

Cambridge sciences

Cambridge
IGCSE

Cambridge
Pre-U

Biology
Chemistry
Physics
Co-ordinated Sciences
Combined Science



CAMBRIDGE
International Examinations

Excellence in education

Contents

- 1 Cambridge IGCSE
- 2 Cambridge IGCSE science syllabuses
- 3 Cambridge IGCSE sciences: Funding and league tables
- 4 Cambridge IGCSE Biology
- 5 Cambridge IGCSE Chemistry
- 6 Cambridge IGCSE Physics
- 7 Cambridge IGCSE Co-ordinated Sciences
- 9 Cambridge IGCSE Combined Science
- 12 Classroom support for teachers and students
- 13 Cambridge IGCSE recognition
- 15 Cambridge Pre-U
- 16 Cambridge Pre-U Biology
- 17 Cambridge Pre-U Chemistry
- 20 Cambridge Pre-U Physics
- 22 Cambridge Pre-U recognition
- 22 Support and resources for teachers
- 23 Cambridge International AS & A Levels
- 25 What next?

About us

Cambridge International Examinations prepares school students for life, helping them develop an informed curiosity and a lasting passion for learning. We are part of Cambridge Assessment, a department of the University of Cambridge.

Our international qualifications are recognised by the world's best universities and employers, giving students a wide range of options in their education and career. As a not-for-profit organisation, we devote our resources to delivering high-quality educational programmes that can unlock learners' potential.

We are the world's largest provider of international education programmes and qualifications for 5 to 19 year olds

Over 10000 schools are part of the Cambridge learning community

Cambridge programmes and qualifications are taken in more than **160 countries**

98% of Cambridge schools would recommend us to others

Cambridge IGCSE®

Cambridge
IGCSE

Cambridge IGCSE is the world's most popular international qualification for 14 to 16 year olds. It is taken by students in over 140 countries around the world.

Over 2500 schools in the UK are now teaching Cambridge IGCSE and it continues to gain popularity with more and more joining the Cambridge community.

Benefits for you and your school

Cambridge teachers tell us that Cambridge IGCSEs are flexible and stimulating to teach. We design the syllabuses so that they can be taught holistically, with exams at the end. This gives you freedom to plan lessons over time, and flexibility to adapt your teaching along the way – bringing in topical issues, or returning to key concepts to check students' understanding.

Our assessments test knowledge and understanding across the whole course. This approach has a positive impact on teaching and learning because it requires students to make links between topics, gaining a full understanding of the subject.

Cambridge IGCSE gives students excellent preparation for further study. Schools tell us it prepares students extremely well for A Level and Cambridge Pre-U by developing a solid foundation of knowledge and skills.

Benefits for your students

Teachers tell us that the extra level of flexibility in the Cambridge IGCSE curriculum and assessment makes

the subject more enjoyable for students. The linear structure of the assessment allows students more time to develop their ideas, and gain an all-round understanding of the subject. Cambridge IGCSE helps develop skills in creative thinking, enquiry and problem solving.

Cambridge IGCSE is an international passport to progression and success. It provides the perfect springboard to the Cambridge Advanced stage, typically for students who are aged 16 to 19 years, who are studying A Levels, Cambridge Pre-U, the International Baccalaureate diploma and other post-16 routes.





Cambridge IGCSE science syllabuses

Science plays an essential role in all our lives. It is vital that students undertake their scientific education in a compelling, relevant and exciting environment, and at a level appropriate to their abilities and future ambitions.

Cambridge IGCSE science syllabuses help students to gain knowledge and understanding of the subject, and learn how to handle information and solve problems. Students learn experimental and investigation techniques, which together will help them develop a deep understanding of the subject, and prepare them to become confident citizens of an increasingly technical world.

The curriculum for Cambridge IGCSE sciences provides options for different pathways:

- keen scientists can develop their skills fully and gain excellent preparation for more advanced study such as A Level, Cambridge Pre-U and the IB diploma
- students for whom sciences are not core subjects can gain a solid grounding in the essential aspects of sciences.

Core and extended curriculum

All students follow a core curriculum. For Cambridge IGCSE science, teachers can also stretch their students with an extended curriculum. Students can change level during the course according to their progression. Those following the core curriculum only are eligible for grades C to G. In sciences, extended curriculum students are eligible for grades A* to G.

Assessment

Assessment takes place at the end of the course and gives you options to suit your students, including written, coursework and practical assessments. This broadens opportunities for students to demonstrate their learning.

With a tiered structure for different ability levels, students of all abilities are assessed positively and bright individuals have the chance to excel. Grades are benchmarked using eight internationally recognised grades from A* to G, which have clear guidelines to explain the standard of achievement.

Current syllabuses

The summaries below are taken from the syllabuses for examination in 2016. Consult the syllabus for each subject, available on our website at www.cie.org.uk and contact us with any questions you may have about the suitability of Cambridge IGCSE or the Cambridge International Level 1/Level 2 Certificate for your school.

Cambridge IGCSE sciences: Funding and league tables

Many Cambridge IGCSE syllabuses, including Biology, Chemistry and Physics, are approved by Ofqual and funded for teaching in state schools in England and Northern Ireland. They are included in the UK government's school performance tables and count towards the English Baccalaureate (Ebacc).

When a Cambridge IGCSE is approved for regulation by Ofqual, it appears on the Register of Regulated Qualifications as a Cambridge International Level 1/Level 2 Certificate. This is the official title for all Cambridge IGCSEs approved by Ofqual.

To count in the English Baccalaureate, all three science Cambridge International Level 1/Level 2 Certificates must be taken and grades A* to C achieved in two of them.

The science qualifications do not need to be provided by the same exam board and can be a mixture of Cambridge IGCSE and GCSE qualifications.

Subject	Funded for teaching in state schools	Counts towards Ebacc
Cambridge IGCSE Biology (0610)	✓	✓
Cambridge IGCSE Chemistry (0620)	✓	✓
Cambridge IGCSE Physics (0625)	✓	✓
Cambridge IGCSE Co-ordinated Sciences (double award) (0654)		
Cambridge IGCSE Combined Science (0653)		

Check the Department for Education website at www.education.gov.uk for the latest information on our Ofqual-approved qualifications and updates on which qualifications count towards performance league tables.



“It’s a great course for students who want to be scientists in the future.”

Andrew Hutchinson, Executive Principal, Parkside Federation, Cambridge, UK

Cambridge IGCSE Biology

Syllabus code 0610

With an emphasis on human biology, the Cambridge IGCSE Biology syllabus helps learners to understand the technological world in which they live, and take an informed interest in science and scientific developments. Learners gain an understanding of the basic principles of biology through a mix of theoretical and practical studies. They also develop an understanding of the scientific skills essential for further study.

As they progress, learners understand how science is studied and practised, and become aware that the results of scientific research can have both good and bad effects on individuals, communities and the environment.



Cambridge IGCSE Biology assessment

Syllabus code 0610 (examination in 2016)

All candidates take three papers:

Paper 1 (Core) Multiple-choice paper. 40 questions of the four-choice type.	45 minutes	Weighted at 30% of total available marks
or		
Paper 2 (Extended) Multiple-choice paper. 40 questions of the four-choice type.	45 minutes	Weighted at 30% of total available marks
and		
Paper 3 (Core) A written paper consisting of short-answer and structured questions.	1 hour 15 minutes	Weighted at 50% of total available marks
or		
Paper 4 (Extended) A written paper consisting of short-answer and structured questions.	1 hour 15 minutes	Weighted at 50% of total available marks
and		
Paper 5 Practical test	1 hour 15 minutes	Weighted at 20% of total available marks
or		
Paper 6 Alternative to Practical	1 hour	Weighted at 20% of total available marks

Syllabus content

Candidates study the following topics:

- Characteristics and classification of living organisms
- Organisation of the organism
- Movement in and out of cells
- Biological molecules
- Enzymes
- Plant nutrition
- Human nutrition
- Transport in plants
- Transport in animals
- Diseases and immunity
- Gas exchange in humans
- Respiration
- Excretion in humans
- Coordination and response
- Drugs
- Reproduction
- Inheritance
- Variation and selection
- Organisms and their environment
- Biotechnology and genetic engineering
- Human influences on ecosystems.

Cambridge IGCSE Chemistry

Syllabus code 0620

The Cambridge IGCSE Chemistry syllabus enables learners to understand the technological world in which they live, and take an informed interest in science and scientific developments. Learners gain an understanding of the basic principles of chemistry through a mix of theoretical and practical studies. They also develop an understanding of the scientific skills essential for further study.

As they progress, learners understand how science is studied and practised, and become aware that the results of scientific research can have both good and bad effects on individuals, communities and the environment.



Cambridge IGCSE Chemistry assessment

Syllabus code 0620 (examination in 2016)

All candidates take three papers:		
Paper 1 (Core) Multiple-choice paper. 40 questions of the four-choice type.	45 minutes	Weighted at 30% of total available marks
or		
Paper 2 (Extended) Multiple-choice paper. 40 questions of the four-choice type.	45 minutes	Weighted at 30% of total available marks
and		
Paper 3 (Core) A written paper consisting of short-answer and structured questions.	1 hour 15 minutes	Weighted at 50% of total available marks
or		
Paper 4 (Extended) A written paper consisting of short-answer and structured questions.	1 hour 15 minutes	Weighted at 50% of total available marks
and		
Paper 5 Practical test	1 hour 15 minutes	Weighted at 20% of total available marks
or		
Paper 6 Alternative to Practical	1 hour	Weighted at 20% of total available marks

Syllabus content

- the particulate nature of matter
- experimental techniques
- atoms, elements and compounds
- stoichiometry
- electricity and chemistry
- chemical energetics
- chemical reactions
- acids, bases and salts
- the Periodic Table
- metals
- air and water
- sulfur
- carbonates
- organic chemistry.

Cambridge IGCSE Physics

Syllabus code 0625

The Cambridge IGCSE Physics syllabus helps learners to understand the technological world in which they live, and take an informed interest in science and scientific developments. They learn about the basic principles of physics through a mix of theoretical and practical studies. Learners also develop an understanding of the scientific skills essential for further study.

As they progress, learners gain an understanding of how science is studied and practised, and become aware that the results of scientific research can have both good and bad effects on individuals, communities and the environment.



Cambridge IGCSE Physics assessment

Syllabus code 0625 (examination in 2016)

All candidates take three papers:		
Paper 1 (Core) Multiple-choice paper. 40 questions of the four-choice type.	45 minutes	Weighted at 30% of total available marks
or		
Paper 2 (Extended) Multiple-choice paper. 40 questions of the four-choice type.	45 minutes	Weighted at 30% of total available marks
and		
Paper 3 (Core) A written paper consisting of short-answer and structured questions.	1 hour 15 minutes	Weighted at 50% of total available marks
or		
Paper 4 (Extended) A written paper consisting of short-answer and structured questions.	1 hour 15 minutes	Weighted at 50% of total available marks
and		
Paper 5 Practical test	1 hour 15 minutes	Weighted at 20% of total available marks
or		
Paper 6 Alternative to Practical	1 hour	Weighted at 20% of total available marks

Syllabus content

General physics

- length and time
- speed, velocity and acceleration
- mass and weight
- density
- forces
- momentum
- energy, work and power
- pressure.

Thermal physics

- simple kinetic molecular model of matter
- thermal properties and processes.

Properties of waves, including light and sound

- general wave properties
- light
- electromagnetic spectrum
- sound.

Electricity and magnetism

- simple phenomena of magnetism
- electrical quantities
- electric circuits
- dangers of electricity
- electromagnetic effects.

Atomic physics

- the nuclear atom
- radioactivity.

Cambridge IGCSE Co-ordinated Sciences (Double Award)

Syllabus code 0654

Cambridge IGCSE Co-ordinated Sciences is a double award, worth two IGCSEs. It covers biology, chemistry and physics. Students are awarded two identical grades, e.g. AA or CC.

The curriculum content is set out in clearly defined biology, chemistry and physics sections, which are extensively cross-referenced to present subject content as a coherent scientific whole.

Teachers can reduce duplication of common themes, and also encourage students to see ideas common to all sciences, such as energy. Teaching in one subject reinforces another and stimulates interest in a third.

Candidates learn about the basic principles of each subject through a mix of theoretical and practical studies, while also developing an understanding of the scientific skills essential for further study.

The syllabus is aimed at candidates across a very wide range of abilities, and allows them to show success over the full range of grades from A*A* to GG.



Syllabus content

Biology

- characteristics of living organisms
- cells
- enzymes
- nutrition
- transportation
- respiration
- coordination and response
- reproduction
- inheritance
- energy flow in ecosystems
- human influences on the ecosystem.

Chemistry

- the particulate nature of matter
- experimental techniques
- atoms, elements and compounds
- stoichiometry
- electricity and chemistry
- energy changes in chemical reactions
- chemical reactions
- acids, bases and salts
- the Periodic Table
- metals
- air and water
- sulfur
- carbonates
- organic chemistry.

Physics

- motion
- matter and forces
- energy, work and power
- simple kinetic molecular model of matter
- matter and thermal properties
- transfer of thermal energy
- waves
- light
- electromagnetic spectrum
- sound
- magnetism
- electricity
- electric circuits
- electromagnetic effects
- radioactivity.

Cambridge IGCSE Co-ordinated Sciences (Double Award): Assessment

Syllabus code 0654 (examination in 2016)

All candidates take:		
Paper 1 Multiple-choice question paper	45 minutes	Weighted at 30% of total available marks
and		
Paper 2 Core tier theory paper eligible for grades C to G	2 hours	Weighted at 50% of total available marks
or		
Paper 3 Extended tier theory paper eligible for grades A* to G	2 hours	Weighted at 50% of total available marks
and		
Paper 4 Coursework		Weighted at 20% of total available marks
or		
Paper 5 Practical test	2 hours	Weighted at 20% of total available marks
or		
Paper 6 Alternative to Practical (written paper)	1 hour	Weighted at 20% of total available marks



Cambridge IGCSE Combined Science

Syllabus code 0653

Cambridge IGCSE Combined Science offers students the opportunity to study biology, chemistry and physics in a single Cambridge IGCSE. Each subject is covered in a separate syllabus section.

Students learn the basic principles of each subject through a mix of theoretical and practical studies, while also developing an understanding of scientific skills.

The Cambridge IGCSE Combined Science syllabus is aimed at candidates across a very wide range of ability, and allows them to show success over the full range of grades from A* to G.

The syllabus has been designed to enable co-teaching with the Co-ordinated Sciences (Double Award) syllabus as well as with the separate Biology, Chemistry and Physics syllabuses.



Syllabus content

Biology

- characteristics of living organisms
- cells
- enzymes
- nutrition
- transportation
- respiration
- coordination and response
- reproduction
- energy flow in ecosystems
- human influences on the ecosystem.

Chemistry

- the particulate nature of matter
- experimental techniques
- atoms, elements and compounds
- stoichiometry
- electricity and chemistry
- energy changes in chemical reactions
- chemical reactions
- acids, bases and salts
- the Periodic Table
- metals
- air and water
- organic chemistry.

Physics

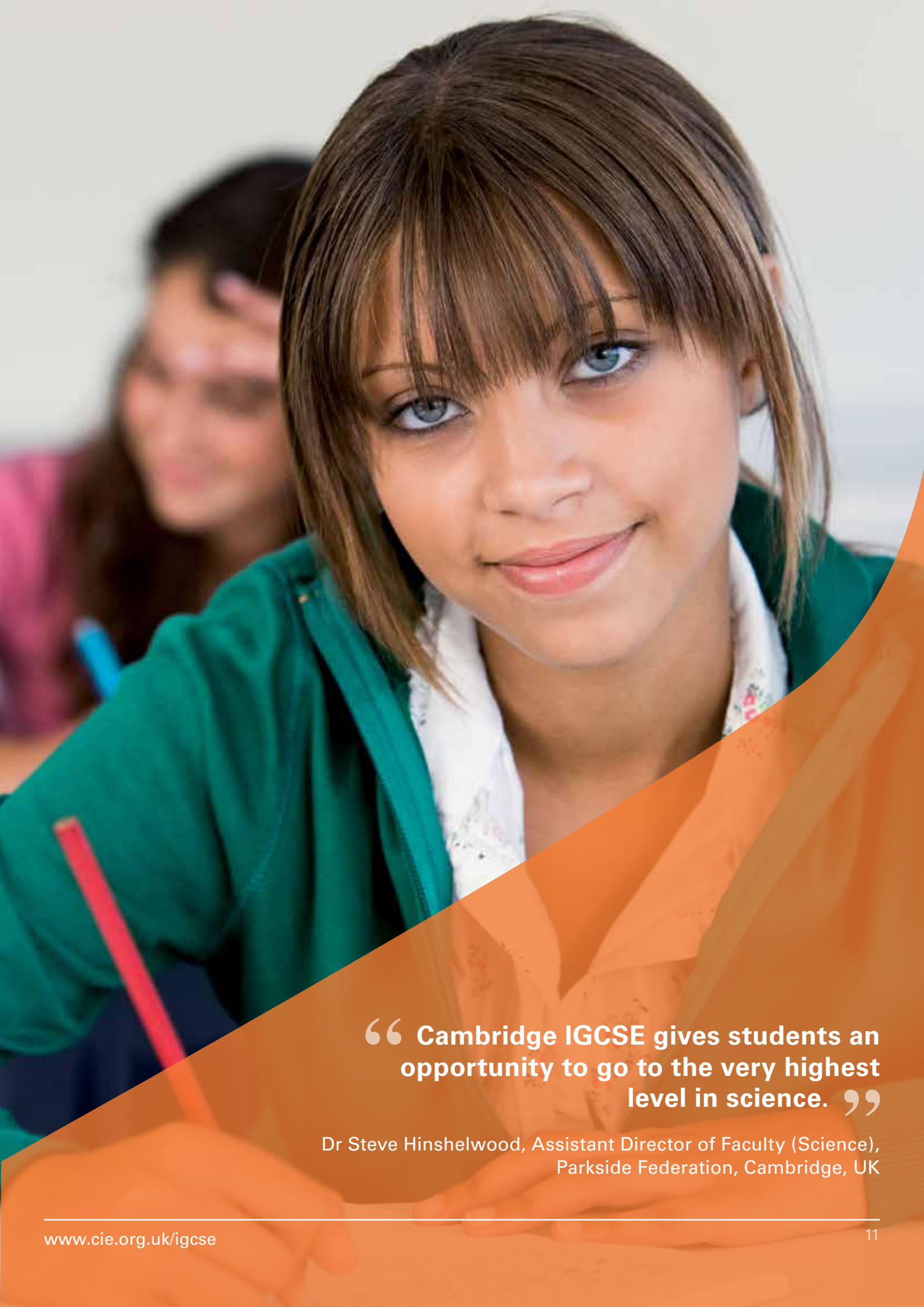
- motion
- matter and forces
- energy, work and power
- simple kinetic molecular models of matter
- matter and thermal properties
- transfer of thermal energy
- waves
- light
- electromagnetic spectrum
- sound
- electricity
- electric circuits.

Cambridge IGCSE Combined Science assessment

Syllabus code 0653 (examination in 2016)

All candidates take:		
Paper 1 Multiple-choice question paper	45 minutes	Weighted at 30% of total available marks
and		
Paper 2 Core tier theory paper eligible for grades C to G	1 hour 15 minutes	Weighted at 50% of total available marks
or		
Paper 3 Extended tier theory paper eligible for grades A* to G	1 hour 15 minutes	Weighted at 50% of total available marks
and		
Paper 4 Coursework		Weighted at 20% of total available marks
or		
Paper 5 Practical test	1 hour 30 minutes	Weighted at 20% of total available marks
or		
Paper 6 Alternative to Practical (written paper)	1 hour	Weighted at 20% of total available marks





“ Cambridge IGCSE gives students an opportunity to go to the very highest level in science. ”

Dr Steve Hinshelwood, Assistant Director of Faculty (Science),
Parkside Federation, Cambridge, UK

Classroom support for teachers and students

Our ethos of excellence in education extends to support and services, to help you deliver engaging and effective courses, and develop as a professional.

Teacher resources

We have a wealth of teaching and learning resources to help you plan and deliver the course. They suit a wide range of teaching methods and different educational contexts and include:

- recommended textbooks
- recommended workbooks
- guidance to explain how the resources support teaching
- teaching schemes and lesson plans
- assessment tools.

The assessment tools, including mark schemes, examiner reports, previous examination papers and global learner performance statistics by grade and subject enable you to provide valuable feedback, to identify learner strengths and weaknesses, before final assessment.

We offer fast, simple, reliable and friendly administration. Schools receive comprehensive help from our Customer Services and UK Schools Development teams.

Teacher Support website

We offer a secure support website for Cambridge teachers. Access is free for Cambridge schools. Here you will find all the materials you need to teach our syllabuses, including past question papers, mark schemes, examiner reports, and lesson plans and schemes of work.

Cambridge Professional Development for teachers

We offer regular training workshops for Cambridge IGCSE syllabuses. Online training is also available, increasing access for teachers who have limited time or are a long way from training events.

We also provide Professional Development qualifications for teachers. They help develop teachers' thinking and practice and build the knowledge and skills they need to help learners succeed with Cambridge.

What resources are available for Cambridge IGCSE science teachers?

- Regular training
- Training – online
- Subject communities and discussion forums
- Syllabuses
- Teacher guides and schemes of work
- Coursework training handbooks
- Syllabus and Support Materials DVD
- Textbooks and resources from publishers
- Secure support website
- Online help – frequently asked questions
www.cie.org.uk/help
- Past question/specimen papers
- Mark schemes
- Examiner reports
- Example candidate responses (Standards Booklet)
- 'Ask the Examiner' question and answer sessions.



Cambridge IGCSE recognition

In the UK, Cambridge IGCSE and the Cambridge International Level 1/ Level 2 Certificate are accepted by universities as equivalent to the GCSE, and are regularly used to choose between higher education applicants.

Many universities worldwide require a combination of A Levels (or their equivalent) and Cambridge IGCSEs to meet their entry requirements.

For more information about recognition of Cambridge qualifications, including a database of institutions that accept them, go to www.cie.org.uk/recognition



Cambridge IGCSE: A great foundation for further study

Cambridge IGCSE is used worldwide as preparation for a range of post-16 courses, including:

- Cambridge Pre-U
- Cambridge International AS & A Level
- UK A Level
- International Baccalaureate diploma.

Cambridge Pre-U is becoming popular in the UK in both state and independent schools. Many of the features that schools like about Cambridge IGCSE are also common to both Cambridge Pre-U and Cambridge International AS & A Levels, such as the linear structure and increased time for teaching, a focus on independent study skills and the opportunity to tailor the course to the strengths and interests of the students.

In the UK, a number of schools offer both Cambridge IGCSE and Cambridge Pre-U. They tell us that students who have studied Cambridge IGCSE make the change up to Cambridge Pre-U with relative ease, and that Cambridge Pre-U then equips students with the skills and confidence to study their chosen subject at undergraduate level.

Read on for more information about Cambridge Pre-U, or visit www.cie.org.uk/cambridgepreu



“ Cambridge Pre-U is very liberating for teachers – the two years and the scope of the syllabuses have given teachers back an opportunity to shape students’ learning to suit their strengths and weaknesses. ”

Dr James Webster, Winchester College, UK

Cambridge Pre-U

Cambridge Pre-U is an exciting qualification for 16 to 19 year olds who want to go to university.

Cambridge Pre-U equips students with the knowledge and skills they need to make a success of their undergraduate studies:

- a solid and coherent grounding in specialist subjects at an appropriate level
- the ability to undertake independent and self-directed learning
- the ability to think laterally, critically and creatively and communicate effectively.

Cambridge Pre-U Principal Subjects and Short Courses are stand-alone qualifications, recognised by universities and attracting a rewarding UCAS tariff. They are compatible with A Levels and may be taken in combination with them.

For Cambridge Pre-U Principal Subjects, students take all examination components at the end of a two-year programme of study, and we assess them at the full Cambridge Pre-U standard.

Common characteristics of Cambridge Pre-U syllabuses

- **Design:** focused on the development of high-level knowledge, understanding and skills to prepare for university and beyond, through extensive consultation with teachers, students and universities.
- **Stretch:** built into syllabus content (380 guided learning hours and challenging concepts), assessment (open-ended questions) and grading outcomes (finer differentiation at the top end).
- **Innovation:** new approaches to subjects, greater freedom in subject combination, new topics, new methods of delivery and new forms of assessment.
- **Progression in learning:** Cambridge Pre-U builds on prior knowledge gained at 14 to 16, where appropriate, and develops broad generic skills (independent study and research skills). Students are better prepared for undergraduate study.
- **Linearity:** assessment at the end of the course makes for greater coherence in teaching and learning.

Subject	Approved by Ofqual	Funded for teaching in state schools	Counts towards sixth form league tables
Biology	✓	✓	✓
Chemistry	✓	✓	✓
Physics	✓	✓	✓

Cambridge Pre-U Biology

Together with schools and universities, we have constructed Cambridge Pre-U Biology with the young bioscientist in mind.

Cambridge Pre-U Biology offers an excellent grounding for the study and use of biology at university. The course encourages learners to do independent study and research, and work collaboratively with their peers. It develops many skills associated with studying biological sciences at a higher level and offers opportunities to make links between different topics that may not be possible in modular courses.

Curriculum

Biology is a subject with a solid foundation based on many decades of research, and yet it is in the exciting position of having developed at a faster rate in the last 20 years than at any time in its history.

While most of the curriculum is familiar – molecular biology, biochemistry, cell biology, physiology, histology, genetics and environmental biology – Cambridge Pre-U Biology is distinctive in its approach to the emerging fields of molecular genetics, biotechnology and immunology.

Syllabus content for examination from 2016 to 2018

The curriculum is divided into six sections:

The cell

Eukaryotic cell structure
Prokaryotic cells
Cell replication
Enzymes
Respiration
Genes and protein synthesis
Applications of cell biology.

The origin and evolution of life

The origins of life
The chemicals of life
The evolution of life
Classification.

Animal physiology

Transport systems
Nutrition
Nerves, muscles and behaviour
Homeostasis and cell signalling
The immune system
Reproduction.

The life of plants

Transport in plants
Photosynthesis
Reproduction
Control of plant processes.

Environmental studies

Adaptation
Measuring and conserving biodiversity.

Practical biology

Planning and decision making
Manipulation, measurement and observation
Presentation of data and observations
Analysis of data and conclusions
Analysis of procedures and data.

Scheme of assessment

Students take four papers in the same series.

A single grade is awarded. Individual papers cannot be retaken.

Component	Component title	Duration	Weighting	Type of assessment
1	Structured	2 hours 30 mins	40%	Written paper, externally set and marked
2	Data analysis and planning	1 hour 15 mins	22.5%	Written paper, externally set and marked
3	Case study and synoptic essay	1 hour 45 mins	22.5%	Written paper, externally set and marked
4	Practical	2 hours 30 mins	15%	Practical examination, externally set and marked

Cambridge Pre-U Chemistry

Cambridge Pre-U Chemistry offers a practical and theoretical approach to the teaching of chemistry, developing students' ability to solve chemical problems in varied contexts.

Written with progression to university chemistry in mind, this course highlights the principles that unify the subject and seeks to examine them through their application to chemical situations.

It equips students with a coherent base of transferable skills and key knowledge suitable for future study and employment in chemistry and related fields (e.g. medicine, engineering, applied sciences) whilst providing thought-provoking material that may appeal to those who do not wish to pursue a scientific career.

Curriculum

Cambridge Pre-U Chemistry contains a number of distinct approaches to topics which are not commonly examined at this level. They enable students to develop an important insight into chemical processes and help to rationalise new and unfamiliar compounds and reactions. These topics are:

- Van Arkel diagrams
- Functional group level
- Orbitals.

Resource materials have been developed especially for these topics.

Syllabus content for examination from 2016 to 2018

The curriculum fits broadly into five underlying themes:

Physical chemistry

Students gain insight into the structure of atoms and molecules and the forces between them, and the theory and measurement of enthalpy changes. Later, students are exposed to the driving forces of chemical reactions, the mechanisms of reactions, how their rate is studied, and the analysis of equilibrium conditions.

Inorganic chemistry

Students gain an understanding of the three main types of bonding within the framework of electronegativity and in the continuum of the van Arkel diagram. The course enables them to rationalise a body of descriptive chemistry in terms of group and periodic trends and to develop knowledge and understanding of the structure, isomerism and redox properties of transition metal complexes. Students should also gain an appreciation of three-dimensional relationships in crystal structures.

Organic chemistry

This section equips students with the tools to understand organic reactions through the framework of the functional group level, to suggest reagents and conditions for the transformations they have studied when encountered in unfamiliar reaction schemes, to consider the three-dimensional nature of organic reactions, and to understand the mechanisms of organic reactions and the acid-base properties of organic molecules. Stereochemistry is an important aspect of this section.

Analysis

Students gain insight into the physical background of spectroscopic techniques and the skills to interpret spectra. They should also acquire an appreciation of molecular symmetry, and in particular, its importance in carbon-13 NMR. Students are also expected to develop their ability to interpret measurements and observations in classical laboratory analytical techniques.

Practical chemistry

Students should be engaged in practical work at all stages of their learning of chemistry. At least 20 per cent of classroom time should be spent doing practical work. This should reinforce the learning of the theoretical content of the syllabus, instil an understanding of the interplay of experiment and theory in the scientific method and be used to develop manipulative and observational skills in the laboratory and an awareness of safe practice.

Scheme of assessment

Cambridge Pre-U Chemistry assesses students' understanding in relatively unfamiliar contexts.

Questions cross the boundaries of different fields of chemistry. Students complete four externally set and marked components in the same series.

Examinations take place at the end of the two-year course and a single grade is awarded.

Individual papers cannot be retaken.

Component	Component title	Duration	Weighting	Type of assessment
1	Multiple choice	1 hour	15%	Externally set and marked
2	Part A Written	2 hours 15 mins	35%	Externally set and marked
3	Part B Written	2 hours 15 mins	35%	Externally set and marked
4	Practical	2 hours	15%	Practical exam, externally set and marked



“ One of our year 12 students commented that he felt this course [Cambridge Pre-U Physics] was the most worthwhile learning experience he had ever taken part in. ”

Dr Anton Machacek, Head of Physics,
The Royal Grammar School, High Wycombe.

Cambridge Pre-U Physics

Cambridge Pre-U Physics offers an excellent preparation for university study, developing a coherent base of theoretical and practical skills. It provides the key knowledge essential for future scientists, engineers and medics, and develops highly transferable thinking skills valuable for any undergraduate course or career.

Curriculum

Cambridge Pre-U Physics gives students a firm foundation in classical physics, along with an introduction to some intellectually stimulating modern concepts such as special relativity, quantum physics and astrophysics. It develops students' understanding of the historical development of some concepts of physics, and the link between experiment and theory.

The course allows some degree of flexibility, enabling teachers to adapt their teaching to suit the different needs of students. Mathematically competent students have the opportunity to develop their problem-solving skills in an intellectually satisfying and relevant way, while those who enjoy a more philosophical approach to physics will find there is much thought-provoking material to challenge and stimulate discussion.

There is ample opportunity to foster good practical technique, and students also complete an individual research project – the personal investigation – with the freedom to choose their own topic.



Syllabus content for examination from 2016 to 2018

Part A

Mechanics
Gravitational fields
Deformation of solids
Energy concepts
Electricity
Waves
Superposition
Atomic and nuclear
Quantum ideas

Part B

Rotational mechanics
Oscillations
Electric fields
Gravitation
Electromagnetism
Special relativity
Molecular kinetic theory
Nuclear physics
The quantum atom
Interpreting quantum theory
Astronomy and cosmology

Scheme of assessment

For Cambridge Pre-U Physics, students take three written examination papers and submit a personal investigation in the same examination series.

Paper 2 includes questions relating to material released to students before the examination, testing the application of physics in interesting contexts such as medical physics, telecommunications or engineering.

In Paper 3, students can select questions according to their own interest and preferred approach to the subject – choosing from questions that demand strong mathematical and problem-solving skills, and those which have a more discursive and philosophical flavour.

Component	Component title	Duration	Weighting	Type of assessment
1	Multiple-choice paper	1 hour 30 mins	20%	Written paper, externally set and marked
2	Written paper	2 hours	30%	Written paper, externally set and marked
3	Written paper	3 hours	35%	Written paper, externally set and marked
4	Personal investigation	20 hours	15%	Project report, internally marked and externally moderated

Examinations take place at the end of the two-year course and a single grade is awarded. Individual components cannot be retaken.

“ The full Physics course sees a return to the linear end of two year approach where candidates take all examinations together. A genuinely worthwhile personal investigation allows students to research and write up independently. Options in the Principal examination allow students to choose between a mathematical route, or an equally demanding historical/philosophical route. ”

Nick Fisher, Rugby School

Cambridge Pre-U cognition

Reporting of achievement

Achievement is reported on a scale of nine grades:

- Distinction 1, 2 and 3
- Merit 1, 2 and 3
- Pass 1, 2 and 3.

The Distinction 3 standard is aligned to that of Grade A and the Pass 3 is aligned to that of Grade E at A Level. Distinction 1 reports achievement above an A* grade at A Level.

The intention is to differentiate more finely and extend reporting at the top end, while keeping the grading scale accessible to the full range of ability currently achieving passes at A Level.

UCAS tariff points

The table below shows the UCAS tariff awarded to each Cambridge Pre-U Principal Subject grade and how this compares with the tariff for A Level. The tariff reflects the additional content within each syllabus and the linear assessment (terminal examinations at full Cambridge Pre-U standard).

Cambridge Pre-U UCAS tariff points

Cambridge Pre-U grade	Cambridge Pre-U Principal Subject UCAS tariff	Equivalent A Level UCAS tariff	Cambridge Pre-U GPR UCAS tariff	Short Course UCAS tariff
Distinction 1	tbc	n/a	tbc	tbc
Distinction 2	145	(A*) 140	140	tbc
Distinction 3	130	(A) 120	126	60
Merit 1	115		112	53
Merit 2	101	(B) 100	98	46
Merit 3	87	(C) 80	84	39
Pass 1	73		70	32
Pass 2	59	(D) 60	56	26
Pass 3	46	(E) 40	42	20

Cambridge Pre-U is recognised by many UK universities and many universities abroad, including all US Ivy League universities. For more details, please go to www.cie.org.uk/qualifications/recognition

Support and resources for teachers

We offer a programme of free Cambridge Pre-U training for teachers accompanied by online support materials including syllabuses, specimen/past papers, mark schemes and example learner responses. A free *Teacher Guide* expands on each syllabus, to help teachers understand what students are expected to know.

It is written by a teacher for teachers and suggests for each topic:

- a checklist of what to cover with students
- resources, both paper and web based
- additional extension/'stretch and challenge' areas
- further teaching and learning opportunities.

“ Cambridge gives clear guidelines and progressive objectives to help teachers optimise student learning at each stage. This makes coordination amongst staff members easier and the gap between stages no longer exists. ”

Jean Gerardi, Teacher, St. Gregory's College, Argentina

Cambridge International AS & A Levels

Cambridge International AS & A Levels are internationally benchmarked qualifications providing excellent preparation for university education. Like Cambridge Pre-U, they are part of the Cambridge Advanced stage.

They are available in 60 subjects and are taken by schools around the world. These are linear courses and are recognised by universities in the UK, the US and around the world. **Please note that they are not funded for teaching in UK state schools.** Learners can choose from a range of assessment options:

Option 1	Take the Cambridge International AS Level only. The Cambridge International AS Level syllabus content is half a Cambridge International A Level programme.
Option 2	Take a 'staged' assessment route – take the Cambridge International AS Level in one examination series and complete the final Cambridge International A Level at a subsequent series.*
Option 3	Take all papers of the Cambridge International A Level course in the same examination series, usually at the end of the second year of study.

* The staged assessment route is not possible in all subjects.

Cambridge International AS & A Levels in sciences

Subject	AS Level	A Level
Biology	✓	✓
Chemistry	✓	✓
Physics	✓	✓

If you would like more information about Cambridge International AS & A Levels, please visit www.cie.org.uk/alevel or email info@cie.org.uk





“ Cambridge provides a fantastic support service, on their website and also from their representatives. For me there was no one else. ”

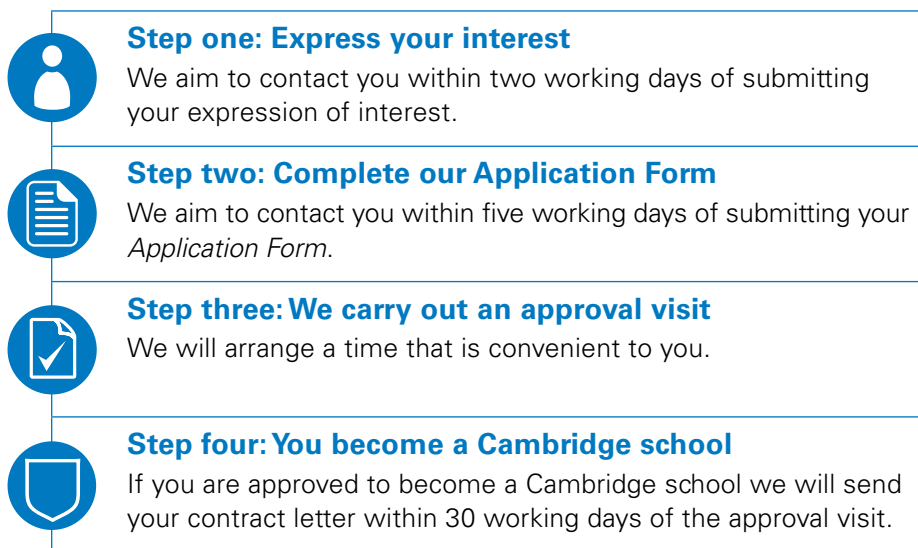
Stephen O'Connor, Headmaster, Heathfield International School

What next?

If you would like to teach one of these science qualifications and are already a Cambridge school, please contact our Customer Services team – contact details are below. If your school is not already teaching Cambridge subjects, we will help you through the simple registration process.

Become a Cambridge school

There are four steps to becoming a Cambridge school:



You can find more information on our website: www.cie.org.uk/startcambridge

Start working with us

On completing the registration process, we will send you a *Welcome to Cambridge* pack. This contains a range of support materials to get you started.

Administration support

You will be able to use a secure support website that allows you to communicate securely with us and exchange all administrative information, including exam entries and results, entry instruction booklets and other documentation. You can always contact us if you need help, or simply have a question that is on your mind. We are pleased to say that our customer service is rated as the best in its class.

Fees

We charge for each examination entry.

Talk to another school

We would be happy to put you in touch with another school teaching Cambridge IGCSE or Cambridge Pre-U.

Learn more!

Getting in touch with Cambridge is easy:

Email: info@cie.org.uk

Call: 01223 553554

Visit: www.cie.org.uk

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