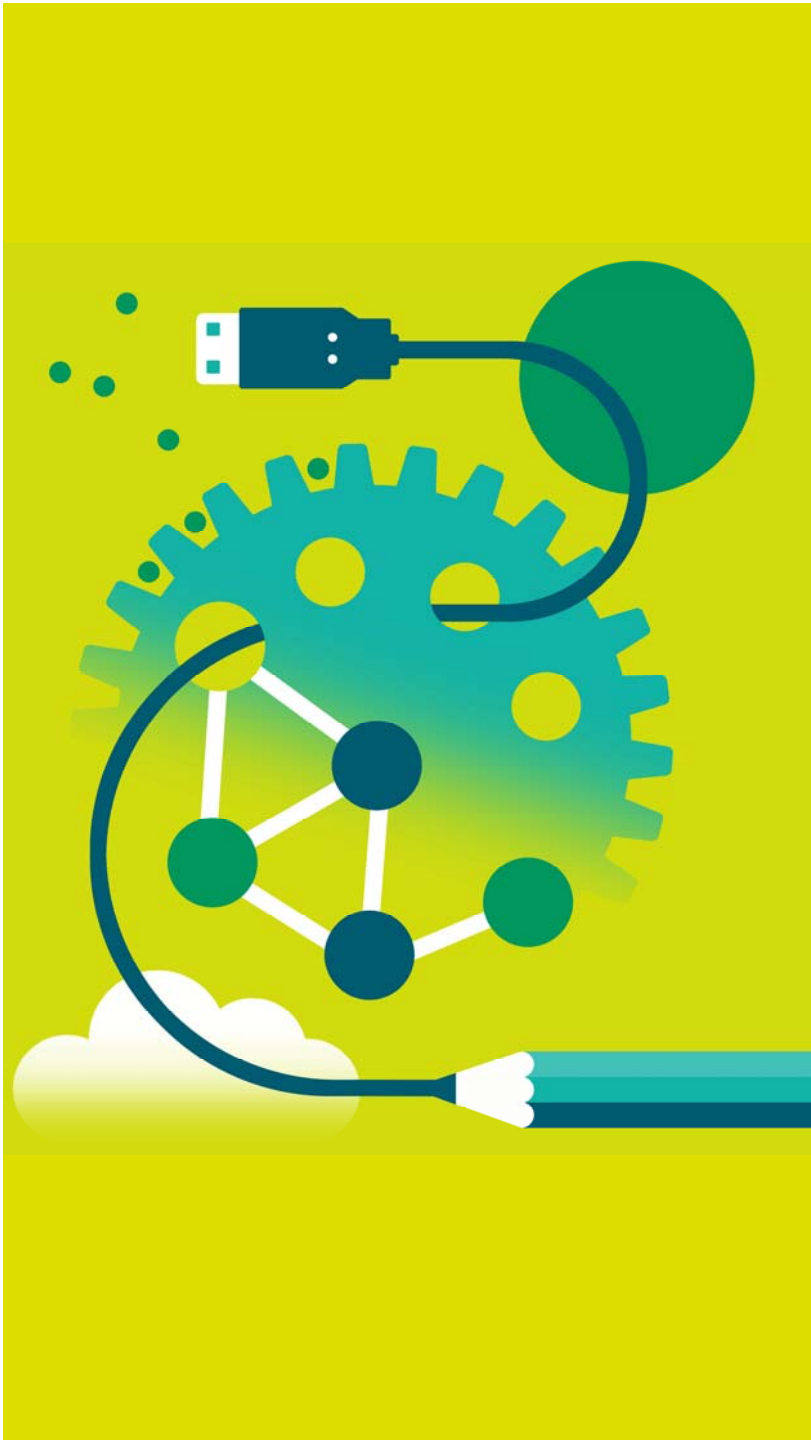




Pearson

INTERNATIONAL GCSE 2017 GETTING READY TO TEACH CHEMISTRY AND DOUBLE AWARD (CHEMISTRY)

16IOAS16



Your Online Environment

XX Technical Difficulties & Support

XX Recording

XX Communication in an online environment

XX Asking Questions

XX Using Polls

XX Downloading Documents

Today's Event

Online Date: (to be inserted)

Online Time: (to be inserted)

Presenter: (to be inserted)

Aims and Objectives

You will learn about

1. Specification content, structure and changes
2. Practical work, mathematical skills, command words
3. Assessment and grading
4. SAMs and exemplar student work
5. Support and published resources

Session Agenda

08:00 Technical introduction by Host

08:05 Welcome and introductions

08:10 Part 1 - new specification and changes

08:35 Part 2 - practical work, mathematical skills and command words

09:00 5-minute comfort break

09:05 Part 3 - new assessment model, examination question styles and
the new 9-1 grading scale

09:25 Part 4 - SAMs, student exemplar work, resources and support

09:55 Replies to questions

10:00 Finish

**Polls to get to know
the delegates.**

Part 1 of the presentation

In the next 25 minutes or so, we aim to cover:

- the new specification, including double and single award
- relevant dates
- additions, deletions and movements of content
- using questions from the old specification

Using the chat box (1)

- If you have questions or comments about what is covered in **Part 1** of the presentation (about the specification content and changes), do write them in the chat box
- I will then try to answer any questions at the end of this part
- Remember that we will be considering other aspects later in this presentation, including practical skills, mathematical skills, command words, examination papers and the new grading scale, so please save any questions on these until later

Our International GCSEs

Our International
GCSE Science
specifications

EXAM SERIES

January

May/June

BIOLOGY

CHEMISTRY

PHYSICS

SCIENCE (DOUBLE AWARD)

SCIENCE (SINGLE AWARD) - NEW!!

In addition, there is also an International GCSE in Human Biology

Overview of dates

SEPTEMBER 2016	SEPTEMBER 2017	MAY / JUNE 2018	MAY / JUNE 2019
<p>"LEGACY"</p> <p>Yr 10 / 4th Form continue with current specifications</p>	<p>"LEGACY"</p> <p>Yr 11 / 5th Form continue with current specifications</p>	<p>"LEGACY"</p> <p>Final summer exam series for Current specifications</p>	<p>"LEGACY"</p> <p>NO EXAMINATION SERIES FOR CURRENT SPECIFICATIONS</p>
<p>"NEW"</p> <p>Yr 9 / 3rd Form embark on new specifications</p>	<p>"NEW"</p> <p>All students* now being taught new specifications * except students being taught over 1 year</p>	<p>JANUARY 2019</p> <p>"LEGACY"</p> <p>Final resit series</p>	<p>"NEW"</p> <p>First exam series for new specifications</p>

Science (Double Award) – 4SDO

- The grouping of topics in a more logical way has led to more changes here than in separate sciences
- Students sit Paper 1 in Biology, Chemistry and Physics
- Students achieve two grades, based on performance across all three papers
- The two grades may be the same or different (9-9 is the highest, then 9-8, 8-8, 8-7, etc)
- Students may still progress to A level

Science (Single Award) – 4SSO

The features of this new qualification:

- Half the content of the Double Award specification
- Involves a 1-hour and 10-minute paper in each science
- Each paper has some questions common with the corresponding Double Award paper
- Students achieve a single grade, based on performance across all three papers
- Not intended for progression to A level

Key changes from 4CH0 to 4CH1

- Changes ensure comparability with reformed UK GCSE specifications
- Suitable preparation for progression to reformed UK and International A levels
- Content rearranged into 4 sections instead of 5
- Less Industrial Chemistry content (old section 5)
- More organic chemistry
- “Embedded” practicals (core practicals)
- Some changes in meanings of command words to achieve consistency across all new science specifications

Current Chemistry (4CH0) content summary

There are currently 5 sections:

Principles of Chemistry	Chemistry of the elements	Organic Chemistry	Physical Chemistry	Chemistry in Society
<ul style="list-style-type: none">▪ States▪ Atoms / structure▪ RFM/moles▪ Formulae & equations▪ Bonding▪ Electrolysis	<ul style="list-style-type: none">▪ Periodic table▪ Groups 1 & 7▪ Oxygen/oxides▪ H₂ & water▪ Reactivity series▪ Acids & salts▪ Tests for ions & gases	<ul style="list-style-type: none">▪ Introduction▪ Alkanes▪ Alkenes▪ Ethanol	<ul style="list-style-type: none">▪ Acids, alkalis, salts▪ Energetics▪ Rates▪ Equilibria	<ul style="list-style-type: none">▪ Extraction of metals▪ Crude oil▪ Synthetic polymers▪ Industrial manufacture

New Chemistry (4CH1) content summary

There are now 4 sections in the specification instead of 5

Principles of Chemistry

- States of matter
- Elements, compounds and mixtures
- Atomic structure
- Periodic Table
- Equations and calculations
- Bonding
- Electrolysis

Inorganic Chemistry

- Groups 1 & 7
- Reactivity series
- Gases in the atmosphere
- Metal extraction & uses
- Acids alkalis & titrations
- Salt preparation
- Chemical tests

Physical Chemistry

- Energetics
- Rates of reaction
- Reversible reactions and equilibria

Organic Chemistry

- Introduction
- Crude oil
- Alkanes
- Alkenes
- Alcohols
- Carboxylic acids
- Esters
- Polymers

Examples of additions

- Solubility and solubility curves
- Alloys
- Alcohols up to C_4 and oxidation using $K_2Cr_2O_7$
- Carboxylic acids – naming up to C_4 and reactions
- Esters

Examples of deletions

- Avogadro number
- Faraday calculations
- Lab preparations of oxygen and carbon dioxide
- Properties and uses of carbon dioxide
- Details of industrial processes, eg extraction of metals, manufacture of ammonia and sulfuric acid, **electrolysis of brine**

Examples of moves from DA

- Calculations involving titrations and gas volumes
- Metallic bonding
- Electrolysis
- Preparation of soluble salts by titration
- Preparation of insoluble salts by precipitation

Using questions from 4CH0

You will probably want to use questions from past 4CH0 papers when helping your students with revision

Look at the question that was sent to you in a download, together with the mark scheme and relevant 4CH1 specification statements

Would you use this question with your students

- 1 with no changes
- 2 not at all
- 3 with some changes?

Take a few minutes to consider these options – please write down your thoughts

You will then be asked to make your choice from 1, 2 or 3 above

Any questions so far?

- I will try to answer any questions you have about what we have covered in **Part 1** – the specification content and changes
- Remember that we will be considering other aspects later in this session, including practical skills, mathematical skills, command words, examination papers and the new grading scale

Part 2 of the presentation

In the next 25 minutes or so, we aim to cover:

- assessment of practical work
- mathematical skills
- command words

Using the chat box (2)

- If you have questions or comments about what is covered in **Part 2** of the presentation (about practical work, maths skills and command words), do write them in the chat box
- I will then try to answer any questions at the end of this part

Definitions of practical terms

- There has been much confusion about the meanings of some scientific terms used in practical work
 - eg accuracy and precision are often confused
 - many do not understand the difference between reliability, repeatability and reproducibility
- At GCSE level it isn't always appropriate to make fine distinctions between all such terms
- There is a definitions document, but this is being revised to clarify the meanings of the terms that we expect International GCSE science students to be familiar with

Practicals in the specification

- The specification includes embedded (core) practicals
- It also includes a list of experimental skills that students are expected to acquire
- Further suggestions for practical work appear in **Appendix 6** of the specification
- Questions on exam papers test practical skills, rather than recall of specific techniques – so they may be in the context of any practical activity

Embedded practicals

- do students have to do them?

- The simple answer is no - but it needs to be remembered that some examination questions assume that students have detailed knowledge of practical techniques
- There is evidence that students perform better in written examinations when they have had more direct experience of practical work
- Ideally, students would carry out all the embedded practicals, either individually, or in pairs, or in small groups
- If this is not possible, then less good alternatives would be teacher demonstrations, or watching suitable video clips

Examples of Embedded Practicals

- There are 8 embedded practicals for Chemistry and Double Award students, for example:

1.13 *practical: investigate paper chromatography using inks/food colourings*

- There are another 4 embedded practicals only for Chemistry students (giving a total of 12), for example:

1.7C *practical: investigate the solubility of a solid in water at a specific temperature*

- Note the C and bold type for Chemistry only

Experimental skills

These are listed on p28 of the specification

Examples of what may be tested in written papers::

- devise and plan investigations, using scientific knowledge and understanding when selecting appropriate techniques
- identify independent, dependent and control variables

Polls about Practical Work

Developing practical skills

Students should be familiar with a range of laboratory apparatus and its use, including the reading of scales.

1

Students should be able to plan an experiment and control variables, to collect and record data in a table, and to plot appropriate graphs with lines of best fit.

2

Students should be able to process and analyse data, to identify and account for anomalies, to evaluate data and methods, and to justify a conclusion.

3

Guidance will be provided on the use of terminology within practical and experimental work.

4

Practical skills in examinations

Students may be tested on their ability to:

Describe and plan experiments

Draw conclusions which are consistent with the evidence, using scientific knowledge and understanding

Describe safe and appropriate practical techniques

Communicate findings from experimental activities using appropriate vocabulary, calculations and graphs

Analyse and interpret data from experimental activities

Evaluate data and methods

Mathematical skills

- The development and use of relevant mathematical skills is important for progression in science subjects
- A list of mathematical skills that should be developed appears in **Appendix 4** of the specification (these are the same skills as for the reformed UK GCSEs)
- These skills will be tested in question papers within the context of the particular science
- Marks awarded for mathematical skills will be approximately 10% in Biology, 20% in Chemistry, 30% in Physics

Mathematical skills - categories

There are 5 categories of mathematical skills:

- 1 Arithmetical and numerical computation
- 2 Handling data
- 3 Algebra
- 4 Graphs
- 5 Geometry and trigonometry (does not apply to chemistry)

Mathematical skills - examples

These appear in Appendix 4 of the specification:

		B	C	P
1	Arithmetic and numerical computation			
A	Recognise and use numbers in decimal form	✓	✓	✓
B	Recognise and use numbers in standard form	✓	✓	✓
C	Use ratios, fractions, percentages, powers and roots	✓	✓	✓
D	Make estimates of the results of simple calculations, without using a calculator	✓		✓
E	Use calculators to handle $\sin x$ and $\sin^{-1} x$, where x is expressed in degrees			✓

Note that not all skills are used in all the sciences

Command words

- All our qualifications in science now use command words with a common meaning
- The list of command words used in external assessments appears in **Appendix 5** of the specification
- Students should expect to see many different command words in questions – they will reflect the range of demand in the exam paper

Command words – describe or explain?

These two command words are often used in questions, but sometimes students are not clear about the differences between them

Describe	To give an account of something. Statements in the response need to be developed, as they are often linked but do not need to include a justification or reason.
Explain	An explanation requires a justification/exemplification of a point. The answer must contain some element of reasoning/justification – this can include mathematical explanations.

Note that dual commands are no longer used in questions – so ‘Explain’ may sometimes have the same meaning as ‘State and explain’

Command words – explain a statement that is given

Question

Explain why the use of a catalyst has no effect on the position of equilibrium in a reversible reaction. (2 marks)

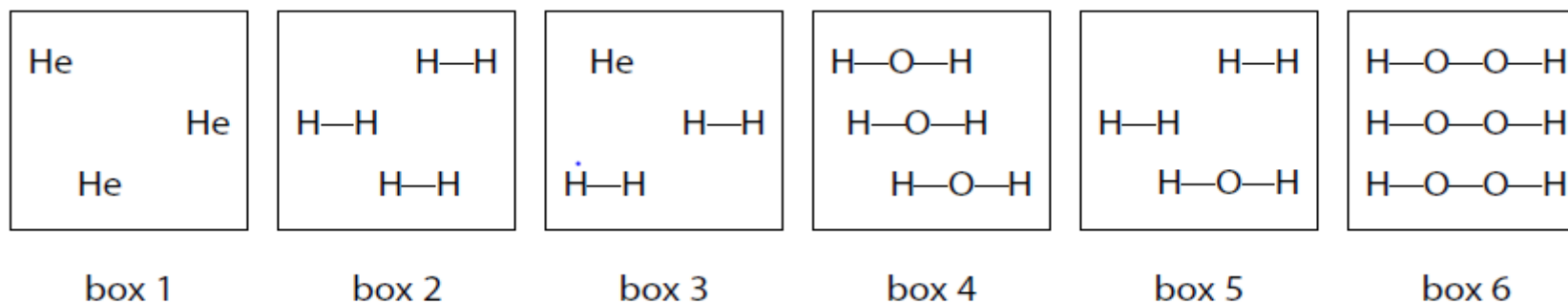
Comment

Note that the students are told that the catalyst has no effect, so the 2 marks are for explaining why it has no effect

Command words – explain something that must first be stated

Question

- (a) Each of the boxes in the diagram represents either an element, a compound or a mixture.



- (i) Explain which **two** boxes represent an element.

(2)

Comment

The first mark is for identifying the two boxes, and the second mark is for giving the reason.

Any questions so far?

I will try to answer any questions you have about what we have covered in **Part 2** – practical work, mathematical skills and command words

Part 3 of the presentation

In the next 20 minutes or so, we aim to cover:

- the new assessment model
- the style of the written papers
- the new 9-1 grading scale

Using the chat box (3)

- If you have questions or comments about what is covered in **Part 3** of the presentation (about the new assessment model, examination paper styles and the new 9-1 grading scale), do write them in the chat box
- I will then try to answer any questions at the end of this part

Summary of assessment

FAMILIAR ...

100% external assessment – with no coursework

Linear assessment – all exams taken in the same exam session

Variety of question types – all marked with 'points-based' mark schemes

Single tier of entry – no foundation or higher

... AND NEW

Questions using maths skills:
10% in Bio
20% in Chem
30% in Phys

Each paper will have some longer questions (4 – 6 marks)

Assessment objectives

AO1

Knowledge and understanding of chemistry

~ 40%
of total marks

AO2

Application of knowledge and understanding, analysis and evaluation of chemistry

~ 40%
of total marks

AO3

Experimental skills, analysis and evaluation of data and methods in chemistry

~ 20%
of total marks

Assessment structure

There will be two examination papers:

Paper 1

Two hours; 110 marks

Paper 2

One hour and 15 minutes; 70 marks

Both papers will contain
a mixture of AO1,
AO2 and AO3

The AO3 questions
are likely to be in a
practical context

Both papers have similar question types

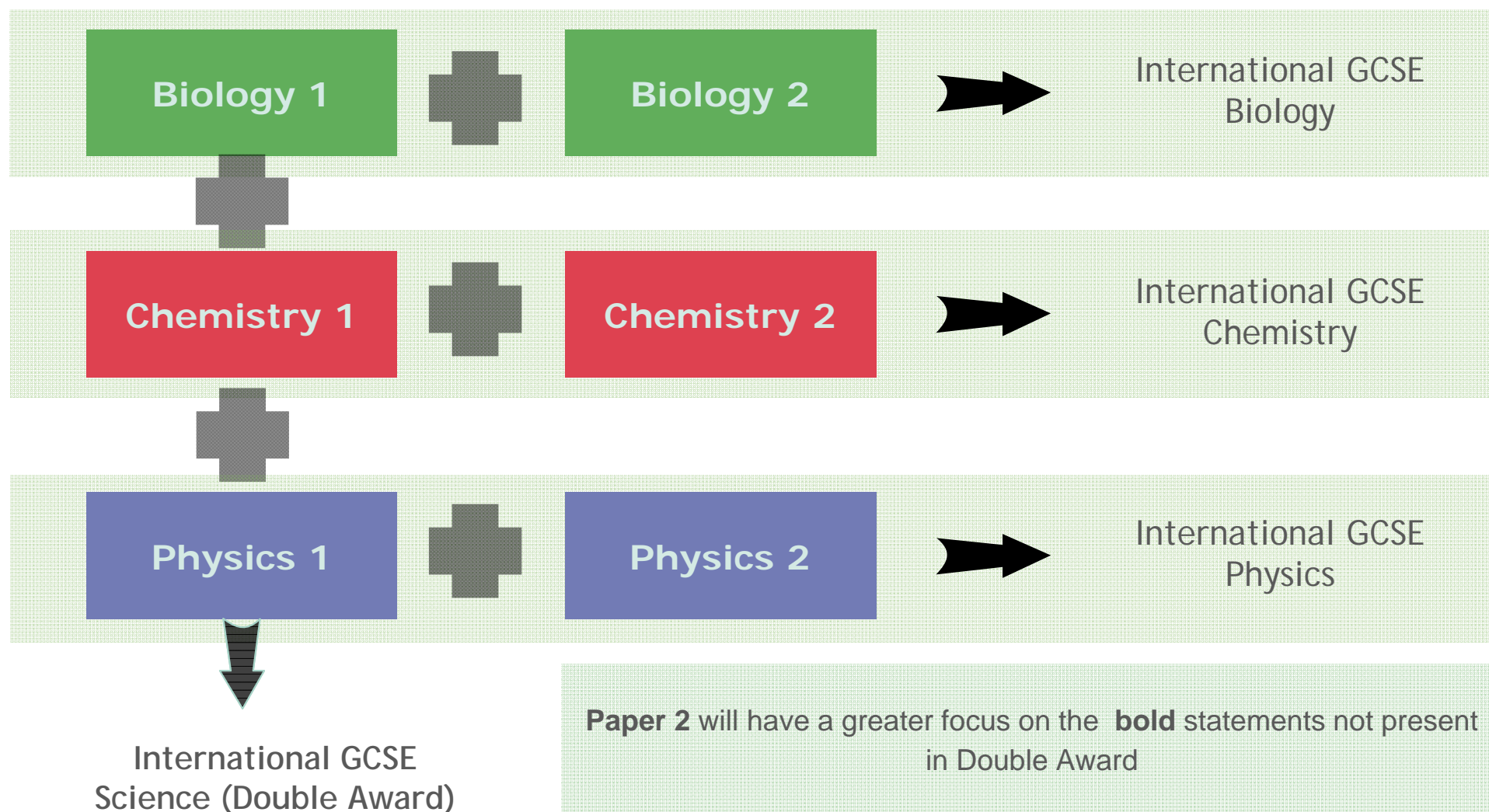
Assessment content

Paper 1

will **NOT** include the specification statements printed in **BOLD**

Paper 2

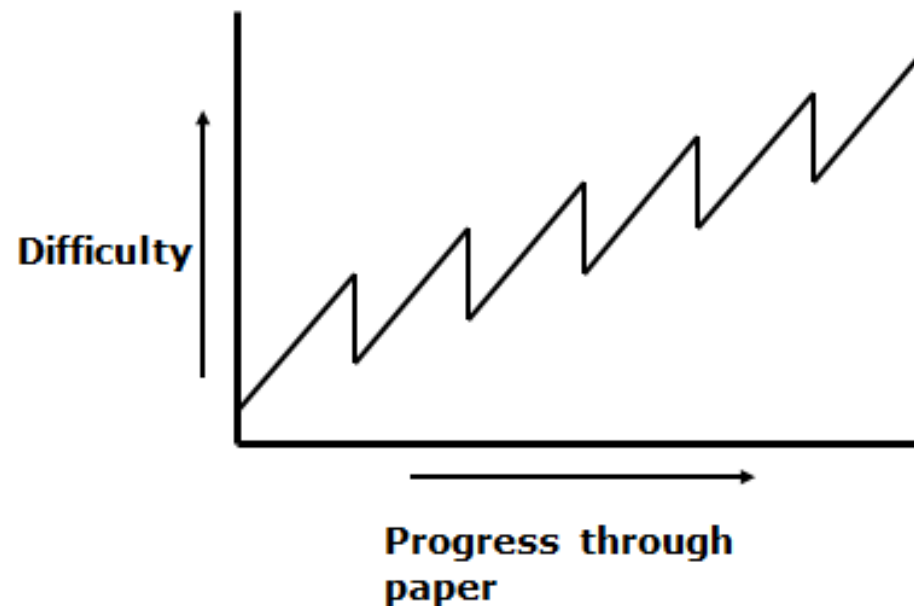
includes **ALL** the specification statements,
including those printed in **BOLD**



An ideal incline of difficulty

Where possible:

- . Increase in difficulty within each question
- . Increase in difficulty from first question to last question



Exam question styles

The question styles are similar to that of the existing International GCSE:

A small number of multiple choice questions

Short answer responses, usually worth 1 – 3 marks

Longer answer questions, up to 6 marks

All questions are **compulsory** and may cover **practical** situations as well as **areas** of theory

The new 9-1 grading scale

Broadly the same proportion of students will achieve a grade 4 and above as currently achieve a grade C and above

Broadly the same proportion of students will achieve a grade 7 and above as currently achieve a grade A and A*

The bottom of grade 1 will be aligned with the bottom of grade G

New grading structure	Current grading structure
9	A*
8	
7	
6	B
5	
4	C
3	D
2	E
1	F
	G
U	U

GOOD PASS (DfE)

5 and above = top of C and above

AWARDING

4 and above = bottom of C and above

Grade 9

- . Originally intended to be “the top 20% of those scoring Grade 7”
- . However, this way of finding Grade 9 has been changed, as this method is not fair on students in subjects with skewed distributions
- . New method of working out Grade 9 will be:

Proportion of Grade 7 students who will be awarded Grade 9

$$= (\% \text{ of students who achieved Grade 7} \div 2) + 7\%$$

Grade 9 – an example

- An exam is sat by 12 000 students
- The grade boundaries are set – and 6 000 students achieve Grade 7 or higher

How many students get a Grade 9?

- 50% of the students have achieved a Grade 7
- So, $(50 \div 2) + 7 = 32\%$ **of the Grade 7 students** will get a Grade 9
- 32% of 6 000 students = 1 920 students achieving Grade 9

Any questions so far?

I will try to answer any questions you have about what we have covered in **Part 3** – the new assessment model, the style of the question papers and the new 9-1 grading scale

Part 4 of the presentation

In the next 30 minutes or so, we aim to cover:

- using the SAMs (sample assessment materials)
- the various types of support available
- published resources and free online resources

Using the chat box (4)

- If you have questions or comments about what is covered in **Part 4** of the presentation (about the SAMs and available resources), do write them in the chat box
- I will then try to answer any questions at the end of this part

International GCSE Chemistry SAMs

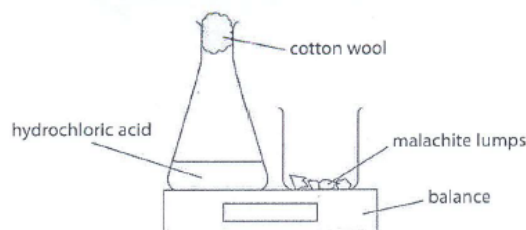
- You can all access the SAMs (including mark schemes) through the Pearson website
- But none of us know how these questions will perform in a real examination
- However, some students have volunteered to answer some of the questions in the SAMs
- Their answers are very useful in informing us of any problems with the questions, or issues to do with their understanding of the topics being tested

Sample answer to SAMs question

The copper(II) carbonate in the mineral, malachite, reacts with hydrochloric acid according to this equation.



Some students investigate the effect of changing the concentration of acid on the rate of this reaction. The diagram shows the apparatus they use.



This is the method they use:

- set the balance to zero
- add an excess of malachite lumps to the conical flask and replace the cotton wool
- start a timer and record the balance reading after one minute.

The experiment is repeated using different concentrations of hydrochloric acid. The mass and number of malachite lumps are kept the same in each experiment.

(a) The table shows the results obtained in one series of experiments.

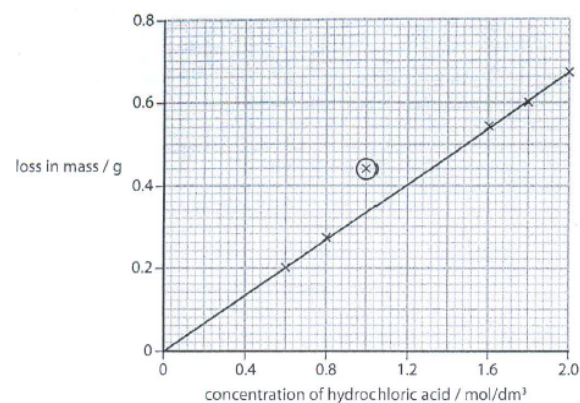
concentration of hydrochloric acid / mol/dm ³	0.6	0.8	1.0	1.6	1.8	2.0
balance reading / g	-0.20	-0.27	-0.44	-0.54	-0.60	-0.67

State why the balance readings have negative values.

(1)

To show that the mass decreases.

(b) The graph shows the results of this series of experiments.



The circled point indicates an anomalous result.

(i) Suggest **one** mistake the students could have made to produce this result.

(1)

Concentration Timer started quickly.

(ii) State the relationship shown by the graph.

(1)

As the concentration of HCl increases the loss in mass also increases.

(c) Explain why an increase in the concentration of the acid causes an increase in the rate of the reaction. You should use the particle collision theory in your answer.

(2)

Increasing concentrations will increase the number of particles. These particles would now collide more frequently so the number of collisions increase and therefore increasing the rate of reaction.

Mark scheme for SAMs question

Question number	Answer	Mark
8(a)	One reaction product is a gas and so escapes from the flask	1

Question number	Answer	Mark
8(b)(i)	Any one of: <ul style="list-style-type: none"> balance reading recorded too late acid concentration greater than recorded 	1

Question number	Answer	Mark
8(b)(ii)	Loss in mass directly proportional to acid concentration	1

Question number	Answer	Additional guidance	Mark
8(c)	An explanation that makes reference to the following two points: <ul style="list-style-type: none"> more particles in the same volume (1) so collide more frequently (with malachite) (1) 	accept particles closer together	2

Examiner comment on answer

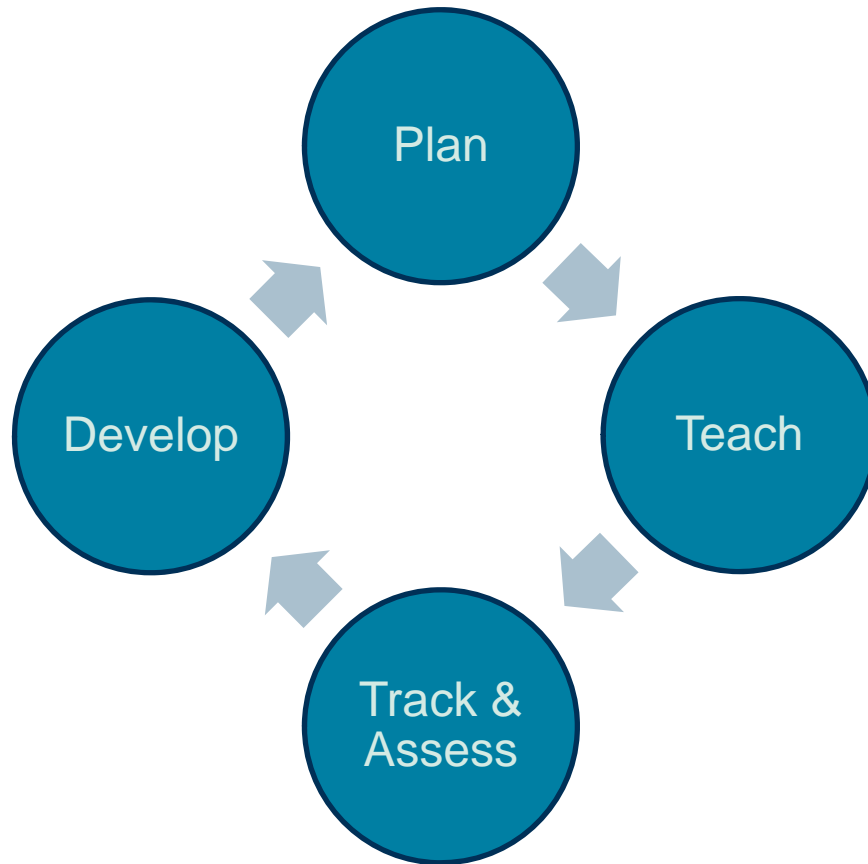
Examiner Comments

Part (a): The question required an answer that showed **why** the mass was decreasing, not just that the mass was decreasing.

Part (b)(ii): Since the graph line passes through the origin it is necessary to state that the two variables are directly proportional to one another.

Part (c): It is necessary to state that there are more particles/ions in **the same volume**.

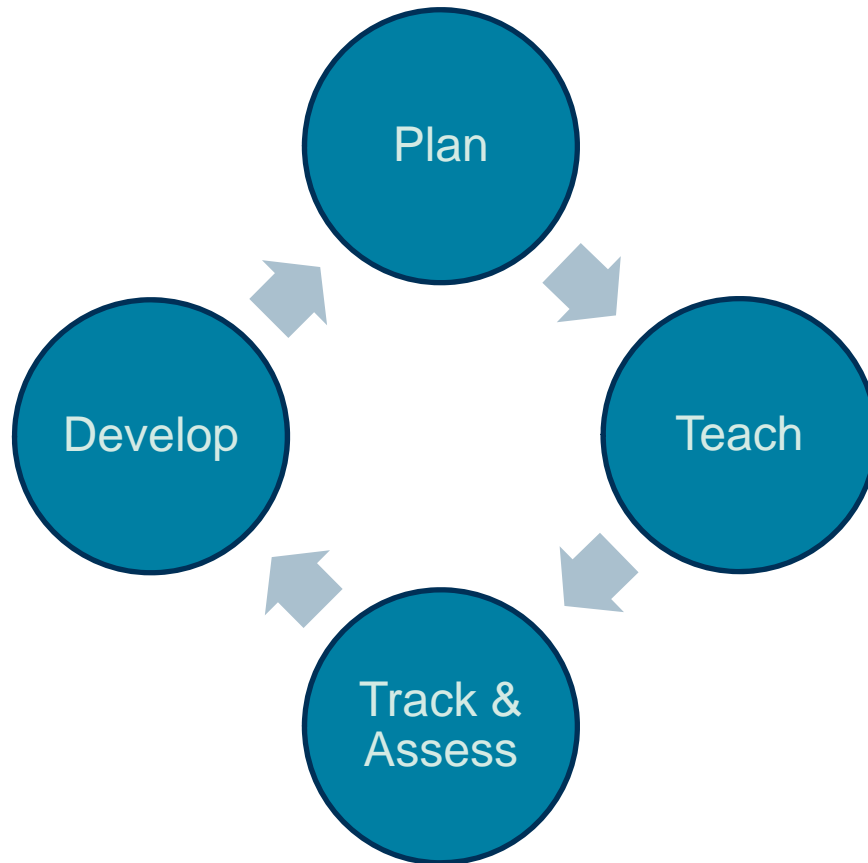
Supporting great science teaching 1



- We will provide a range of support to help you plan, teach, track and assess, and develop the new course.
- This includes free qualification support to download from our website as well as published resources*

* You do not have to purchase any resources to deliver our qualifications

Supporting great science teaching 2

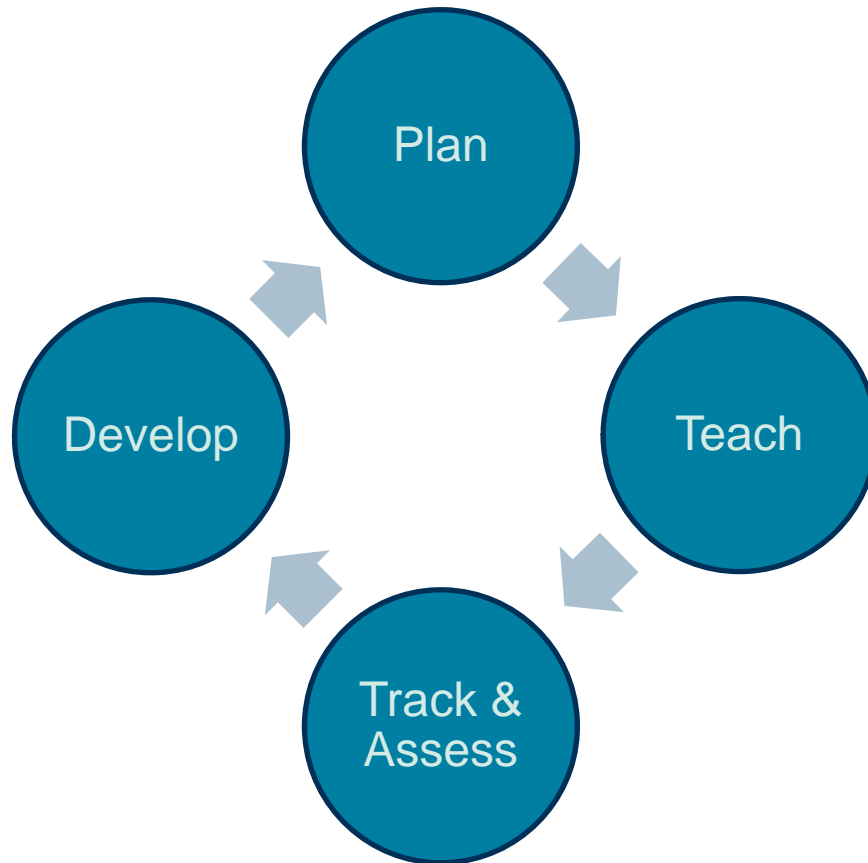


To help you plan the new course we are providing:

Free support for the qualification-

- Getting Started Guide
- Course planners / schemes of work
- Mapping documents

Supporting great science teaching 3



There will be teaching and learning support to help you deliver the new qualification:

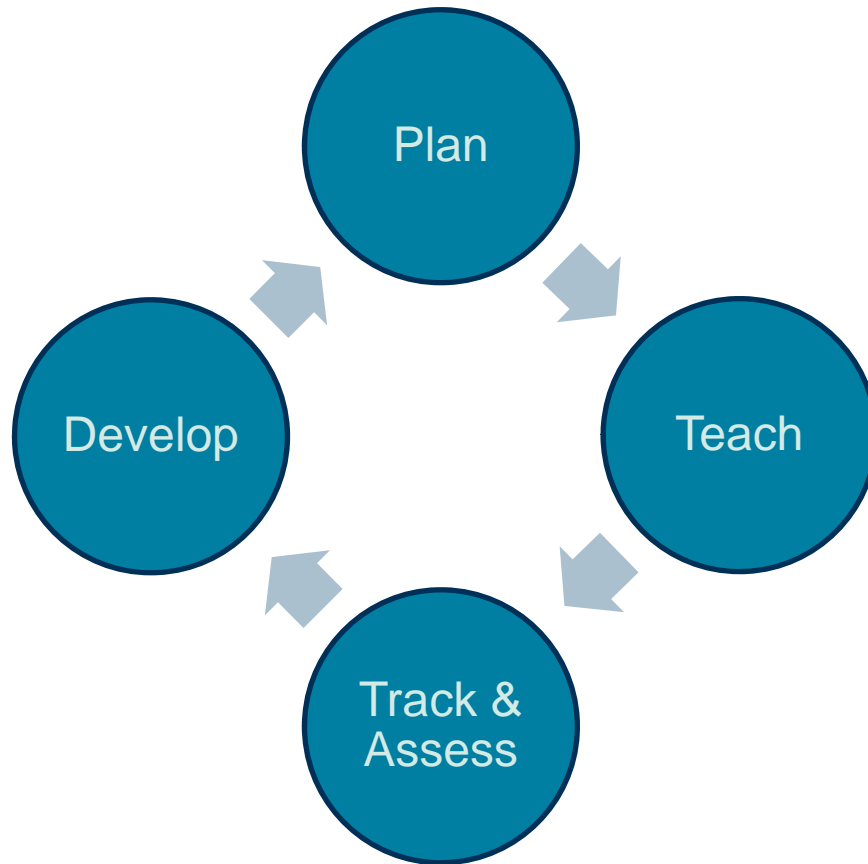
Free support for the qualification:

- Support for practical activities

Published resources from Pearson:

- Student book and ActiveBook

Supporting great science teaching 4



To help you prepare your students for the assessments:

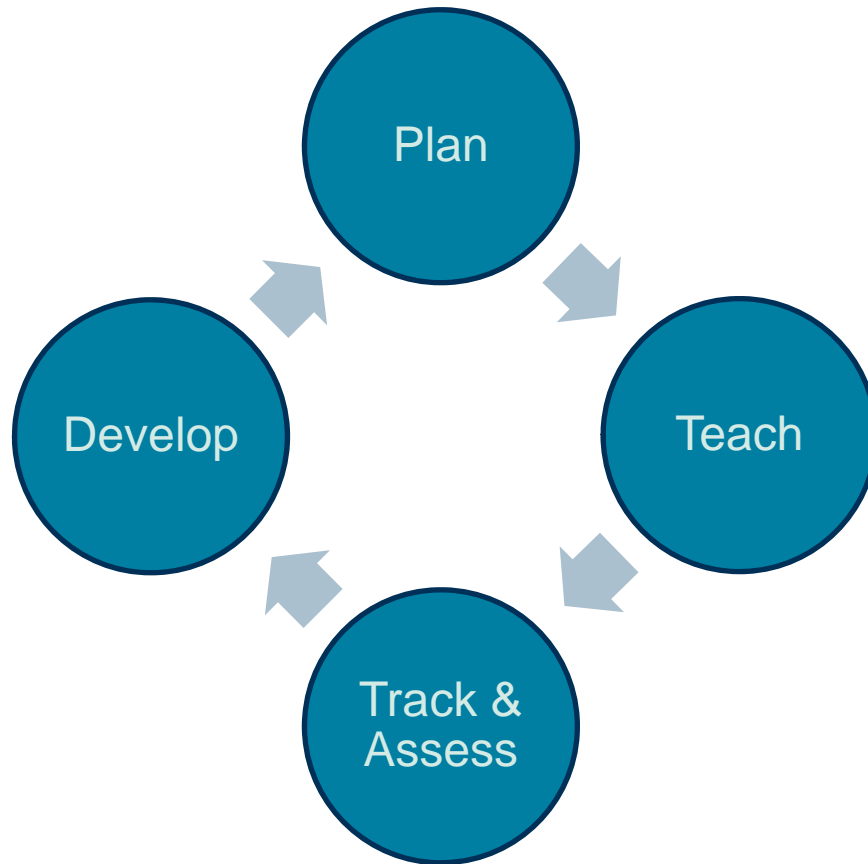
Free support for the qualification:

- Specimen papers to support formative assessment and mock exams
- ResultsPlus and ExamWizard

Published resources from Pearson:

- Consideration is being given to a Revision Guide and Workbook

Supporting great science teaching 5



Our training programme includes:

- Launch events
- Getting Ready to Teach events

Our subject advisor team, led by **Stephen Nugus**, will guide you through all the changes and are on hand to answer any questions you might have.

TeachingScience@pearson.com

ResultsPlus and ExamWizard

- . **ResultsPlus** provides the most detailed analysis available of your students' exam performance. This free online service helps you identify topics and skills where students could benefit from further learning, helping them gain a deeper understanding.
- . **ExamWizard** is a free exam preparation tool containing a bank of past Edexcel exam questions, mark schemes and examiners' reports, so you can create mock papers, homework or practice tests in minutes.

Published resources for sale 1

We are committed to helping teachers deliver our Edexcel qualifications and helping students to achieve their full potential.

To do this, we aim for our qualifications to be supported by a wide range of high-quality resources, produced by a range of publishers.

However, it is not necessary to purchase endorsed resources to deliver our qualifications.

Published resources for sale 2

Three UK publishers are preparing resources, including Student Books, for the new International GCSE qualifications

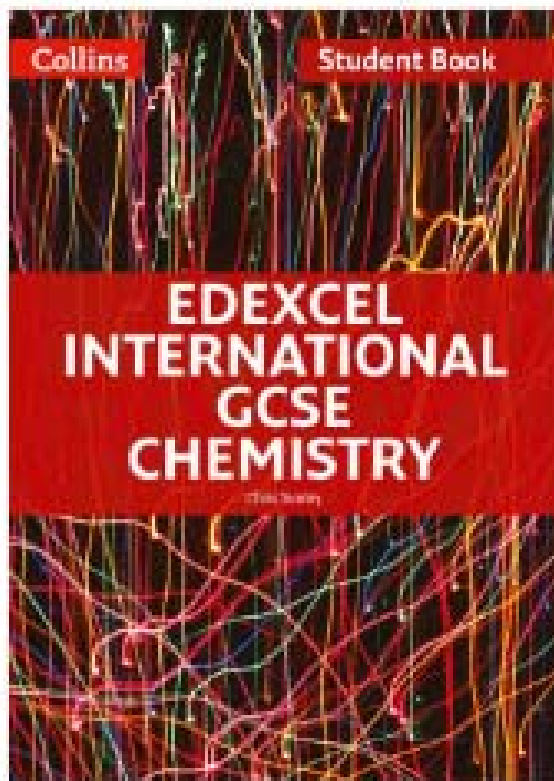
These are **Collins**, **Hodder** and **Pearson**

Most resources are planned to be available in the months before first teaching in September 2017

The Student Books will be endorsed by Pearson/Edexcel – which means that they will have been checked for chemical accuracy and specification coverage

Published resources –Collins

<http://collins.co.uk/product/9780008236212/Edexcel+International+GCSE+-+Edexcel+International+GCSE+Chemistry+Student+Book>



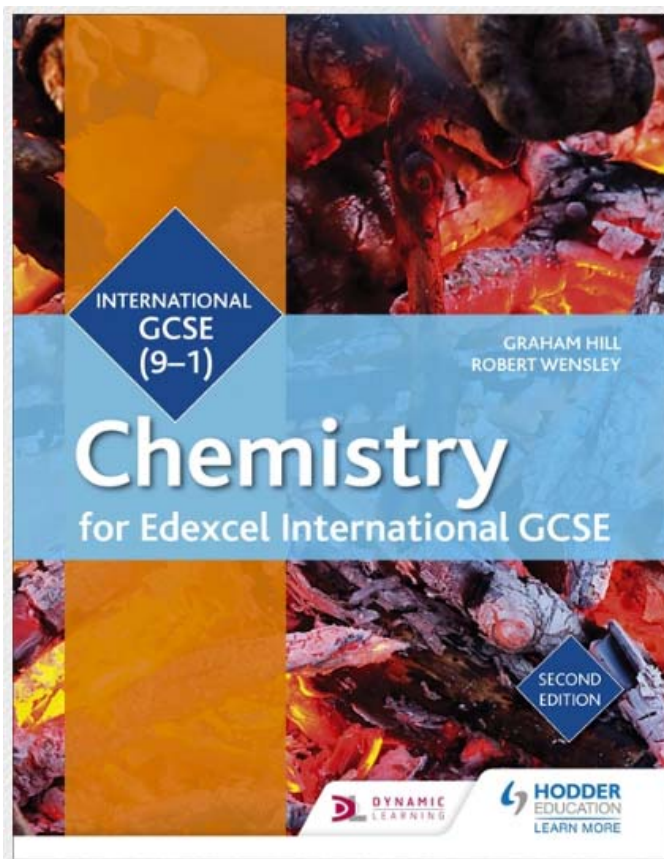
- **Student Book** – from June 2017
- **Teacher Pack** – from June 2017

The Collins Student Book allows you to co-teach Edexcel International GCSE Chemistry and Double Award Science

It is packed full of engaging content, practical skills features and questions, and is rigorously updated for the new specifications.

Published resources – Hodder

www.hoddereducation.co.uk/edexceligcse



- **Student Book – from May 2017, and as an eBook from June 2017**

Provide your students with complete coverage of the Edexcel International GCSE Chemistry specification with these affordable student books written by expert authors and teachers; testing knowledge and building practical skills throughout.

- **Workbook – from July 2017**

Maximise every student's performance with exam-style questions, sample answers and examiner comments, written to support and enhance the content of the Edexcel International GCSE Chemistry book.

Published resources – Pearson

<http://www.pearsonglobalschools.com>



- **Student Book – from May 2017**

This new resource, which includes access to an eBook, has been developed for the new Edexcel International GCSE specification with progression, international relevance and support at their core, and is designed to supply students with the best preparation possible for the examination

.

- **Teacher Pack– from August 2017**

This new resource, available online, will include videos, worksheets, lesson plans and other support to help you deliver the International GCSE in Chemistry.

Free resources from the website:

Specification

These are the sections:

- About this specification
- Chemistry content
- Assessment information
- Administration and general information
- Appendices

Free resources from the website:

Sample assessment material (SAM)

This includes:

- General marking guidance
- Paper 1C and mark scheme
- Paper 2C and mark scheme

Free resources from the website:

Getting started guide

This includes:

- Some information from the specification
- A list of the new assessment statements
- An outline course planner, assuming topics will be taught in the same order as the specification

Free resources from the website:

Mapping document

This includes:

- All the assessment statements in the specification in the first column
- In the second column, a comment on whether the statement has been transferred from 4CH0, or modified, or combined with another statement, or is new, eg

(e) Chemical formulae, equations and calculations	
1.25 write word equations and balanced chemical equations (including state symbols): <ul style="list-style-type: none">• for reactions studied in this specification• <u>for</u> unfamiliar reactions where suitable information is provided.	1.21 & 1.22: combined and slightly re-worded

Free resources from the website:

Scheme of work

This is much more detailed than the outline course planner.

It suggests one example of a logical order of teaching topics, not in the order in the specification.

It includes for each week:

- the assessment statements in the specification
- exemplar activities, including teacher demonstrations, class practicals and resources

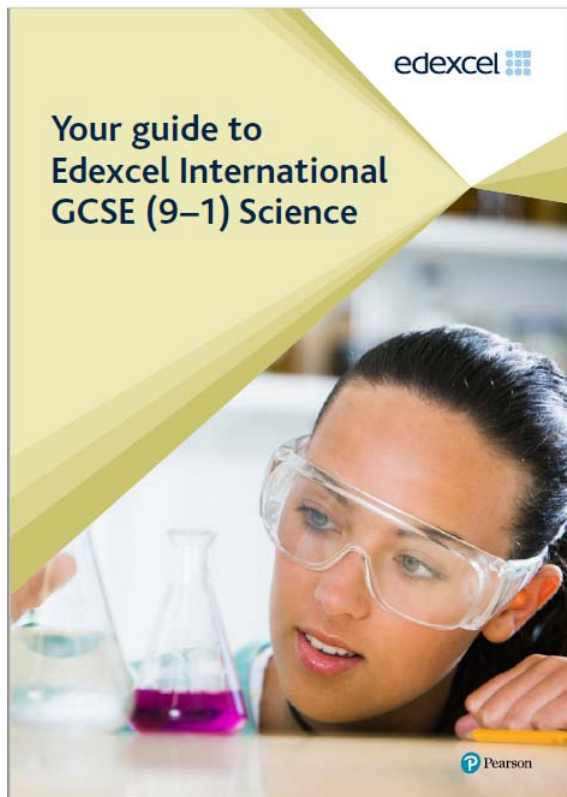
Free resources from the website:

Scheme of work example

Week	Content coverage	Learning outcomes	Exemplar activities	Exemplar resources	Which transferable skills are explicitly assessed through examination	Which transferable skills could also be acquired through teaching and delivery
1	Section 1: Principles of chemistry (a) States of matter	<p>Students will be assessed on their ability to:</p> <p>1.1 understand the three states of matter in terms of the arrangement, movement and energy of the particles</p> <p>1.2 understand the interconversions between the three states of matter in terms of:</p> <ul style="list-style-type: none"> the names of the interconversions how they are achieved the changes in arrangement, movement and energy of the particles <p>1.3 understand how the results of experiments involving the dilution of coloured solutions and diffusion of gases can be explained.</p>	<p>Activity:</p> <ul style="list-style-type: none"> Model particle behaviour in the three states using trays of marbles; draw diagrams of the results. <p>Demonstrations:</p> <ul style="list-style-type: none"> Diffusion of gases – ammonia and hydrogen chloride (RSC 65). Bromine diffusing into a gas jar of air. <p>Class practicals:</p> <ul style="list-style-type: none"> Diffusion in liquids (RSC 27). Recording a heating curve for water, from ice to boiling point. 	<p>Edexcel International GCSE Chemistry Student Book: Pages 1–4</p> <p>RSC Classic Chemistry Experiments Page 68</p> <p>RSC Classic Chemistry Demonstrations Page 162</p>	Analysis	Analysis Problem solving

Free resources from the website:

Your guide to Edexcel International GCSE (9-1) Science



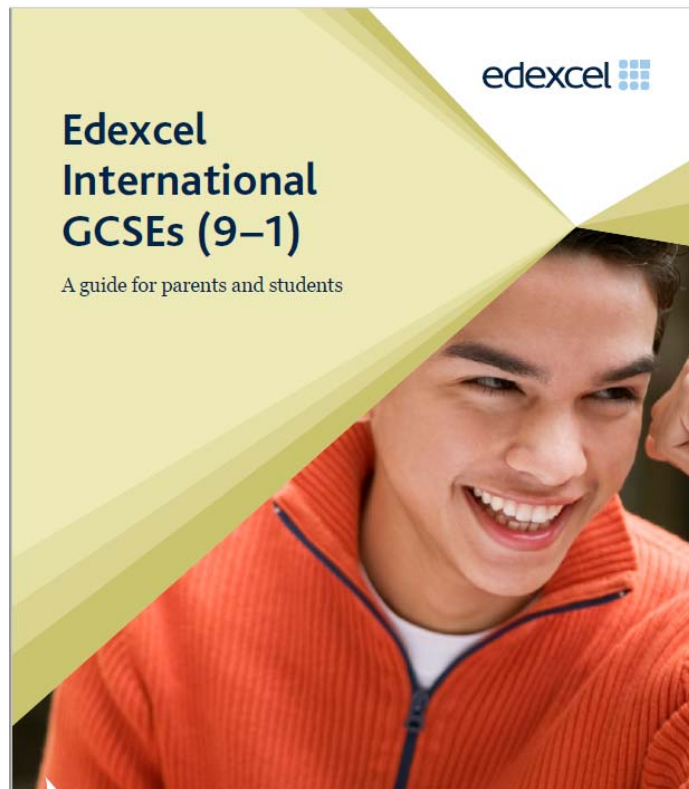
This is a glossy brochure that refers to all the new science specifications, including Human Biology and the new Single Award qualification

It gives full details of all the planned Pearson published resources, including planned publication dates and ISBNs

Free resources from the website:

Edexcel International GCSEs (9-1)

- a guide for parents and students



This is a glossy brochure that gives general information about all the 9-1 GCSEs

It gives full details of the 9-1 grading scale

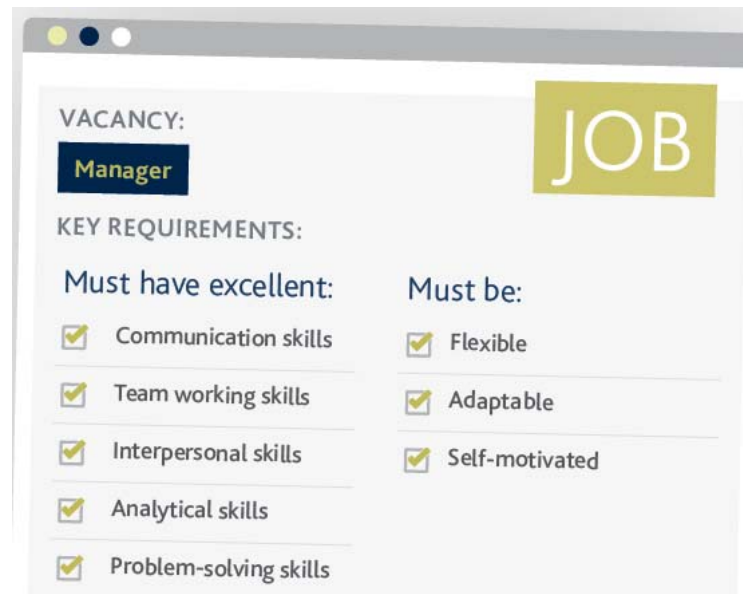
Free resources from the website:

Edexcel International GCSEs (9-1)

- transferable skills

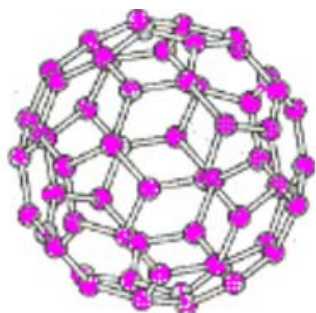


This is a glossy brochure that gives information about transferable skills in the context of the 9-1 GCSEs



Other internet resources 1

- There are many websites on the internet that provide free and useful information and support to chemistry teachers
- Very few of them are designed to cover a particular specification, but are still worth looking at
- Some of them are mentioned in the Scheme of Work – one is www.docbrown.info
- Here is one example of how this might help students understand the structure of C₆₀ fullerene (spec 1.50):



One of the simplest
'buckyballs' C₆₀

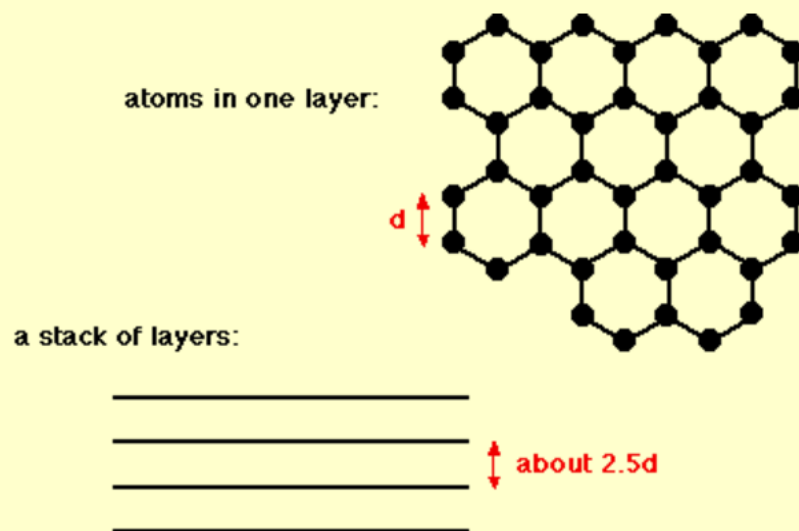
Other internet resources 2

Another useful UK site is www.chemguide.co.uk - here is one small extract that also supports spec 1.50

explain how the structures of diamond, graphite and C₆₀ fullerene influence their physical properties, including electrical conductivity and hardness

The giant covalent structure of graphite

Graphite has a **layer structure** which is quite difficult to draw convincingly in three dimensions. The diagram below shows the arrangement of the atoms in each layer, and the way the layers are spaced.



RSC resources 3.1

- One of the best UK sites is the Royal Society of Chemistry
- Go to www.rsc.org then choose Resources and tools
- You can now click on either Learn Chemistry or ChemSpider
- Many resources can be downloaded free of charge

RSC resources 3.2

Learn Chemistry has a huge number of resources, and they can be searched by:

Select audience ▼	Select resource type ▼	Select age group ▼	Select subject ▼
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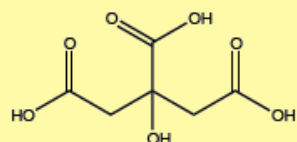
- Audience means Student or Teacher
- Resource type – a long list, eg video, experiment, handout
- Age group from Primary to Postgraduate – including 14-16
- Subject – includes Patterns, Organic chemistry and others

RSC resources 3.3

Here is one example of an infographic from Learn Chemistry

THE CHEMISTRY OF A LEMON

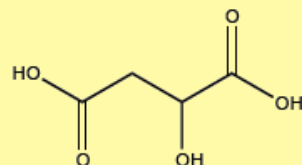
ACIDIC COMPOUNDS IN LEMONS



CITRIC ACID

The sour taste of lemons is caused by the presence of organic acids. The major acid in lemons is citric acid, which constitutes around 5 to 6% of the lemon's juice.

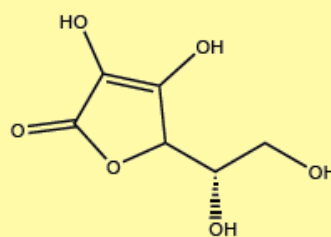
Other acids are also present, although in much lower concentrations than citric acid. Malic acid is one of these, present at around 5% of the concentration of citric acid.



MALIC ACID



VITAMIN C, LEMONS & SCURVY



VITAMIN C (ASCORBIC ACID)

Lemons contain high levels of vitamin C, also known as ascorbic acid. The levels in lemons are around 50mg per 100g, on a par with oranges and around double the amount of limes.

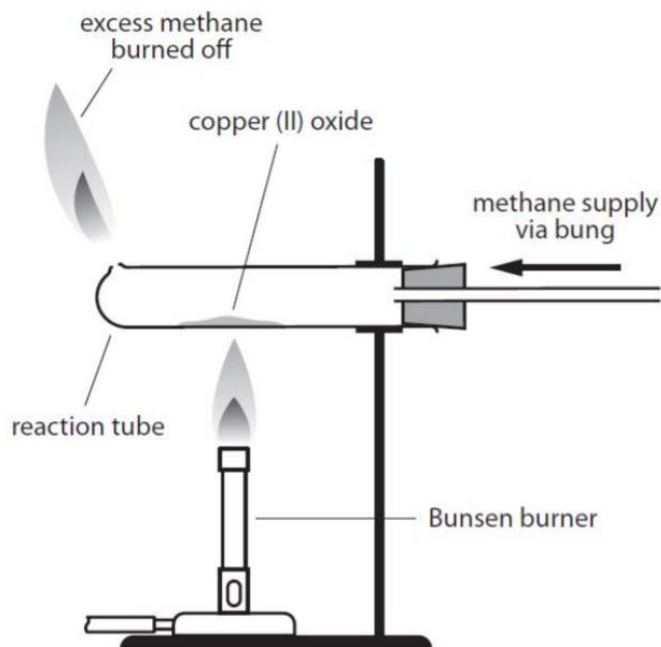
Vitamin C deficiency can lead to scurvy, a disease that causes loss of teeth, jaundice, and eventually death. In the 1700s, all British ships were required to provide a lemon juice ration to seamen to guard against this disease.

2014 COMPOUND INTEREST - WWW.COMPOUNDCHEM.COM

RSC resources 3.4

Here is one example of a practical resource from Learn Chemistry

Finding the formula of copper(II) oxide



The resource includes:

- Practical details
- Safety precautions
- Sample calculation
- Video of the experiment

**The presentation is
over – any final
questions?**