

PEARSON EDEXCEL INTERNATIONAL GCSE (9-1)

**Understanding
assessment and
improving delivery in
International GCSE
Sciences**



Event code: 4SD0/19IF0

1

First teaching in 2017, first assessment in 2019.

Location:

Trainer:

Welcome to today's event

- ❖ Introduction to your trainer: Damian Riddle
- ❖ Housekeeping
- ❖ What's in your pack?
- ❖ How today's training is structured

Today's Agenda

1000 – 1015 Welcome and introductions

1015 – 1115 Introduction to Assessment Objectives

How AOs are assigned in question papers

1115 – 1130 MORNING BREAK

1130 – 1245 AO2: feedback and strategies

1245 – 1345 LUNCH

1345 – 1500 AO3: feedback and strategies

1500 – 1530 Support

1530 – 1600 Plenary and departure

Getting to know you

- ❖ Who are you, and which school do you teach at?
- ❖ Do you teach Biology, Chemistry or Physics?
- ❖ Are you new to Pearson Edexcel International GCSE; or have you been teaching the existing specification?

Introduction to Assessment Objectives

Pearson Edexcel International GCSE

Biology, Chemistry & Physics

What are assessment objectives?

- ❖ Help make exams fairer year on year
- ❖ Provide structure for question paper writers
- ❖ Make sure that exams are about skills, not just about knowledge
- ❖ Can provide students with some reassurance about the types of questions they will be asked

Assessment objectives

AO1

Knowledge and understanding....

40%
of total marks

AO2

Application of knowledge and understanding, analysis and evaluation....

40%
of total marks

AO3

Experimental skills, analysis and evaluation of data and method....

20%
of total marks

Assessment objectives

AO1

Questions requiring students to recall and use information that you have taught them

AO2

Questions requiring students to apply what you have taught them, or to use skills, or to analyse and make judgements

AO3

Questions on practical work and associated practical skills, such as planning, graph drawing

Assessment objectives

AO1

40%
of total marks

AO2

40%
of total marks

AO3

20%
of total marks

- ❖ Note the proportions of AOs on International GCSE papers
- ❖ Paper 1 and Paper 2 both have the same balance of AO1 : AO2 : AO3
- ❖ Compared to our previous specification, the new specification has less AO1 and more AO2

Typical AO1 questions

- ❖ Can be simple recall – about half of AO1 is
- ❖ Can be based on understanding, not just knowledge

2 Enzymes are involved in many processes.

(a) The table gives some information about different enzymes.

Complete the table by giving the missing information.

(4)

Enzyme	Function	Name of process
	breakdown of protein into amino acids	
maltase		digestion
	to cut DNA	genetic modification

Typical AO2 questions

- ❖ Can involve simple ideas being applied – or can involve more complex scenarios involving data analysis or evaluation

(c) The student extends her investigation by collecting data for cars P, Q, R and S.

She records the useful power output of their engines, their masses and their maximum speeds.

The table shows her data.

Car	Engine useful power output in kW	Mass in kg	Maximum speed in m/s
P	47	721	41
Q	92	1143	51
R	194	915	62
S	198	1226	68

Using information from the table, discuss the relationships between useful power output, mass and maximum speed.

(4)

Typical AO3 questions

- ❖ Questions based on practical experiences – not just Core Practicals, but any practical work!

3 Sodium chloride is a soluble salt.

(a) Name the acid and the alkali that can be used to make sodium chloride.

(2)

acid

alkali

(b) A teacher drops a bottle containing sodium chloride. The bottle breaks when it hits the floor. The teacher sweeps up the mixture of sodium chloride and glass.

Describe how the teacher can obtain a pure, dry sample of sodium chloride from the mixture.

(4)

The border lines...

- ❖ Context is important for assigning an AO
- ❖ For example:
 - ❖ a graph question could involve plotting data from a laboratory experiment e.g. voltage against current for a variable resistor
 - ❖ or, it could involve plotting data from a different source e.g. melting point on an alkane against its relative molecular mass
- ❖ Would these questions be tagged to the same AO?

ACTIVITY 1 – Assigning AOs

Your pack contains questions from Paper 2 in this summer's International GCSE question papers.

Read the questions and:

- ❖ assign an AO to each question part**
- ❖ create a tally showing the command word used and the AO assigned to each question**

ACTIVITY 1 – tally table

AO1	AO2	AO3
Which x 2	Draw	Describe
What	Label	Explain
Describe x 2	Explain x 4	Calculate x 2
Name	Write x 2	
Give	Calculate x 3	
State x 4	Complete	
	Suggest	

Command words

- ❖ Questions in our exam papers are designed to use a specific command word to guide students
- ❖ The command words represent a range of skills:
 - simple recall (Give..., Name...)
 - using knowledge (Describe...)
 - giving reasons (Explain...)
 - provide more detailed analysis (Evaluate, Justify)
 - show particular skills (Calculate..., Plot...)
- ❖ Is there a link between command words and AOs?

ACTIVITY 2 – Assigning AOs

Your pack contains a list of command words used in International GCSE question papers.

- ❖ Draw a table with 3 columns one for each AO

AO1	AO2	AO3

- ❖ Place the command words into the columns, to show which command words can commonly be used to assess that AO

BREAK TIME!

AO2 questions

Pearson Edexcel International GCSE

Biology, Chemistry and Physics

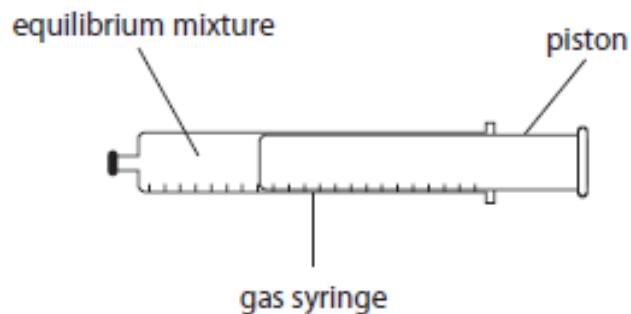
Why not look at AO1?

- ❖ AO1 is all about knowledge – and understanding
- ❖ This isn't one that teachers can influence much...
- ❖ ... students either go away and learn what you teach them or they don't!
- ❖ BUT... remember that students should still recognise AO1 questions and don't spend time going beyond AO1

What is AO2?

❖ Application of knowledge to new scenarios

- (b) Some N_2O_4 and some NO_2 are put into a sealed gas syringe and allowed to form an equilibrium mixture.



This equilibrium mixture is brown.

- (i) The pressure of the gas in the syringe is increased by pushing in the piston. The mixture is then allowed to reach a new equilibrium at the same temperature as before.

Explain why the new equilibrium mixture contains less NO_2 than the original equilibrium mixture.

(2)

What is AO2?

❖ Questions starting “Suggest...”

(b) A kangaroo rat is a mammal that lives in hot desert regions of America.

(iii) Kangaroo rats rarely drink water.

Suggest where they get their water from.

(1)

❖ This question is in the context of the kidney

What is AO2?

❖ Most calculations*

*except in practical scenarios

(c) The alpha particle experiences a resultant force of 3.6 N and has a mass of 6.6×10^{-27} kg.

Calculate the acceleration of the alpha particle.

(3)

acceleration = m/s^2

What is AO2?

❖ Equations / dot and cross diagrams in chemistry

(ii) Write a chemical equation for the complete combustion of ethanol in air.

(2)

What is AO2?

❖ Data analysis*

*except in practical scenarios

(c) A student investigates the effect of genetic modification on the growth of salmon.

The student measures the mass and length of one normal salmon and one genetically modified salmon when both salmon are 18 months old.

The table shows the student's results.

Type of salmon	Mass in g	Length in cm
normal	1250	33
genetically modified	3000	61

(ii) The student concludes that his results show that genetically modified (GM) salmon are useful in providing a balanced diet.

Discuss the student's conclusion.

(6)

ACTIVITY 3 – AO2 in exams

Your pack contains two questions from this summer's International GCSE question papers, with mark schemes and student answers.

- ❖ Mark the questions using the scheme provided
- ❖ Can you see where students are going wrong in their answers?

Preparing students for AO2

- ❖ Teaching approaches: facts vs principles
- ❖ Questioning styles: closed vs open
- ❖ Homework activities: formative vs summative
- ❖ Exam preparation

AO2: teaching approaches

- ❖ In covalent bonding, two atoms come together to form a bond. The atoms share a pair of electrons, usually one from each atom....
- ❖ Water is a covalent molecule made from hydrogen and oxygen. Hydrogen and oxygen form a covalent bond in water when each atom donates one electron to a shared pair of electrons. Hydrogen peroxide is also covalent...

AO2: question styles

Think about one of the topics which you teach that often has AO2 questions in exams.

What sorts of questions do you ask in class when teaching this topic?

How do these questions help students to prepare for AO2 questions?

AO2: homework activities

- ❖ Why do you set homework?
- ❖ What sort of questions do you set?
- ❖ What do you expect students to gain from the questions that you set?

ACTIVITY 4 – AO2 exam preparation

Your pack contains two questions from this summer's International GCSE question papers, Paper 2.

- ❖ **How are these two questions different?**
- ❖ **What advice can you give your students on approaching each question?**

LUNCH

AO3 questions

Pearson Edexcel International GCSE

Biology, Chemistry and Physics

What is AO3?

AO3 assesses the practical skills and understanding gained by students as they undertake practical work.

AO3 questions may require RECALL of practical techniques and understanding or APPLICATION of these to new situations.

AO3 may also involve the use of experimental data, and the evaluation of experimental methods or results.

AO3: planning

3 This question is about sound waves.

(a) Describe an experiment to measure the speed of sound in air.

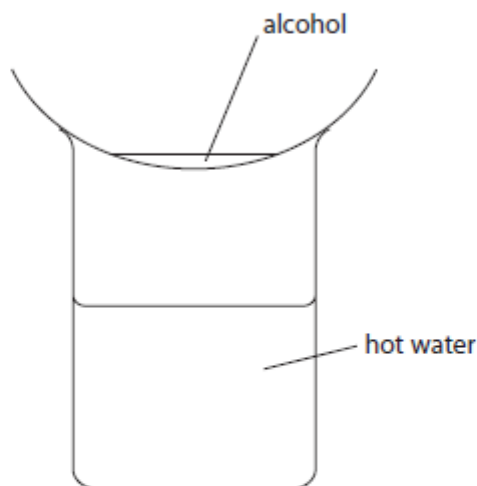
You may draw a diagram to help your answer.

(5)

AO3: experimental design

- 3 Methanol, ethanol, propanol and butanol are alcohols. They are all liquids that evaporate easily when warmed.

A student uses this apparatus to compare the time taken for the four liquids to evaporate.



She uses this method.

- pour some methanol into an evaporating basin
 - place the evaporating basin on top of a beaker containing hot water
 - measure the time taken for the methanol to evaporate completely
 - repeat the experiment with each of the other alcohols, using the same apparatus
- (a) State two variables the student should control to make sure her results are valid.

(2)

AO3: use of data

(c) The table shows the results of experiments done by four students, A, B, C and D.

Alcohol	Formula of alcohol	Time taken for liquid to evaporate in s				
		Student A	Student B	Student C	Student D	Mean time in s
methanol	CH ₃ OH	20	24	22	26	23
ethanol	C ₂ H ₅ OH	32	34	35	30	33
propanol	C ₃ H ₇ OH	45	47	50	48	48
butanol	C ₄ H ₉ OH	64	63	90	60	

(ii) Explain how the results show which alcohol evaporates most easily.

(2)

AO3: representing data

2 A student investigates a transformer.

This is the student's method.

- use a primary coil with 10 turns
- connect the primary coil to a constant maximum input voltage
- measure the output voltage across the secondary coil
- repeat using an increasing number of turns on the primary coil

The table shows the student's results.

Number of turns on primary coil	Output voltage in V
10	39.6
20	19.7
40	9.9
60	6.6
80	5.0
100	4.0

(a) (i) Plot a graph of the student's results on the grid.

(1)

(ii) Draw a curve of best fit.

(1)

AO3: evaluation

(b) A student investigates the effect of soil pH on the decomposition of bags made from starch.

She uses this method.

- cut two small squares from a bag
- measure the mass of each small square
- place one square in a beaker of soil with a pH of 7.0
- place the other square in a beaker of soil with a pH of 9.0
- after 10 days, remove the squares and measure their mass again

(iii) Explain how the student could improve her method so that she can obtain more accurate results.

(4)

ACTIVITY 5 – AO3 in exams

Your pack contains two questions from this summer's International GCSE question papers, with mark schemes and student answers.

- ❖ **Mark the questions using the scheme provided.**
- ❖ **Are students showing understanding of what they did in practical lessons?**

CORMS and devising investigations

- **C**hange with and without OR range of values
(independent variable)
- **O**rganism e.g. species / size / age / sex....
(controlled variable: biotic)
- **R**epeat more than one reading
- **M**easure what is measured, and when?
(dependent variable)
- **S**ame any two factors
(controlled variable: abiotic)

CORMS questions in 2019

Paper 1

(c) Plant growth substances stimulate root growth from a cut stem.

Describe an investigation to find the best concentration of plant growth substance to stimulate root growth.

You should include experimental details in your answer and write in full sentences.

(6)

Paper 1B

11 The diagram shows an insect called a wasp.

Wasps kill their prey by injecting a poison called venom through a small tube called a stinger.

Some scientists believe that the smell of venom attracts other wasps.

Design an investigation to find out if the smell of venom attracts other wasps.

Include experimental details in your answer and write in full sentences.



(6)

Does CORMS work for other sciences?

- ❖ Biology questions are set in very general situations
- ❖ In Chemistry and Physics, questions tend to be in a familiar situation
- ❖ Chemistry and Physics questions tend, therefore, to require more specific experimental details e.g. apparatus used, measurements taken
- ❖ It is always worth addressing validity and reliability!

Teaching AO3 - terminology

validity

precision

anomaly

accuracy

reliability

Terminology – accuracy

(b) A student investigates the effect of soil pH on the decomposition of bags made from starch.

She uses this method.

- cut two small squares from a bag
- measure the mass of each small square
- place one square in a beaker of soil with a pH of 7.0
- place the other square in a beaker of soil with a pH of 9.0
- after 10 days, remove the squares and measure their mass again

(iii) Explain how the student could improve her method so that she can obtain more accurate results.

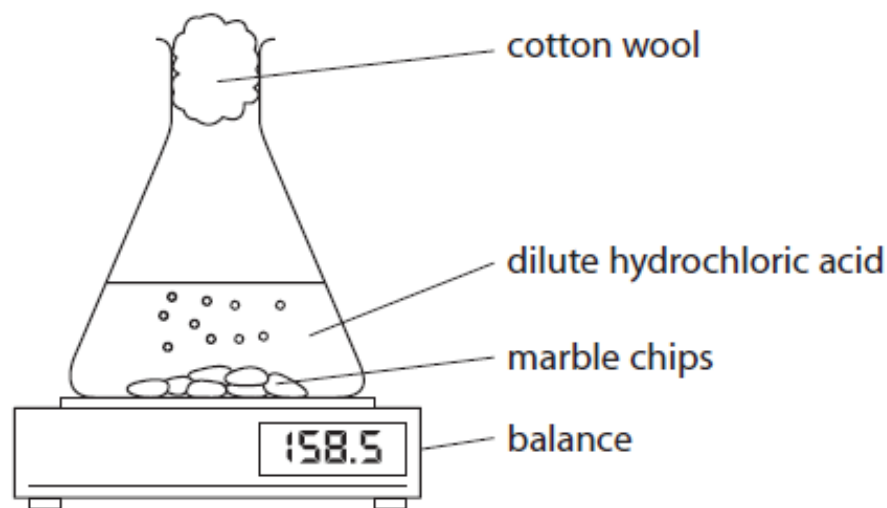
(4)

Terminology – accuracy

Question Number	Answer	Additional guidance	Mark
3(b)(iii)	<p>An answer that makes reference to four of the following points:</p> <ul style="list-style-type: none"> • same surface area / mass / thickness / area / size (1) • remove soil from square (before weighing) (1) • control <u>temperature</u> / oxygen / moisture / water (1) • (soil) same mass / same amount / same volume / same type / same soil / decomposers / bacteria / fungi (1) • repeat / use more squares / obtain average / remove anomalies (1) • increase range of pH / use different pHs / more pHs (1) 	<p>Ignore more time</p> <p>Mp3 Ignore light / carbon dioxide</p> <p>Mp4 Ignore sterile soil</p>	4

Terminology – accuracy

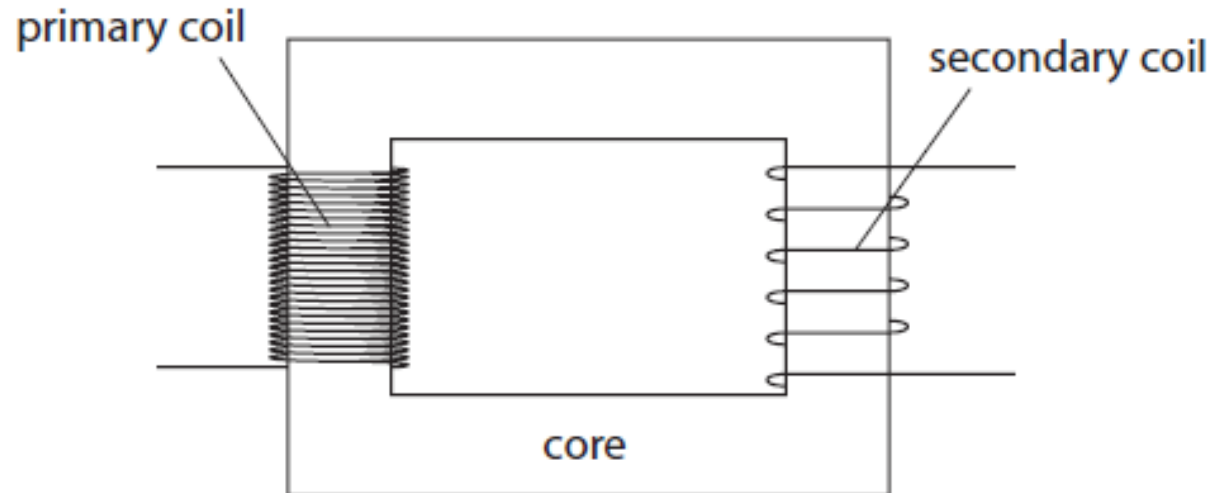
- 5 A student uses this apparatus to investigate the rate of reaction between marble chips and dilute hydrochloric acid.



- (a) During the reaction, the reading on the balance decreases because mass is lost from the flask.
- (i) Explain how using the cotton wool increases the accuracy of this investigation.
- (2)

Terminology – precision & reliability

(a) The diagram shows a typical transformer.



Terminology – precision & reliability

(b) The student investigates the effect of changing the number of turns in the secondary coil.

This is his method.

- apply a constant maximum voltage to a primary coil with 1200 turns
- use a secondary coil with 100 turns
- measure the output voltage of the transformer
- replace the secondary coil with one that has 200 turns
- measure the output voltage again

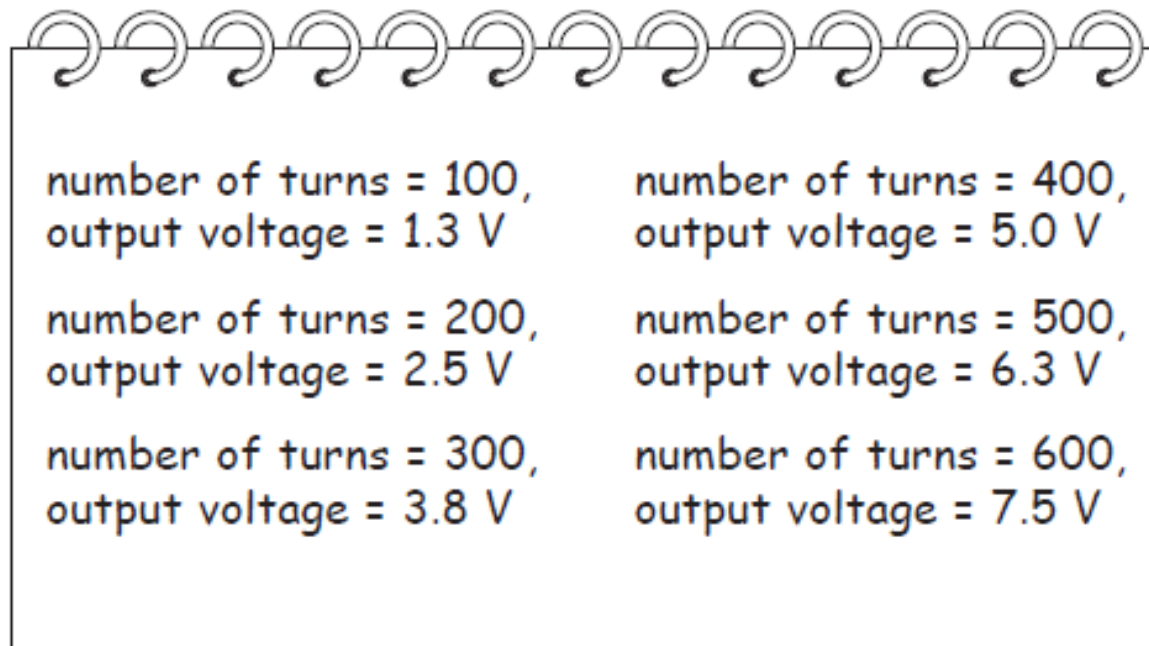
The student repeats this method using different numbers of turns in the secondary coil.

(i) Suggest how the student could improve the reliability of his investigation.

(1)

Terminology – precision & reliability

(ii) These are the student's results.



number of turns = 100, output voltage = 1.3 V	number of turns = 400, output voltage = 5.0 V
number of turns = 200, output voltage = 2.5 V	number of turns = 500, output voltage = 6.3 V
number of turns = 300, output voltage = 3.8 V	number of turns = 600, output voltage = 7.5 V

(iii) Suggest how the student could improve the precision of his voltage measurement.
(1)

Terminology – validity

2 Scientists investigate the effect of pollution on the growth of plant shoots.

This is their method.

- expose a sample of 500 seeds to pollution
- leave another sample of 500 seeds free from pollution
- allow the seeds to germinate and produce shoots
- after one day, squash 100 shoots from each sample
- using a microscope, count the number of cells in each shoot

The scientists squash 100 shoots from each sample every day for five days.

(ii) To make sure their conclusion is valid, the scientists control abiotic variables while the seeds are germinating.

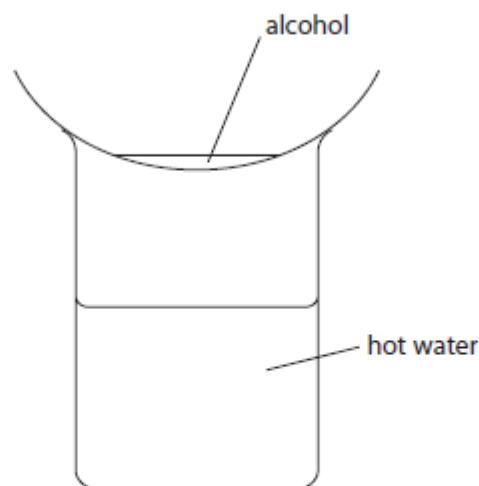
Discuss two abiotic variables that the scientists control.

(4)

Terminology – validity

- 3 Methanol, ethanol, propanol and butanol are alcohols. They are all liquids that evaporate easily when warmed.

A student uses this apparatus to compare the time taken for the four liquids to evaporate.



She uses this method.

- pour some methanol into an evaporating basin
- place the evaporating basin on top of a beaker containing hot water
- measure the time taken for the methanol to evaporate completely
- repeat the experiment with each of the other alcohols, using the same apparatus

- (a) State two variables the student should control to make sure her results are valid.

(2)

Teaching AO3 – doing practical work

- ❖ The specifications for International GCSE contain a number of practical activities which form part of the subject content
- ❖ Exam questions expect students to be familiar with methods for these practicals
- ❖ Questions also expect students to apply their knowledge of practical methodology to new scenarios

Teaching AO3 – doing practical work

- ❖ **Why should students do practical work?**
- ❖ **Are students getting knowledge or skills from practical activities?**
- ❖ **When do you do practical activities: before or after teaching the theory of a topic?**

ACTIVITY 6 – Questions for practicals

Your pack has a list of Core Practicals for each science.

- ❖ Select one Core Practical from the list: it should ideally be one that your students actually do**
- ❖ What questions would you ask your students as they do this practical?**
- ❖ What homework would you set?**

Practical support guide

- ❖ An introduction to each practical activity
- ❖ Description of the practical, with some useful hints and tips
- ❖ Questions to use with students to test their understanding as they do the experiment in the lab
- ❖ A past paper question, where relevant, to use as a homework activity

Support

Pearson Edexcel International GCSE

Biology, Chemistry and Physics

What's on the website?



International GCSEs and Edexcel Certificates Chemistry (2017)

[Specification](#)[Course materials](#)[Published resources](#)[News](#)

Find course materials

[Specification and sample assessments \(3\)](#)[Exam materials \(8\)](#)[Teaching and learning materials \(18\)](#)

1 - 18 of 18

Find your Document

[Assessment guidance](#)

Teaching and learning materials

In this section of the website you will find:

- Getting started guides
- Mapping document and schemes of work
- Guides for practical and mathematical skills
- Exemplars
- Topic Guides
- Past training materials

Teaching and learning support overview

Getting Started Guide
& Scheme of Work

Subject interpretation
of transferable skills

Subject Advisor

Results Plus &
ExamWizard

Regional Support
Manager

Curriculum Matched
Publishing

Access to Scripts

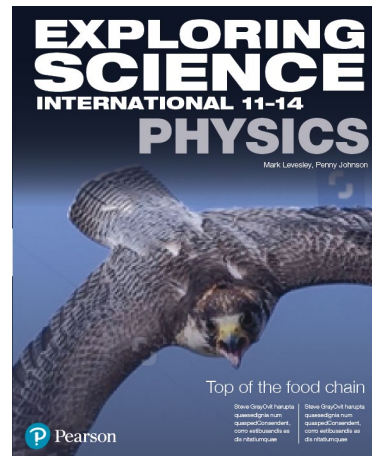
Exploring Science International

Inspiring 11–14 science that builds the foundation for International GCSEs

Exploring Science International: Our leading 11–14 course, re-worked to provide seamless progression to International GCSE.

- ❖ **Inspiring, real-world science** that sparks students' curiosity
- ❖ Provides content for a **broad and balanced** science curriculum
- ❖ Delivers the specific skills needed to **progress** to Pearson Edexcel International GCSE Sciences
- ❖ Choose from student books arranged by subject (Biology, Chemistry, Physics) or by Year (7, 8, 9) to suit your school.

Components



ActiveLearn

Videos, animations, powerpoints

1,000s worksheets

Progress and Assess

Online homework



ResultsPlus is the free online results analysis tool for teachers - it provides analysis features that other similar solutions don't

- Provides a detailed breakdown of student performance in Edexcel exams.
- Helps identify topics where the student can benefit from further learning and allows this knowledge to inform teaching strategies and approaches.
- Provides a comparison of student performance at regional level.
- Allows you to view your school's performance against other Pearson Edexcel schools in your country. You can also find student results analysis from their previous Pearson Edexcel school.
- Mock exams results can also be fed into the system to produce an analysis.
- [ResultsPlus Direct](#) gives your students access to their final grades and performance breakdown, wherever they are.
- Sign up for free ResultsPlus account in just a few quick and easy steps [here](#).
- Access additional video guides here:
 - [ResultPlus - Individual Student Analysis](#)
 - [ResultsPlus - Cohort Analysis](#)
 - [ResultsPlus - Mock Analysis](#)
 - [ResultsPlus - Global Analysis](#)



examWizard is a free tool for teachers containing a bank of past paper questions to help create their own bespoke mock exams and tests to focus on particular topic areas as needed:

- Use existing mark schemes for accurate marking
- Use existing examiner report for insight
- Use the results to understand where students need more support, informing teaching strategies.

Unlike other similar question banks, ExamWizard is:

- Available free to all Edexcel centres
- Updated with latest questions faster, following the exam series
- One stop shop for assessment material with access to whole past papers and examiner reports as well as the ability to construct bespoke ones easily with content tagged to specific attributes.

New Access to Script (ATS) Online Portal

Access to Scripts (ATS) is a free online portal which allows teachers to immediately access electronically marked exam papers

Provides enhanced transparency and

- Offers transparent approach to marking process
- Provides better understanding of marking before requests for enquiries about results are made
- Provides excellent aid for teaching and preparing other cohorts for examinations by helping you to evaluate a student's performance on particular questions in relation to what they have been taught.

Available instantly from results day for all our examination series, for a defined window, you can view and download scripts which have been marked online free of charge from our Self-Service Portal.

For more information on ATS, and the post results windows, visit our [post-results pages here](#).



Examination feedback

- ❖ Look out for our pre-recorded feedback sessions for International GCSE
- ❖ These provide feedback directly from the Principal Examiner on the summer's exams
- ❖ Examiner reports are also provided on each subject website, along with question papers & mark schemes

Contact your Subject Advisor

Your Science Subject Advisor team can be contacted through our website

<https://qualifications.pearson.com/en/contact-us/teachers.html>

Phone: **+44 (0)330 058 9493**

Twitter: [**@PearsonSciences**](#)

Thank you

Find out more about us at:
<http://qualifications.pearson.com>