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INTERNATIONAL GCSE SCIENCES 2017

An introduction to our new specifications

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Headline changes

- Some revisions to subject content; including a review of content split between Double Award and separate sciences
- Removal of equivalent Edexcel Certificate specifications
- Slight changes to paper lengths and number of marks
- No change to assessment style; or to assessment of practical skills
- Introduction of Science (Single Award)
- Grading moves to new 9 – 1 system

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Our suite of 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

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Dates for the new specifications

- New specifications are designed for first teaching in **September 2017**, with first exams in **May/June 2019**
- Many schools teach over 3 years, the specifications will be available to schools to teach from **September 2016**
- Final specifications and sample question papers are now available on our website

Dates for the new specifications

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

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Specification content

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Biology qualification content summary

There continue to be five topic areas in the specification:

Nature and variety of living organisms	Structures and functions in living organisms	Reproduction and inheritance	Ecology and the environment	Use of biological resources
▪ Characteristics of living organisms ▪ Variety of living organisms	▪ Organisation ▪ Cell structure ▪ Bio molecules ▪ Movement in & out of cells ▪ Nutrition ▪ Respiration ▪ Gas exchange ▪ Transport ▪ Excretion ▪ Coordination & response	▪ Reproduction ▪ Inheritance	▪ Organisms in environment ▪ Feeding relationships ▪ Cycles within ecosystems ▪ Human influences on environment	▪ Food production ▪ Selective breeding ▪ Genetic modification ▪ Cloning

Overview of changes in Biology

Some additions:

- Mitochondria & ribosome function
- **Stem cells and specialisation (B)**
- Test for protein and lipid
- Risk factors for coronary heart disease
- **Hormones and the menstrual cycle (B)**
- **RNA, protein transcription and translation (B)**
- Theory of natural selection
- **Concept of biodiversity (B)**

Some deletions:

- **Turgidity of plant cells (B)**
- **Water cycle (B)**

Overview of changes in Biology

Moving from Double Award into Biology:

- Balanced diet
- Gas exchange in plants
- Transpiration
- Kidney function
- DNA structure
- Genetic mutations
- Deforestation
- Fish farming
- Micropropagation and cloning

Overview of changes in Biology

Moving from Biology into Double Award:

- Role of phloem
- Structure and function of the eye
- Germination
- Embryo and development
- Effects of pollution on water
- Fermenters and production of yoghurt
- Transgenic organisms

Chemistry qualification content summary

There are now four topic areas in the specification:

Principles of Chemistry

- Atomic structure
- Bonding
- Periodic Table
- Electrolysis
- Moles

Inorganic Chemistry

- Groups 1 & 7
- Reactivity series
- Metal extraction
- Acids and salts
- Tests for ions and gases

Physical Chemistry

- Energetics
- Rates of reaction
- Equilibria

Organic Chemistry

- Crude oil
- Alkanes and alkenes
- Alcohols
- Carboxylic acids and esters
- Polymers

Overview of changes in Chemistry

Some additions:

- Solubility & **solubility curves (C)**
- Rf values
- **Definitions of anode, cathode etc (C)**
- **Explaining trend in Gr 7 reactivity (C)**
- Flame test for copper(II)
- Definitions in organic: types of formula and reaction types
- **Alcohols up to C_4 (C)**
- **Carboxylic acids, esters and polyester (C)**
- PTFE
- **Reaction profiles for catalysed reactions (C)**
- **Steel and alloys (C)**

Overview of changes in Chemistry

Some deletions:

- **Avogadro number (C)**
- **Faraday calculations (C)**
- **Differences between HCl (g) and HCl (aq) (C)**
- Lab preparation of oxygen and carbon dioxide
- Properties of carbon dioxide
- Details of extraction of iron, using a blast furnace*
- Details of the extraction of aluminium*
- Haber process
- **Contact process (C)**
- **Electrolysis of sodium chloride solution (C)**

* General principles are expected, not specific knowledge of individual extractions

Overview of changes in Chemistry

Moving from Double Award into Chemistry:

- Titration calculations
- Metallic bonding
- Electrolysis
- Preparation of soluble salts by titration
- Preparation of insoluble salts by precipitation
- Energy level diagrams
- Dynamic equilibria
- Extraction of metals

Overview of changes in Chemistry

Moving from Chemistry into Double Award:

- Percentage yield calculations
- Ionic lattices
- Structures of diamond and graphite
- PVC
- Molar enthalpy calculations

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

Overview of changes in Physics

Some additions:

- Use of $v^2 = u^2 + 2as$
- Stopping distance = thinking distance + braking distance
- Calculating I, V and R in electrical circuits
- Use of E = QV
- Doppler effect
- Ray diagrams for reflection and refraction
- Radiation emission / absorption related to surface and temp
- **Specific heat capacity (P)**
- Contamination vs irradiation
- Nuclear fusion
- Stellar evolution & **brightness of stars (P)**
- **Evidence for Big Bang, through CMBR and red shift (P)**

Overview of changes in Physics

Some deletions:

- Electrical hazards
- **Relationship between wavelength, gap and diffraction (P)**
- Ray diagram for a virtual image
- **Digital and analogue signals (P)**
- Brownian motion

Overview of changes in Physics

Moving from Double Award into Physics:

- Centre of gravity and moments
- Conductors and insulators
- Frequency range for human hearing
- Speed of sound in air
- Energy transfers in electricity generation

Overview of changes in Physics

Moving from Physics into Double Award:

- Vectors and scalars
- Calculating a resultant force
- Definition of voltage
- Concept of diffraction
- Temperature proportional to average kinetic energy
- Use of $P_1/T_1 = P_2/T_2$ for gases

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Double Award (Science) & Single Award (Science)

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Science (Double Award)

- The grouping of topics in a more logical way leads to more changes here than to separate sciences
- Students take Paper 1 in Biology, Chemistry and Physics
- Students achieve two grades, based on performance across all three papers
- The two grades may not be the same
- Students may still progress to A level

Science (Single Award)

This qualification is still under development – but should be available soon.

Our proposed model is:

- Half the content of the Double Award specification
- Likely to involve a 1 hour paper in each science
- This paper may share some questions with the Double Award exam
- Students would achieve a single grade, based on performance across all three papers

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Assessment model

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Summary of assessment

FAMILIAR …

… AND NEW

100% external assessment – with no coursework

Linear assessment – all exams take in the same exam session

Questions using maths skills (10% in Biology 20% in Chemistry 30% in Physics)

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

Single tier of entry (untiered)

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

Assessment objectives

AO1	AO2	AO3
Knowledge and understanding of biology / chemistry / physics	Application of knowledge and understanding, analysis and evaluation of biology / chemistry / physics	Experimental skills, analysis and evaluation of data and methods in biology / chemistry / physics
~40 % of total marks	~40 % of total marks	~20 % of total marks

Assessment summary

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

Assessment summary

There will be two examination papers:

Paper 1	will **NOT** include the specification statements printed in **BOLD**
Paper 2	includes **ALL** the specification statements, including those printed in **BOLD**

Both papers have similar question types

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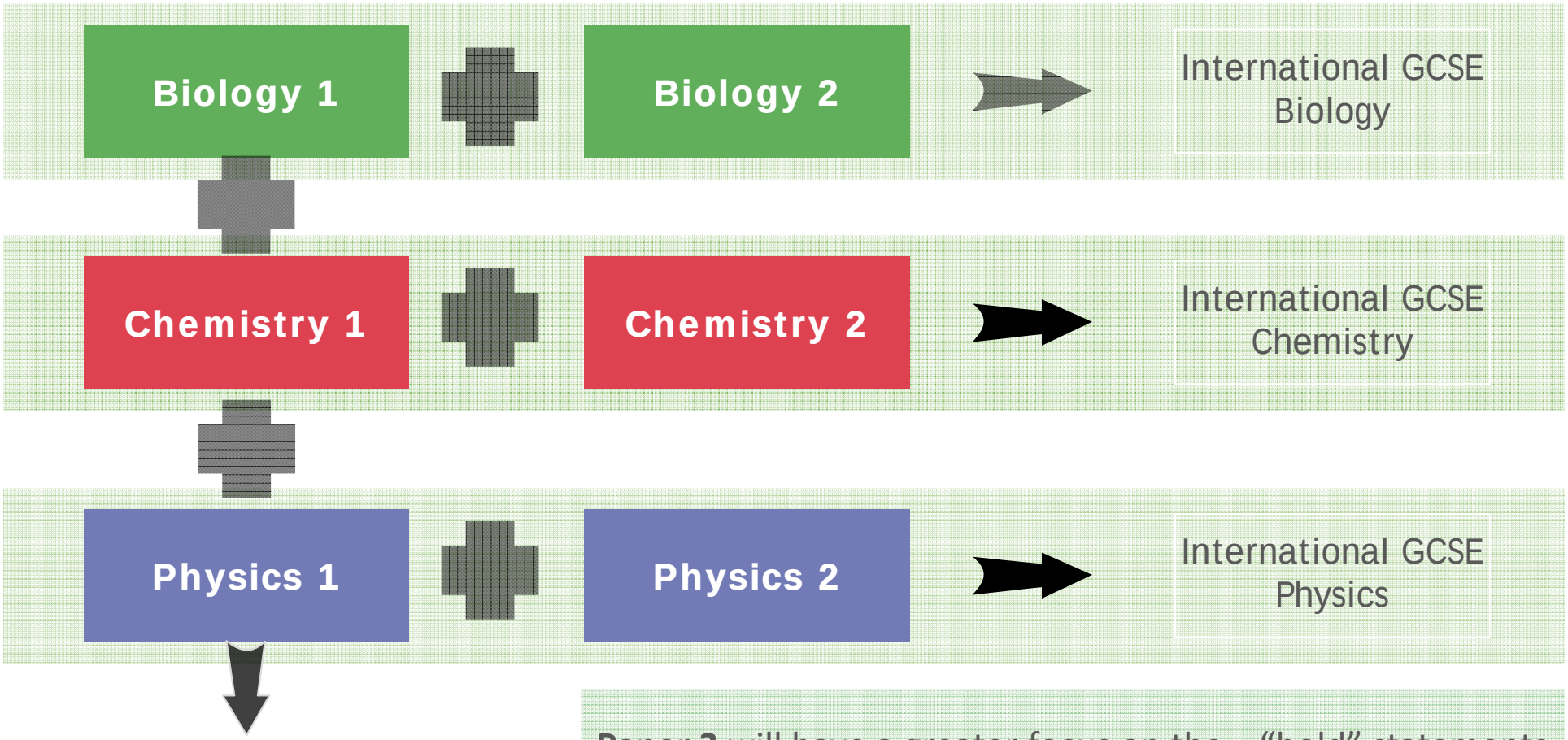

International GCSE Science (Double Award)

Paper 2 will have a greater focus on the "bold" statements not present in Double Award

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Practical and mathematical skills

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Practicals in the specification

- Specifications contain a number of suggested practicals
- Further suggestions for practicals appear in an Appendix
- The suggested practicals would form a basis for practical work, on which schools would be encouraged to build
- Questions on exam papers test practical skills, rather than recall of specific techniques – so may be in the context of any practical activity

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 specification will include 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

Mathematical skills

- The development and use of relevant mathematical skills is key to progress in science subjects
- A list of mathematical skills which should be developed appears in the Appendix for each specification
- These skills will be tested in exam papers within the context of the science
- Assessment of mathematical skills will account for 10% of marks in Biology, 20% in Chemistry and 30% in Physics

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Examination papers

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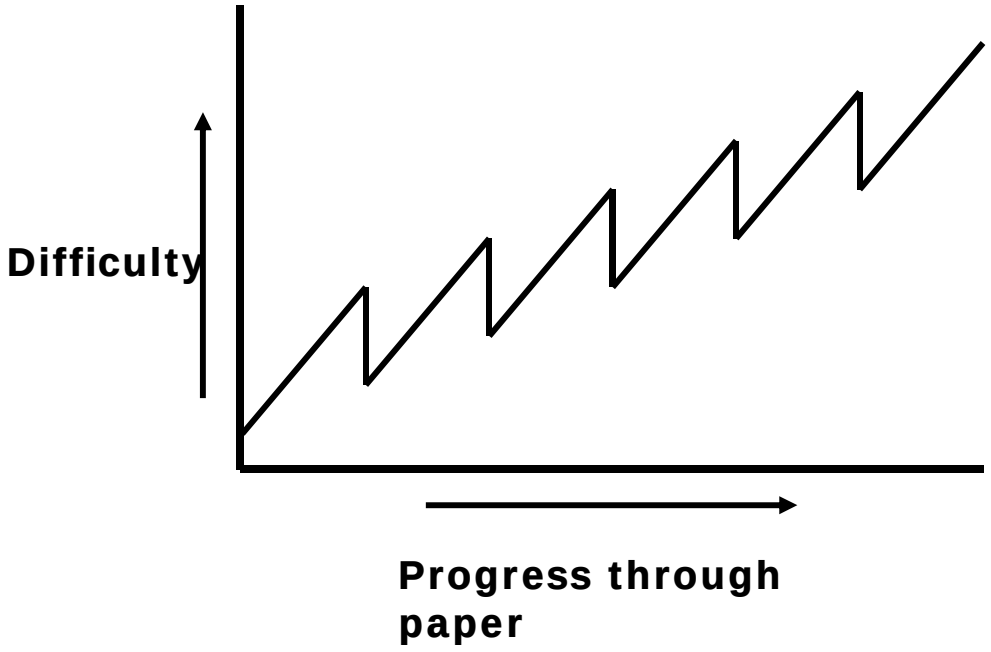
An ideal incline of difficulty

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



Exam question guide

The question style is 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

Command words

- All our qualifications in science now use a common taxonomy for command words
- These can be found in an appendix at the back of the specification
- Students can still expect a range of command words across the demand range of the exam paper

Specific assessment issues

BIOLOGY

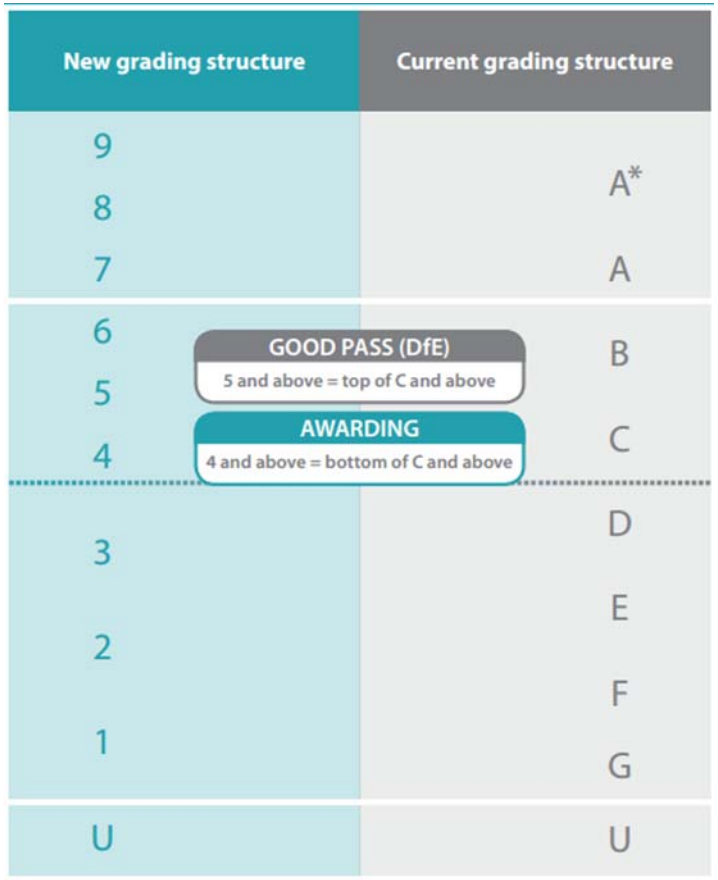
- Paper 1 will still retain an experimental design (CORMS) question
- Paper 2 will still begin with a comprehension question based on a short printed passage.

PHYSICS

- both Papers will require students to recall some equations *(these appear as "know and use…" in the specification)*
- others will be provided on a formula sheet *(these appear as "use…." in the specification)*

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



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Grade 9

- currently defined as “the top 20% of those scoring Grade 7”
- possibility that this may change, as Ofqual aware that this method may behave oddly in subjects with skewed distributions
- currently, we set grade boundaries using statistics from the international cohort
- modelling will take place to ensure that the new grading is fair to students

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Support for the new specification

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Planning and teaching

As changes are small, many existing resources will still be relevant!

Exam Wizard – online bank of past questions

Results Plus – post-results analysis service

A revised **Teacher Guide**, with **schemes of work**

A recommended teaching time would be at least 125 hours per science.

Specimen question papers

It is likely that a second set will be produced for 2018

Possible additional support for **practical work** e.g. worksheets for core practicals

Published resources

We are committed to helping teachers deliver our Edexcel qualifications and 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 - Pearson

- We plan to publish resources for separate sciences (inc. Human Biology)
- A separate Double Award Student Book is also planned
- Resources would include Student Book (& ActiveBook), plus digital support
- Work on this process will begin once final specifications are available
- Endorsement would be sought on all resources, as currently.

www.pearsonschoolsandfecolleges.co.uk/Secondary/Science

AVAILABLE: April 2017 for student books; August 2017 for digital resources

Published resources – Pearson

Support for new centres and early starters

- If you buy legacy textbooks for your Year 9 in September, look out for our free online download to cover topics in the new specification not covered by the legacy textbooks.
- We also have ways to support schools new to International GCSE, who will have Year 10 students sitting legacy and Year 9 sitting new International GCSEs.

Talk to your Curriculum Support Consultant to find about ways in which we can support you!

Published resources – Collins

- Plan to revise their current textbooks
- Work on this process will begin once final specifications are available
- Endorsement would be sought on all resources, as currently.

www.collins.co.uk/category/Secondary/Science

Published resources – Hodder

- Plan to revise their current textbooks and practice books
- Work on this process will begin once final specifications are available
- Endorsement would be sought on all resources, as currently.

www.hoddereducation.co.uk/Science

Published resources – IGCSE Physics

- Edexcel International GCSE Physics Simplified by Kaleem Akbar helps students as they prepare for their examinations from 2019. It is written to take the mystery out of physics but to keep the magic in!

http://www.igcsephysics.com/

Finally

- Any questions?