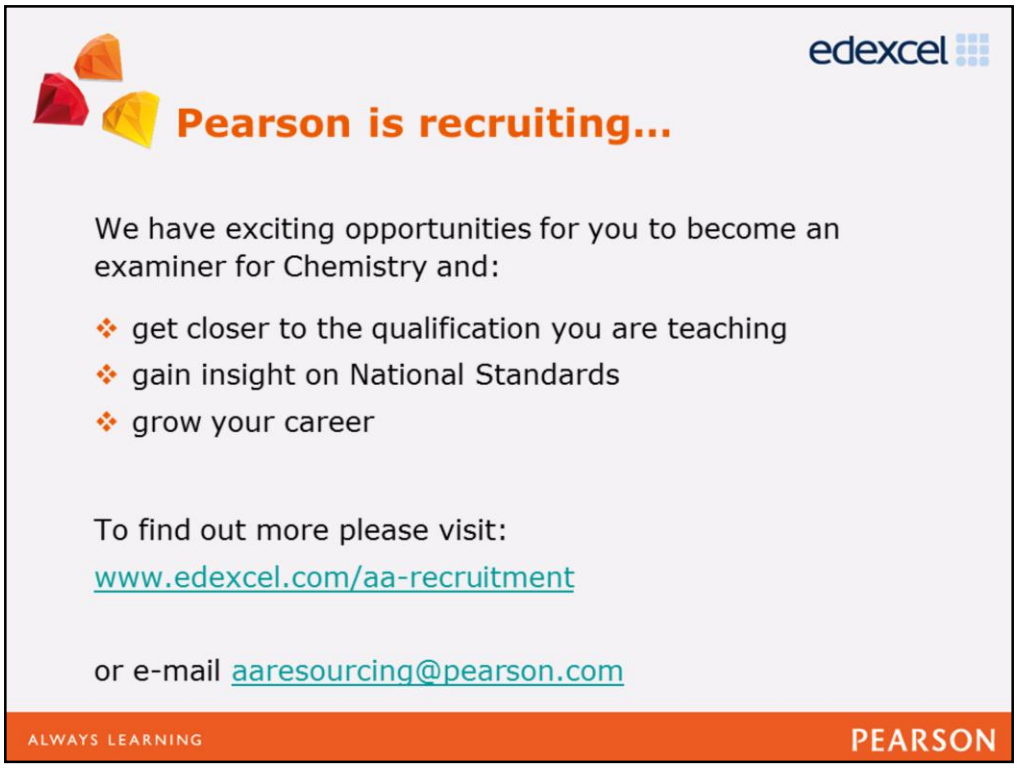

Applications are welcome form teachers regardless of the country in which you work, since the marking is carried out online.

You usually have to have a minimum of two years teaching experience before your application will be considered.