

# INTERNATIONAL GCSE 2017

## GETTING READY TO TEACH SCIENCE (SINGLE AWARD)



**Location:**

**Trainer:**

# Aims and Objectives

1. Specification content and structure
2. Practical and mathematical skills
3. Assessment and grading
4. Sample Assessment materials
5. Support and published resources

# Today's Agenda

1000 – 1010 Welcome and introductions

1010 – 1110 Session 1: Specification structure & content

1110 – 1130 Morning break

1130 – 1300 Session 2: Practical & maths skills

1300 – 1400 Lunch

1400 – 1530 Session 3: Assessment, SAMs & resources

1530 – 1600 Plenary and departure

# Getting to know you

Are you:

- new to teaching or do you have many years' experience?
- a specialist in Biology, Chemistry or Physics?
- do you also teach separate sciences or Double Award?
- how many students will you teach Single Award to?

# Headlines

- New course, based on half the content of the new Science (Double Award) International GCSE
- Same style of question papers as the rest of the International GCSE Science suite
- Written assessment of practical skills
- Worth one International GCSE
- Grading moves to new 9 – 1 system to match changes in UK reformed GCSE



## Our suite of International GCSEs

Our International  
GCSE Science  
specifications

**EXAM SERIES**  
January\*  
May / June

\*not for Single  
Award

**BIOLOGY**

**CHEMISTRY**

**PHYSICS**

**SCIENCE (DOUBLE AWARD)**

**SCIENCE (SINGLE AWARD) - NEW!!**

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

# Dates for the new specifications

- New specifications are designed for first teaching in **September 2017**
- Some schools teach over 3 years, so the specification has been available for first teaching from **September 2016**
- Examinations available in **May/June** each year after the first exam series in **May/June 2019**



# Overview of dates

SEPTEMBER 2016

MAY / JUNE 2017

SEPTEMBER 2017

MAY / JUNE 2019

"LEGACY"

Many schools have been offering GCSE Science (Core)

"LEGACY"

Final opportunity to sit GCSE Science (Core)

"NEW"

Yr 9 / 3<sup>rd</sup> Form embark on new specifications

"NEW"

All students\* now being taught new specifications

\* except students being taught over 1 year

"NEW"

First exam series for new specifications

# INTERNATIONAL GCSE SCIENCE (SINGLE AWARD)

## Specification content



## Science (Single Award) – 4SS0

- Specification is about half the size of the Science (Double Award)
- Contains a number of embedded (“core”) practicals
- Students sit Paper 1 in Biology, Chemistry and Physics
- Students achieve one grades, based on performance across all three papers
- Progression to A level not recommended, but students could progress to Double Award or separate sciences

# Overview of content

- An overview of most topics
- Not designed to be “the easy parts” of science
- Even amounts of each of the three sciences
- Can be used as an introductory course; or as a final course

# Biology qualification content summary

There continue to be five topic areas in the specification:

<b>Nature and variety of living organisms</b> <ul style="list-style-type: none"><li>▪ Characteristics of living organisms</li><li>▪ Variety of living organisms</li></ul>	<b>Structures and functions in living organisms</b> <ul style="list-style-type: none"><li>▪ Organisation</li><li>▪ Cell structure</li><li>▪ Bio molecules</li><li>▪ Movement in &amp; out of cells</li><li>▪ Nutrition</li><li>▪ Respiration</li><li>▪ Gas exchange</li><li>▪ Transport</li></ul>	<b>Reproduction and inheritance</b> <ul style="list-style-type: none"><li>▪ Reproduction</li><li>▪ Inheritance</li></ul>	<b>Ecology and the environment</b> <ul style="list-style-type: none"><li>▪ Organisms in environment</li><li>▪ Feeding relationships</li><li>▪ Cycles within ecosystems</li></ul>	<b>Use of biological resources</b> <ul style="list-style-type: none"><li>▪ Food production</li><li>▪ Genetic modification</li></ul>
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# Chemistry qualification 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
- Formulae and equations
- Ionic and covalent bonding

## Inorganic Chemistry

- Groups 1 & 7
- Reactivity series
- Gases in the atmosphere
- Reactivity series
- Acids alkalis & titrations
- Chemical tests

## Physical Chemistry

- Energetics
- Rates of reaction

## Organic Chemistry

- Introduction
- Crude oil
- Alkanes
- Alkenes
- Polymers

# Physics qualification content summary

There are now eight topic areas in the specification:

**Forces and  
motion**

**Electricity**

**Waves**

**Energy  
resources and  
energy  
transfers**

**Solids, liquids  
and gases**

**Magnetism  
and electro-  
magnetism**

**Radioactivity  
and particles**

**Astrophysics**

## ACTIVITY 1 – Getting to know the new specification

Use the specification to identify any topic areas that will be high demand for Single Award students.

**How will you teach these topics?**

**What resources might be useful for delivering these topics?**



## Course planner

- The website has a course planner to help you plan the delivery of the new specifications

## Schemes of work

- An editable scheme of work is provided for the Single Award specification.
- It includes many suggested activities to enrich the delivery of the specification in classrooms.

### **HOW DO YOU TEACH THE SPECIFICATION?**

- Most teachers deliver over a two year period.
- Which order do you choose to teach the topics?
- Is a spiral curriculum possible e.g. a little of each topic taught every year to make progress more gradual?

Any questions about the content or structure?



**MORNING BREAK!**

**Please be back in 20 minutes**

# INTERNATIONAL GCSE SCIENCE (SINGLE AWARD)

## Practical skills



# 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
- The current definitions document will be revised to outline the meanings of the terms that we expect International GCSE science students to be familiar with

# Experimental skills

The specification contains a number of Core Practicals which

- form the basis for a practical curriculum
- introduce students to a range of practical work
- develop experimental skills

The complete list of Experimental Skills is in your pack

# 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** – reproduced in your pack
- 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 – Biology

Investigate...

- ...food samples for the presence of glucose, starch, protein and fat
- ...how enzyme activity can be affected by changes in temperature
- ... photosynthesis, showing the evolution of oxygen from a water plant, the production of starch and the requirements of light, carbon dioxide and chlorophyll
- ... the population size of an organism in two different areas using quadrats
- ... the role of anaerobic respiration by yeast in different conditions

## Embedded practicals – Chemistry

- Investigate paper chromatography using inks/food colourings
- Determine the approximate percentage by volume of oxygen in air using a metal or a non-metal
- Investigate temperature changes accompanying some types of change (salts dissolving in water, neutralisation, displacement, combustion)
- Investigate the effect of changing the surface area of marble chips and of changing the concentration of hydrochloric acid on the rate of reaction between marble chips and dilute hydrochloric acid

## Embedded practicals – Physics

Investigate...

- ... the motion of everyday objects such as toy cars or tennis balls
- ... the refraction of light, using rectangular blocks, semi-circular blocks and triangular prisms
- ... the magnetic field pattern for a permanent bar magnet and between two bar magnets
- ... the penetration powers of different types of radiation using either radioactive sources or simulations

## 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

## ACTIVITY 2

### **BIOLOGY**

- Experimental design questions are marked using the CORMS system
- Construct a mark scheme for an experimental design

### **CHEMISTRY**

- Look at the activity of finding the percentage of oxygen in air.
- What questions could you ask students about this practical?

### **PHYSICS**

- Look at the activity for investigating refraction.
- What method could you follow to meet the requirements of this practical?

# 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

The support material includes guidance 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

**Any questions about practical skills?**





# INTERNATIONAL GCSE SCIENCE (SINGLE AWARD) 2017

## Mathematical skills



# 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 5% in Biology, 15% in Chemistry, 25% 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

## ACTIVITY 3

Your pack contains example questions from the SAMs which use mathematical skills.

**How does the level of maths in these questions match the level of ability in maths of your Single Award students?**

**What strategies can you use to improve how well your students approach mathematical questions?**

# Any questions about maths skills?



# INTERNATIONAL GCSE SCIENCE (SINGLE AWARD) 2017

## Assessment



# 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:  
5% in Bio  
15% in Chem  
25% in Phys

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

# Assessment objectives

## A01

Knowledge and understanding of biology / chemistry / physics

~ 40%  
of total marks

## A02

Application of knowledge and understanding, analysis and evaluation of biology / chemistry / physics

~ 40%  
of total marks

## A03

Experimental skills, analysis and evaluation of data and methods in biology / chemistry / physics

~ 20%  
of total marks



# Assessment summary

**Paper 1B**

One hour and 10 minutes; 60 marks

**Paper 1C**

One hour and 10 minutes; 60 marks

**Paper 1P**

One hour and 10 minutes; 60 marks

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

Candidates sit a paper in  
each of the three Sciences to  
make up either the Single  
Award or the Double Award

**LUNCH BREAK!**

**Please be back in 1 hour**

# INTERNATIONAL GCSE SCIENCE (SINGLE AWARD) 2017

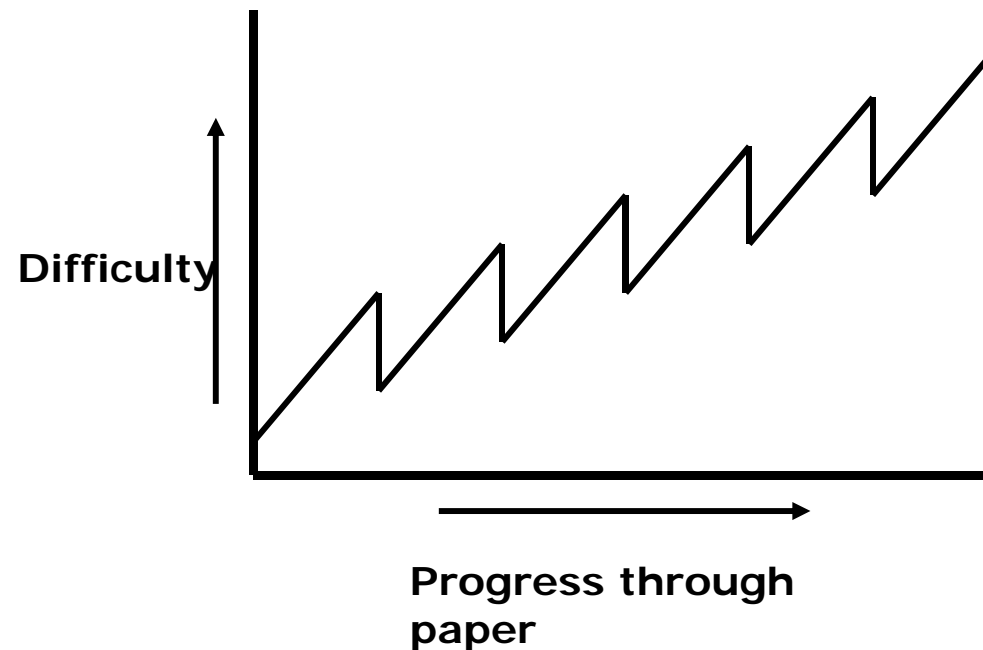
## Examination papers and grading



# 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 style is similar to that of the International GCSE suite:

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
U	G
	U

**GOOD PASS (DfE)**  
5 and above = top of C and above

**AWARDING**  
4 and above = bottom of C and above

Source:

[https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/465873/your\\_qualification\\_our\\_regulation.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/465873/your_qualification_our_regulation.pdf)

## 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 are awarded a Grade 7

### 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



Any questions about the new grading scale?



# INTERNATIONAL GCSE SCIENCE (SINGLE AWARD) 2017

## Command words



## 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
- The full list is reproduced in your pack

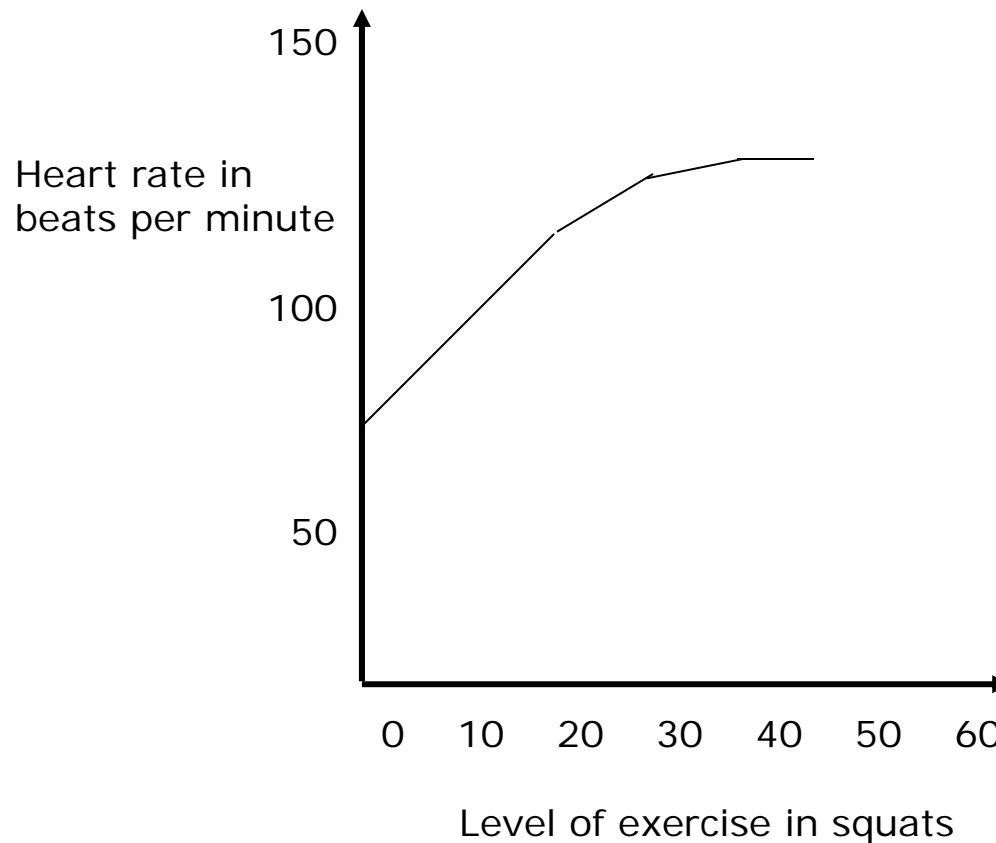
## Command words – describe or explain?

These two command words are often used in questions, but sometimes students are not clear about the differences between them – look at what appears in Appendix 5

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

# What does EXPLAIN mean?

The graph below shows the effect of exercise on human heart rate.



**Question:** Explain the pattern shown by the graph.

**Answer:** As the level of exercise increases  
so does the heart rate. = ✗

**Answer:** As the level of exercise increases so does the heart rate BECAUSE exercising muscle; cells need a supply of glucose; and oxygen; to carry out aerobic respiration; which makes ATP.; Also, more blood needs to be sent to the skin for heat loss.; The graph levels off at 48 squats because there is a maximum rate; at which the heart can beat regardless of the level of exercise. = ✓

# 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)

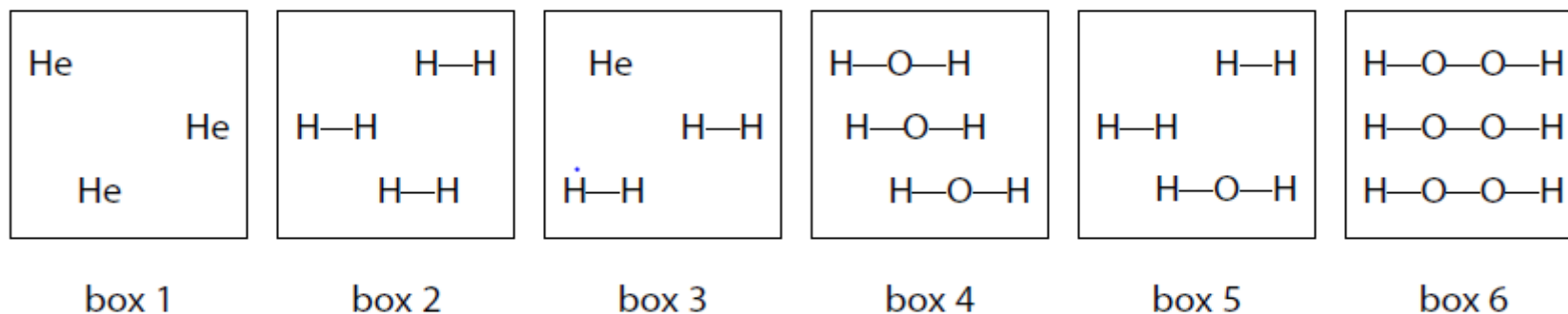
## Comment

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 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 about command words?**



# INTERNATIONAL GCSE SCIENCE (SINGLE AWARD) 2017

A closer look at the SAMs  
(Sample Assessment Materials)



# Question Styles

- Multiple choice
- Short, structured questions
- Graph plotting
- Data analysis
- Longer answers – points based marking
- Calculations

# Data analysis in Biology

A shrew is a very small mammal.

Different types of shrew have different body masses.

The table gives the oxygen used, in  $\text{cm}^3$  per g per hour, by five different types of shrew.

Type of shrew	Body mass of shrew in g	Oxygen used in $\text{cm}^3$ per g per hour
Masked	2.5	10.8
Wandering	4.5	8.6
Monterey	6.5	7.2
Sonoma	11.5	5.2
Short-tailed	20.0	4.0

# INTERNATIONAL GCSE SAMs

- You can all access the SAMs (including mark schemes) through the Pearson website
- A second set of SAMs papers is currently being written and should be available in April / May 2018

## ACTIVITY 4

This Activity is about how students are able to answer questions on the new specification

You will need:

- Questions
- Mark scheme

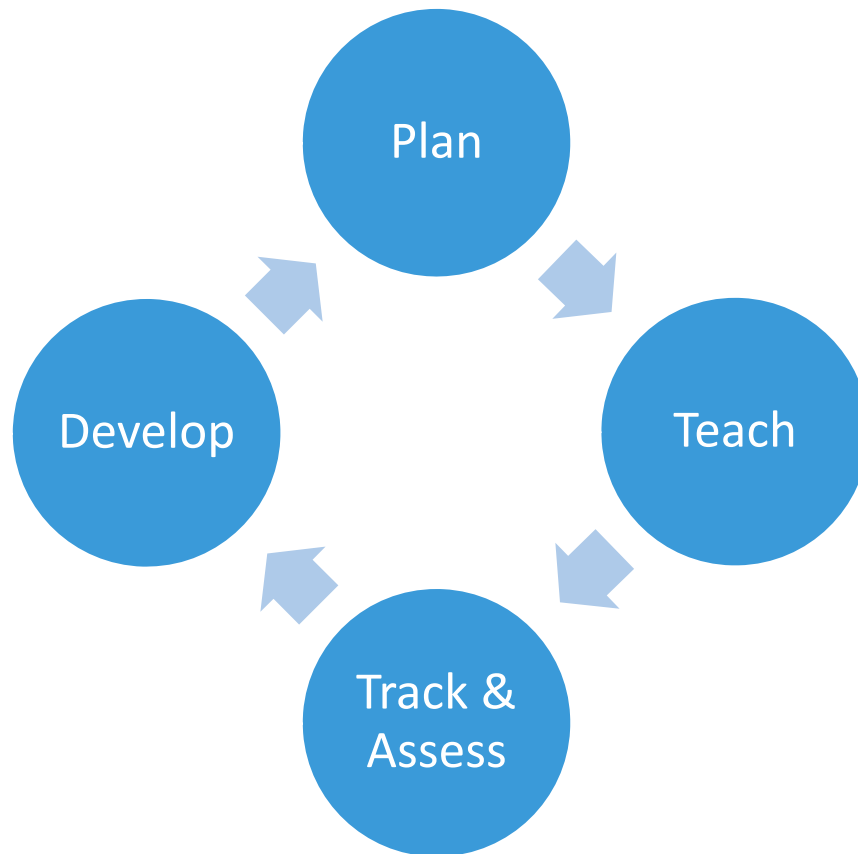
from your pack

# INTERNATIONAL GCSE SCIENCE (SINGLE AWARD) 2017

## Support and published resources



# Supporting great science teaching

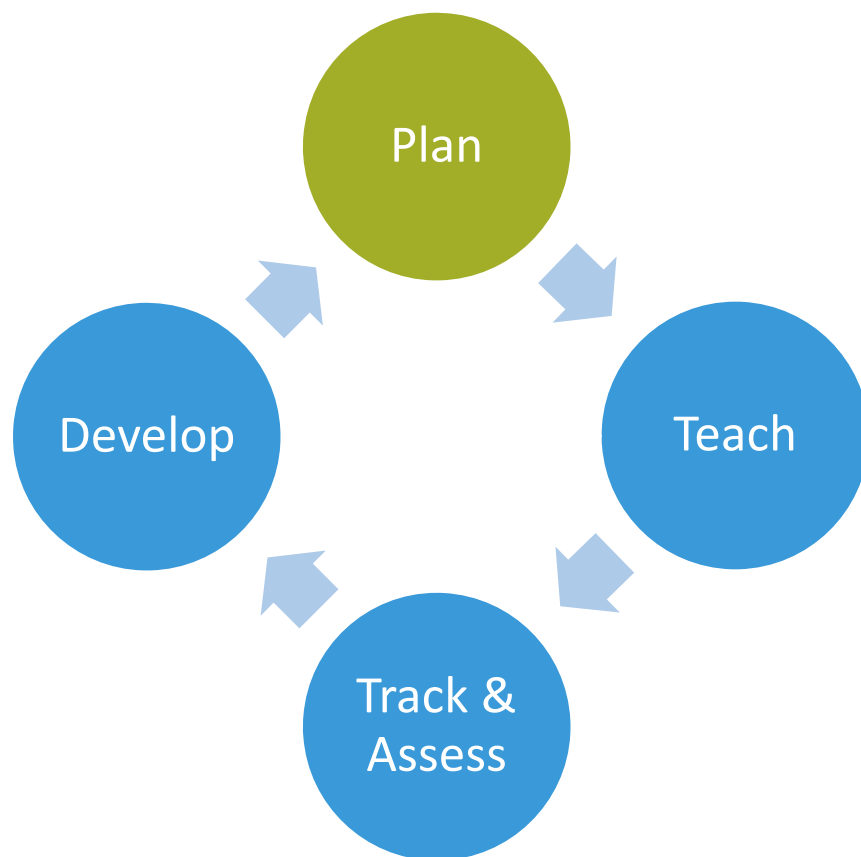


- We will provide a range of support to help you plan, teach, track and assess, and develop the new course.
- This includes free qualification support to download from our website as well as published resources\*

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



# Supporting great science teaching

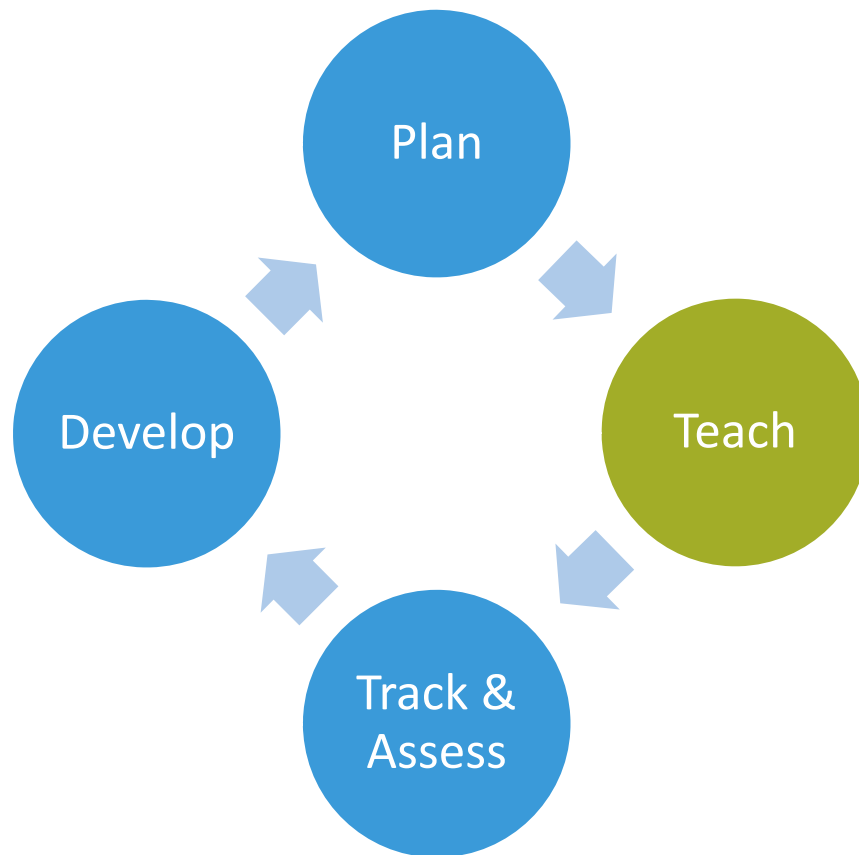


To help you plan the new course we are providing:

## **Free support for the qualification-**

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

# Supporting great science teaching



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

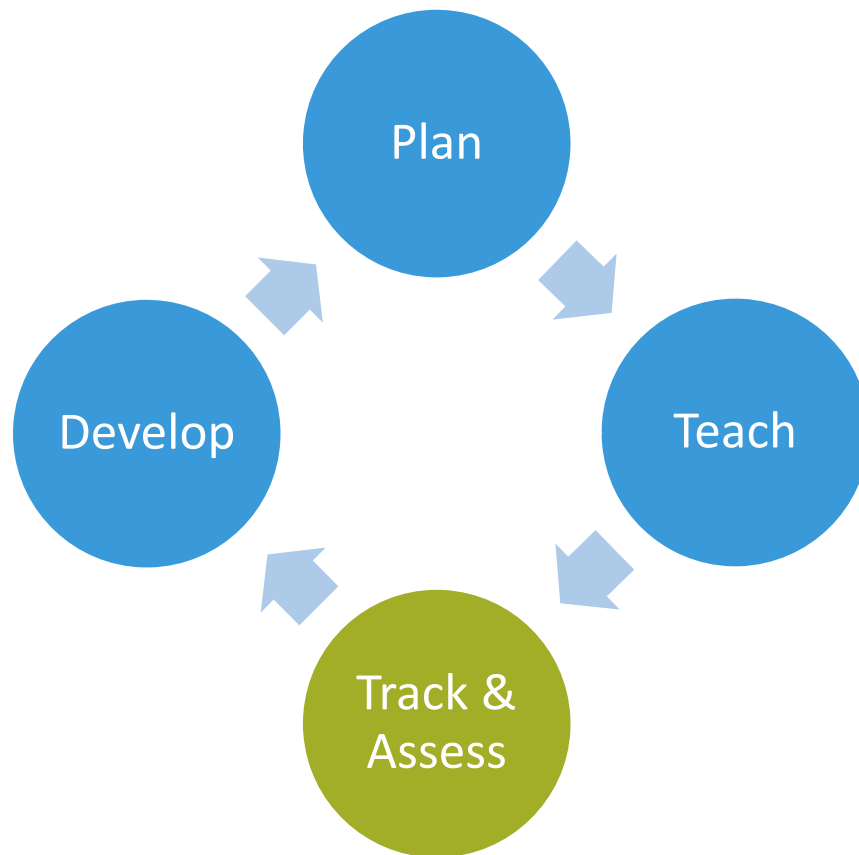
## **Free support for the qualification:**

- Support for practical activities

## **Published resources from Pearson:**

- Student book and ActiveBook (for Double Award)

# Supporting great science teaching



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:**

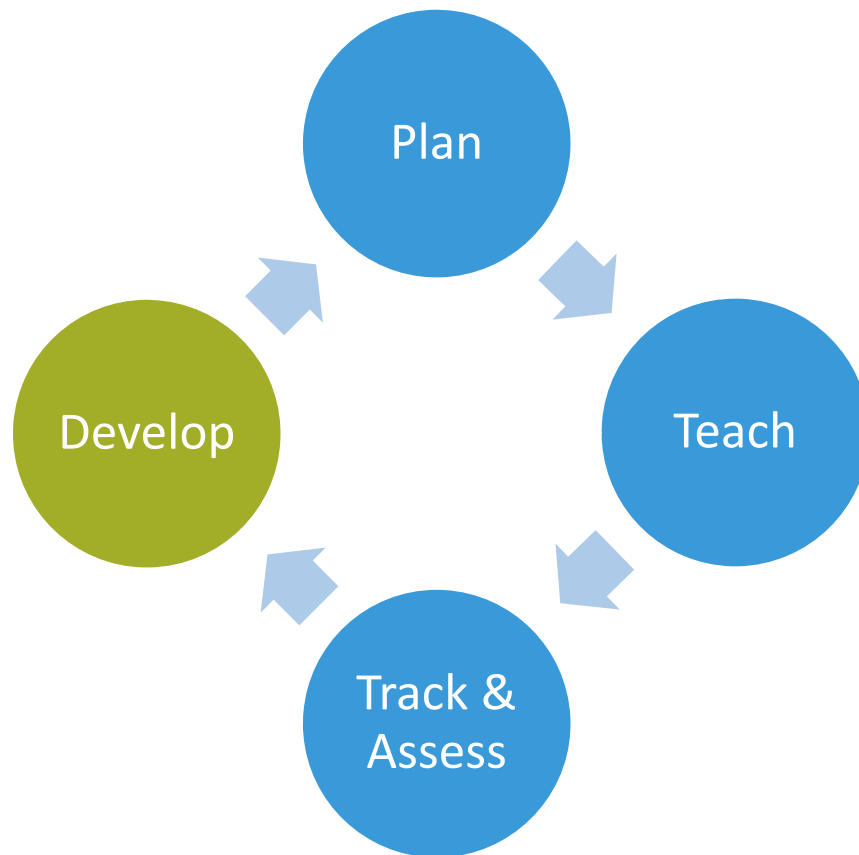
- Consideration is being given to a Revision Guide and Workbook

\* You do not have to purchase any resources to deliver our qualification

## 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.

# Supporting great science teaching



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](mailto:TeachingScience@pearson.com)

# 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.

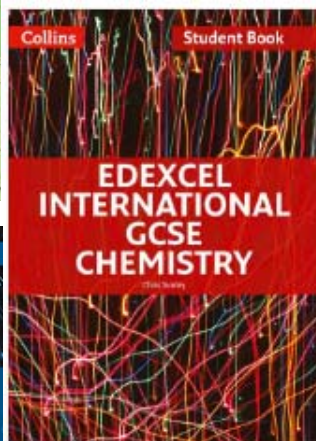
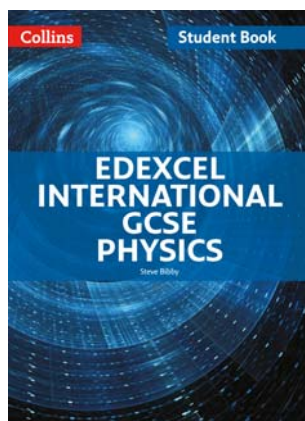
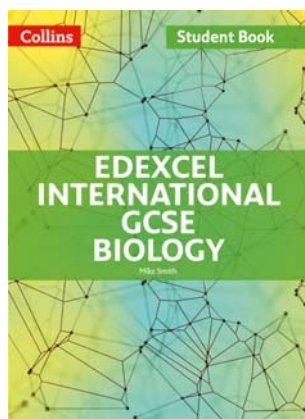
However, it is not necessary to purchase endorsed resources to deliver our qualifications.

## Published resources for sale 2

- Four UK publishers are preparing resources, including Student Books, for the new International GCSE qualifications
- These are **Collins, Hodder, International GCSE Physics** 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

[www.collins.co.uk/category/International/Ages+14-16/Science/](http://www.collins.co.uk/category/International/Ages+14-16/Science/)



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

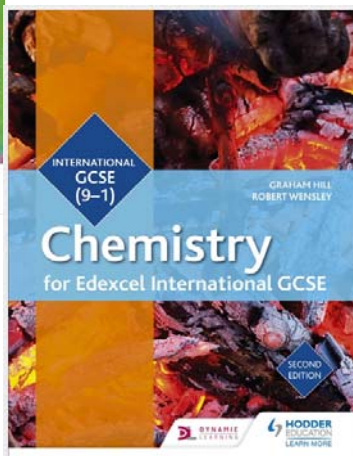
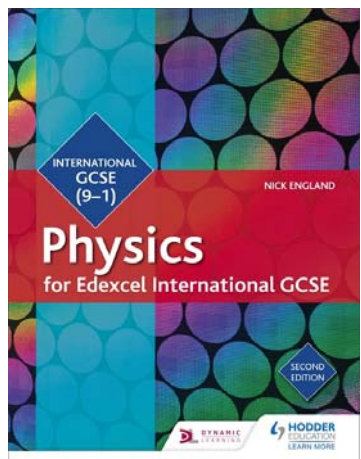
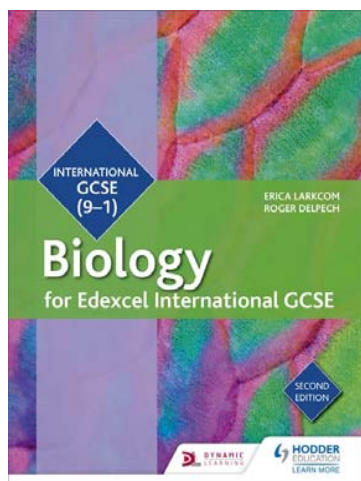
The Collins Student Books allows you to co-teach Edexcel International GCSE separate sciences and Double Award Science

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



# Published resources – Hodder

[www.hoddereducation.co.uk/edexceligcse](http://www.hoddereducation.co.uk/edexceligcse)



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

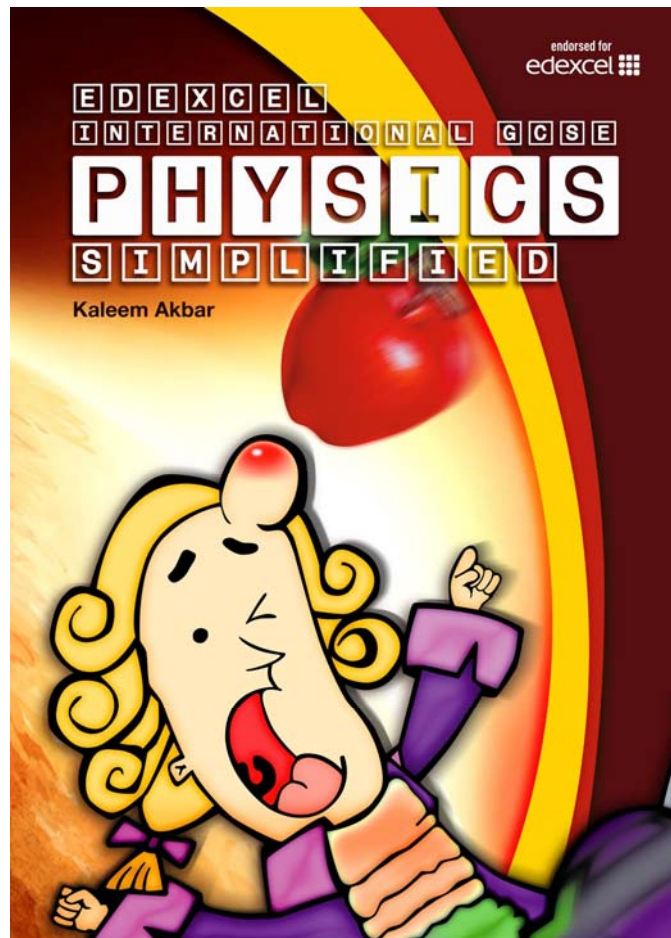
Provide your students with complete coverage of the new Edexcel International GCSE Science specifications with these affordable student books written by expert authors and teachers; testing knowledge and building practical skills throughout.

- **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 student books.

# Published resources – International GCSE Physics

[www.igcsephysics.com/edexcel/](http://www.igcsephysics.com/edexcel/)

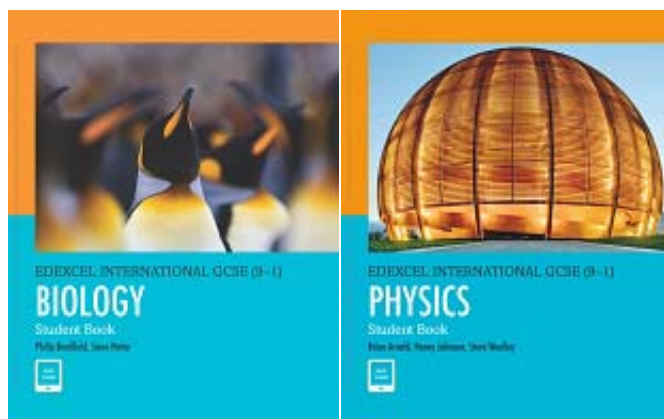


Edexcel International GCSE Physics Simplified provides everything students need as they prepare for their International GCSE examinations. It is written to take the mystery out of physics but to keep the magic in!

Straightforward language and a helpful glossary ensure that the book is accessible to all. Clear images aid understanding; worked example questions are provided throughout. National and international teaching experience of over a decade ideally places the author to understand the requirements of students both in the UK and abroad.

# Published resources – Pearson

[www.pearsonglobalschools.com/](http://www.pearsonglobalschools.com/)



- **Student Book – from May 2017**

These new resources, which include access to an eBook, have been developed for the new Edexcel International GCSE specifications with progression, international relevance and support at their core, and are designed to supply students with the best preparation possible for the examination.

- **Teacher Pack– from August 2017**

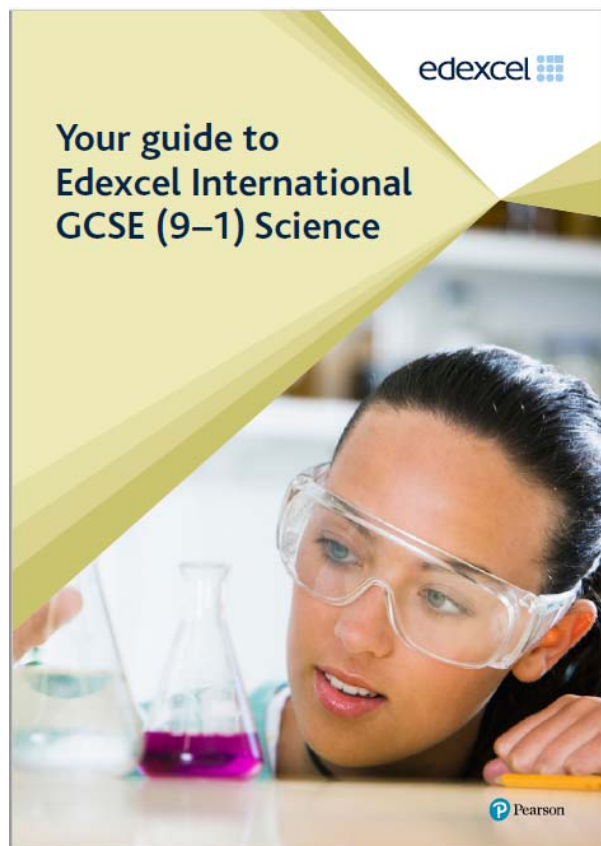
These new resources, available online, will include videos, worksheets, lesson plans and other support to help you deliver the International GCSE.

## Free resources from the website:

- Specification
- Sample Assessment Materials (SAMs)
- Getting Started Guides
- Mapping documents
- Course planner and schemes of work
- Guides for maths and practical skills

# Free resources from the website:

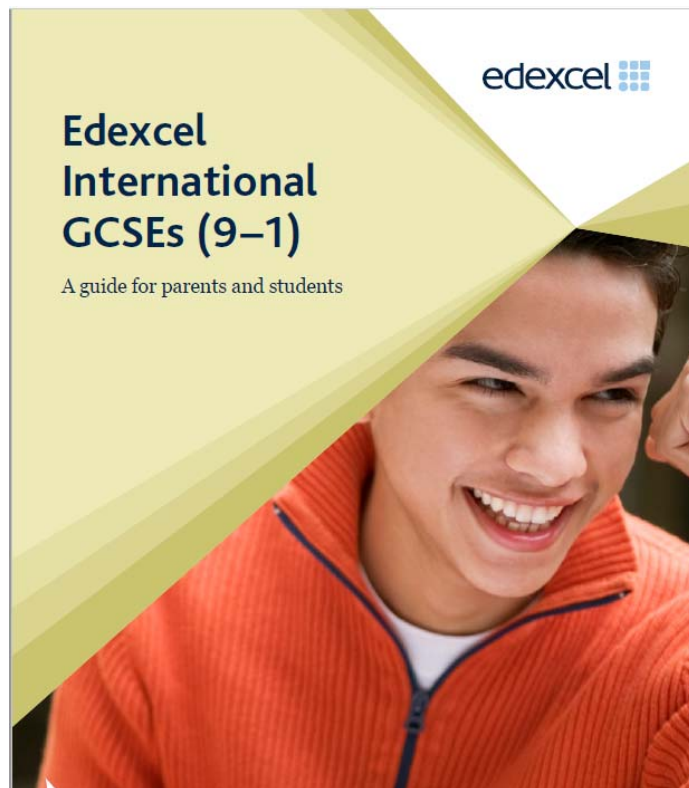
## Your guide to Edexcel International GCSE (9-1) Science



- 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

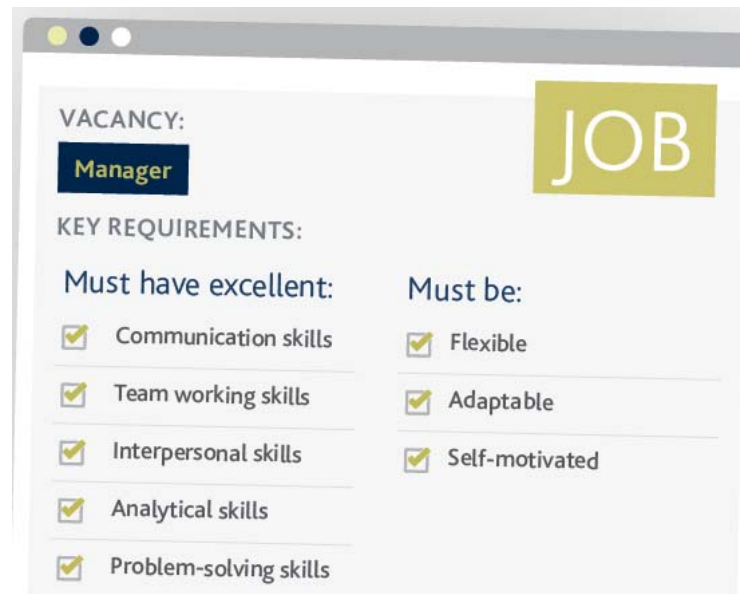


- This is a glossy brochure that gives general information about all the 9-1 GCSEs
- It gives full details of the 9-1 grading scale

# 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



The presentation is over –  
any final questions?







**Finally – thank you for coming**

**Please complete your evaluation form**

**Have a safe journey home**