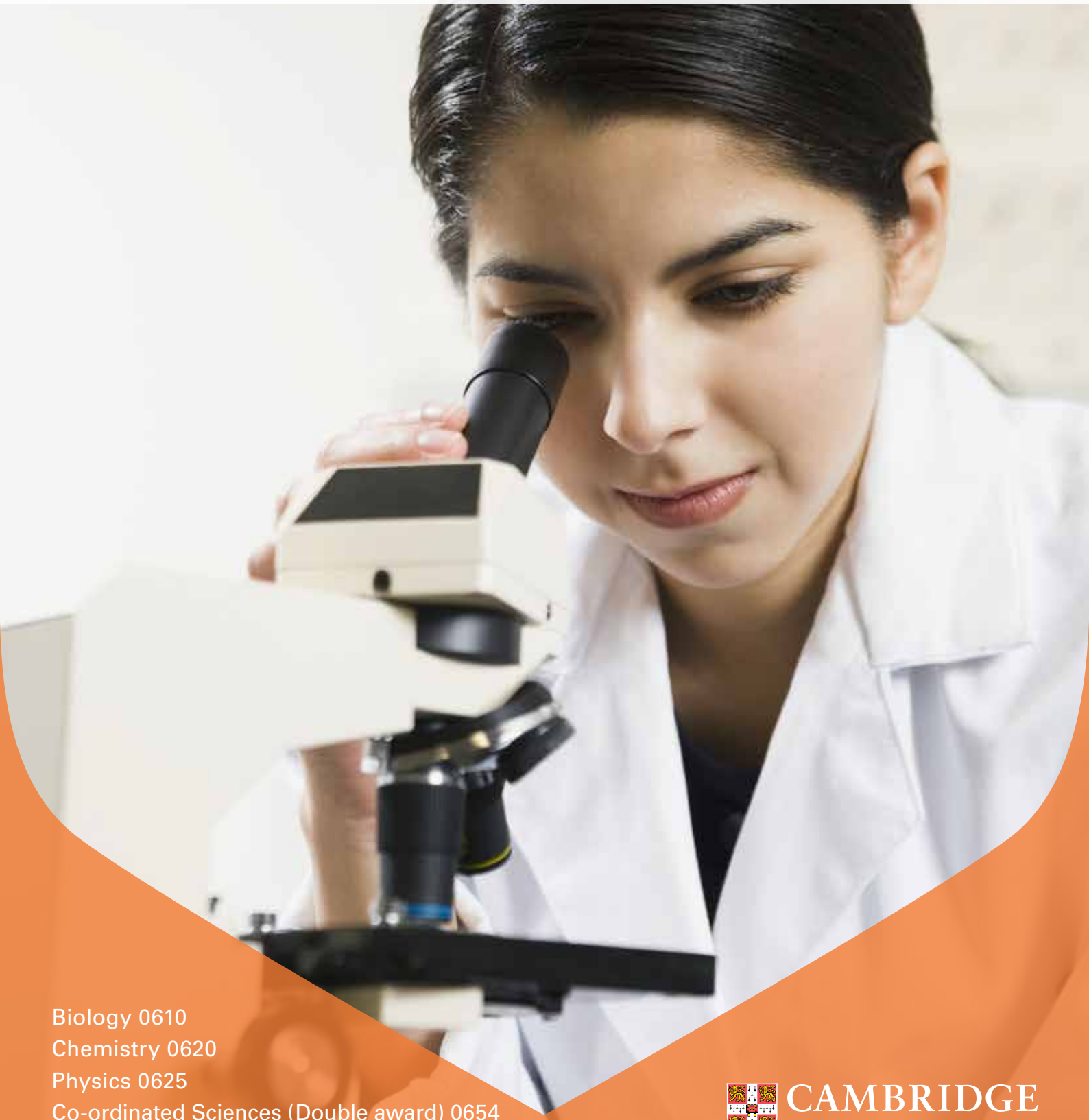
Introducing updated Cambridge IGCSE® syllabuses for science subjects

Syllabus outlines

Cambridge IGCSE



Biology 0610
Chemistry 0620
Physics 0625
Co-ordinated Sciences (Double award) 0654
Combined Science 0653
Physical Science 0652

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Excellence in education

The range of Cambridge IGCSEs in science 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, chemistry or physics through a mix of theoretical and practical studies.

They also develop an understanding of the scientific skills essential for further study in the subject. 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 learners will:

- better understand the technological world, with an informed interest in scientific matters
- recognise the usefulness (and limitations) of scientific method, and how to apply this to other disciplines and in everyday life
- develop relevant attitudes, such as a concern for accuracy and precision, objectivity, integrity, enquiry, initiative and inventiveness
- develop an interest in, and care for, the environment
- better understand the influence and limitations placed on scientific study by society, economy, technology, ethics, the community and the environment
- develop an understanding of the scientific skills essential for both further study and everyday life.

Important information

Syllabuses available now for first examination in June 2016:

- Cambridge IGCSE Biology
- Cambridge IGCSE Chemistry
- Cambridge IGCSE Physics.

For schools in India, the first assessment of these syllabuses will be in March 2016.

Syllabuses available now for first examination in June 2017:

- Cambridge IGCSE Co-ordinated Sciences
- Cambridge IGCSE Combined Science.

Syllabuses available now for first examination in November 2017:

- Cambridge IGCSE Physical Science.

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Cambridge IGCSE Biology (0610)

This syllabus is approved for use in England, Wales and Northern Ireland as a Cambridge International Level 1/Level 2 Certificate (QN: 500/5871/X).

Overview of changes

- The structure of the assessment has changed. The practical option, Paper 4: Coursework has been withdrawn. A new multiple-choice paper for extended candidates has been included.
- The syllabus content has been revised and updated to modernise and improve the relevance of the syllabus. Some material has been moved or reordered from the Core to the Supplement or from the Supplement to the Core.
- One topic (Assimilation) has been removed. There are seven new topics:
  - Biological molecules*
  - Diseases and immunity
  - Sense organs*
  - Chromosomes, genes and proteins*
  - Adaptive features
  - Biotechnology and genetic engineering*
  - Human influences on ecosystems*

*contains some material previously found in other sections of the syllabus.

Syllabus content – Learners will study the following topics:

1. Characteristics and classification of living organisms
1.1 Characteristics of living organisms
1.2 Concept and use of a classification system
1.3 Features of organisms
1.4 Dichotomous keys

2. Organisation of the organism
2.1 Cell structure and organisation
2.2 Levels of organisation
2.3 Size of specimens

3. Movement in and out of cells
3.1 Diffusion
3.2 Osmosis
3.3 Active transport

4. Biological molecules

5. Enzymes

6. Plant nutrition
6.1 Photosynthesis
6.2 Leaf structure
6.3 Mineral requirements

7. Human nutrition
7.1 Diet
7.2 Alimentary canal
7.3 Mechanical digestion
7.4 Chemical digestion
7.5 Absorption

8. Transport in plants
8.1 Transport in plants
8.2 Water uptake
8.3 Transpiration
8.4 Translocation (Extended candidates only)

9. Transport in animals
9.1 Transport in animals
9.2 Heart
9.3 Blood and lymphatic vessels
9.4 Blood

10. Diseases and immunity

11. Gas exchange in humans

12. Respiration
12.1 Respiration
12.2 Aerobic respiration
12.3 Anaerobic respiration

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Biology syllabus content continued

13. Excretion in humans

14. Coordination and response

14.1 Nervous control in humans
14.2 Sense organs
14.3 Hormones in humans
14.4 Homeostasis
14.5 Tropic responses

15. Drugs

15.1 Drugs
15.2 Medicinal drugs
15.3 Misused drugs

16. Reproduction

16.1 Asexual reproduction
16.2 Sexual reproduction
16.3 Sexual reproduction in plants
16.4 Sexual reproduction in humans
16.5 Sex hormones in humans
16.6 Methods of birth control in humans
16.7 Sexually transmitted infections (STIs)

17. Inheritance

17.1 Inheritance
17.2 Chromosomes, genes and proteins
17.3 Mitosis
17.4 Meiosis
17.5 Monohybrid inheritance

18. Variation and selection

18.1 Variation
18.2 Adaptive features
18.3 Selection

19. Organisms and their environment

19.1 Energy flow
19.2 Food chains and food webs
19.3 Nutrient cycles
19.4 Population size

20. Biotechnology and genetic engineering

20.1 Biotechnology and genetic engineering
20.2 Biotechnology
20.3 Genetic engineering

21. Human influences on ecosystems

21.1 Food supply
21.2 Habitat destruction
21.3 Pollution
21.4 Conservation

“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

Cambridge IGCSE Chemistry (0620)

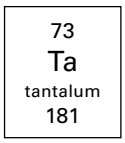
This syllabus is approved for use in England, Wales and Northern Ireland as a Cambridge International Level 1/Level 2 Certificate (QN: 500/5701/7).

Overview of changes

- The structure of the assessment has changed. The practical option, Paper 4: Coursework has been withdrawn. A new multiple-choice paper for extended candidates has been included.
- The syllabus content has been revised and updated to modernise and improve the relevance of the syllabus. Some material has been moved or reordered from the Core to the Supplement, or from the Supplement to the Core.

Periodic Table

The Periodic Table has been updated. The data for each element is presented as shown. Some recently named elements have also been added.



Syllabus content – Learners will study the following topics:

1. The particulate nature of matter

2. Experimental techniques
2.1 Measurement
2.2.1 Criteria of purity
2.2.2 Methods of purification

3. Atoms, elements and compounds
3.1 Atomic structure and the Periodic Table
3.2.1 Bonding: the structure of matter
3.2.2 Ions and ionic bonds
3.2.3 Molecules and covalent bonds
3.2.4 Macromolecules
3.2.5 Metallic bonding
(Extended candidates only).

4. Stoichiometry
4.1 Stoichiometry
4.2 The mole concept
(Extended candidates only)

5. Electricity and chemistry

6. Chemical energetics
6.1 Energetics of a reaction
6.2 Energy transfer.

7. Chemical reactions
7.1 Physical and chemical changes
7.2 Rate (speed) of reaction
7.3 Reversible reactions
7.4 Redox.

8. Acids, bases and salts
8.1 The characteristic properties of acids and bases
8.2 Types of oxides
8.3 Preparation of salts
8.4 Identification of ions and gases

9. The Periodic Table
9.1 The Periodic Table
9.2 Periodic trends
9.3 Group properties
9.4 Transition elements
9.5 Noble gases

10. Metals
10.1 Properties of metals
10.2 Reactivity series
10.3 Extraction of metals
10.4 Uses of metals.

11. Air and water
11.1 Water
11.2 Air
11.3 Nitrogen and fertilisers
11.4 Carbon dioxide and methane.

12. Sulfur

13. Carbonates

14. Organic chemistry
14.1 Names of compounds
14.2 Fuels
14.3 Homologous series
14.4 Alkanes
14.5 Alkenes
14.6 Alcohols
14.7 Carboxylic acids
14.8.1 Polymers
14.8.2 Synthetic polymers
14.8.3 Natural polymers.

Cambridge IGCSE Physics (0625)

This syllabus is approved for use in England, Wales and Northern Ireland as a Cambridge International Level 1/Level 2 Certificate (QN: 500/5660/8).

Overview of changes

- The structure of the assessment has changed. The practical option, Paper 4: Coursework has been withdrawn. A new multiple-choice paper for extended candidates has been included.
- The syllabus content has been revised and updated to modernise and improve the relevance of the syllabus. Some material has been moved or reordered from the Core to the Supplement, or from the Supplement to the Core.
- Two topics (Capacitors and transistors in electrical circuits; and Cathode rays and the oscilloscope) have been deleted. There is a new topic, Momentum.

Syllabus content – Learners will study the following topics:

1. General physics
1.1 Length and time
1.2 Motion
1.3 Mass and weight
1.4 Density
1.5 Forces
1.6 Momentum (Extended candidates only)
1.7 Energy, work and power
1.8 Pressure

2. Thermal physics
2.1 Simple kinetic model of matter
2.2 Thermal properties and temperature
2.3 Thermal processes

3. Properties of waves, including light and sound
3.1 General wave properties
3.2 Light
3.3 Electromagnetic spectrum
3.4 Sound

4. Electricity and magnetism
4.1 Simple phenomena of magnetism
4.2 Electrical quantities
4.3 Electric circuits
4.4 Digital electronics (Extended candidates only)
4.5 Dangers of electricity
4.6 Electromagnetic effects

5. Atomic physics
5.1 The nuclear atom
5.2 Radioactivity

“Learning with Cambridge affects how students learn throughout their lives – it’s this that gives them an edge.”

Cambridge school

Cambridge IGCSE Co-ordinated Sciences (Double Award) 0654

Overview of changes for first assessment in June 2017

The structure of the assessment has changed. The practical option, Paper 4: Coursework has been withdrawn. A new multiple-choice paper for extended candidates has now been included.

The syllabus has been revised to align it with the equivalent model of assessment for Cambridge IGCSEs in Biology, Chemistry and Physics for 2016, including updates to the assessment objectives and guidance on practical assessment.

Syllabus content – Learners will study the following topics:

Biology

B1. Characteristics of living organisms

B2. Cells

2.1 Cell structure
2.2 Movement in and out of cells

B3. Enzymes

B4. Nutrition

4.1 Nutrients
4.2 Plant nutrition
4.3 Animal nutrition

B5. Transportation

5.1 Transport in plants
5.2 Transport in humans

B6. Respiration

6.1 Aerobic and anaerobic respiration
6.2 Gas exchange

B7. Co-ordination and response

7.1 Nervous control in humans
7.2 Hormones
7.3 Tropic responses
7.4 Homeostasis

B8. Reproduction

8.1 Asexual and sexual reproduction
8.2 Sexual reproduction in plants
8.3 Sexual reproduction in humans

B9. Inheritance

9.1 Chromosomes and genes
9.2 Cell division
9.3 Monohybrid inheritance
9.4 Variation and selection

B10. Energy flow in ecosystems

B11. Human influences on the ecosystem

Chemistry

C1. The particulate nature of matter

C2. Experimental techniques

C3. Atoms, elements and compounds

3.1 Physical and chemical changes
3.2 Elements, compounds and mixtures
3.3 Atomic structure and the Periodic Table
3.4 Ions and ionic bonds
3.5 Molecules and covalent bonds
3.6 Giant structures

C4. Stoichiometry

4.1 The mole concept

C5. Electricity and chemistry

C6. Energy changes in chemical reactions

C7. Chemical reactions

7.1 Rate of reaction
7.2 Redox

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Cambridge IGCSE Co-ordinated Sciences (Double Award) 0654

Chemistry syllabus content continued

C8. Acids, bases and salts

8.1 The characteristic properties of acids and bases
8.2 Types of oxides
8.3 Preparation of salts
8.4 Identification of ions and gases

C9. The Periodic Table

9.1 Periodic trends
9.2 Group properties
9.3 Transition elements
9.4 Noble gases

C10. Metals

10.1 Properties of metals
10.2 Reactivity series
10.3 Extraction of metals
10.4 Uses of metals

C11. Air and water

C12. Sulfur

C13. Carbonates

C14. Organic chemistry

14.1 Fuels
14.2 Introduction to organic compounds
14.3 Hydrocarbons
14.4 Alcohols
14.5 Macromolecules
14.6 Synthetic polymers
14.7 Natural macromolecules

Physics

P1. Motion

P2. Matter and forces

2.1 Mass and weight
2.2 Density
2.3 Effects of forces
2.4 Pressure

P3. Energy, work and power

3.1 Energy
3.2 Energy resources
3.3 Work
3.4 Power

P4. Simple kinetic molecular model of matter

4.1 States of matter
4.2 Molecular model
4.3 Evaporation
4.4 Pressure changes

P5. Matter and thermal properties

5.1 Thermal expansion of solids, liquids and gases
5.2 Thermal capacity
5.3 Melting and boiling

P6. Transfer of thermal energy

6.1 Conduction
6.2 Convection
6.3 Radiation
6.4 Consequences of energy transfer

P7. Waves

7.1 General wave properties

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Cambridge IGCSE Co-ordinated Sciences (Double Award) 0654

Physics syllabus content continued

P8. Light
8.1 Reflection of light
8.2 Refraction of light
8.3 Thin converging lens
8.4 Dispersion of light

P9. Electromagnetic spectrum

P10. Sound

P11. Magnetism

P12. Electricity
12.1 Electrical quantities
12.2 Electric charge
12.3 Current, electromotive force and potential difference
12.4 Resistance
12.5 Electrical energy
12.6 Dangers of electricity

P13. Electric circuits
13.1 Circuit diagrams
13.2 Series and parallel circuits
13.3 Action and use of circuit components

P14. Electromagnetic effects
14.1 Electromagnetic induction
14.2 a.c. generator
14.3 Transformer
14.4 The magnetic effect of a current
14.5 Force on a current-carrying conductor
14.6 d.c. motor

P15. Radioactivity
15.1 Detection of radioactivity
15.2 Characteristics of three kinds of emission
15.3 Radioactive decay
15.4 Half-life
15.5 Safety precautions
15.6 The nuclear atom
15.7 Isotopes

Cambridge IGCSE Combined Science (0653)

Overview of changes for first assessment in June 2017

The structure of the assessment has changed. The practical option, Paper 4: Coursework has been withdrawn. A new multiple-choice paper for extended candidates has now been included.

The syllabus has been revised to align it with the equivalent model of assessment for Cambridge IGCSEs in Biology, Chemistry and Physics for 2016, including updates to the assessment objectives and guidance on practical assessment.

Syllabus content – Learners will study the following topics:

Biology

B1. Characteristics of living organisms

B2. Cells

2.1 Cell structure and organisation

2.2 Movement in and out of cells

B3. Enzymes

B4. Nutrition

4.1 Nutrients

4.2 Plant nutrition

4.3 Animal nutrition

B5. Transportation

5.1 Transport in plants

5.2 Transport in humans

B6. Respiration

6.1 Respiration and energy

6.2 Gas exchange

B7. Co-ordination and response

7.1 Hormones

7.2 Tropic responses

B8. Reproduction

8.1 Asexual and sexual reproduction

8.2 Sexual reproduction in plants

8.3 Sexual reproduction in humans

B9. Energy flow in ecosystems

B10. Human influences on the ecosystem

Chemistry

C1. The particulate nature of matter

C2. Experimental techniques

C3. Atoms, elements and compounds

3.1 Physical and chemical changes

3.2 Elements, compounds and mixtures

3.3 Atomic structure and the Periodic Table

3.4 Ions and ionic bonds

3.5 Molecules and covalent bonds

C4. Stoichiometry

C5. Electricity and chemistry

C6. Energy changes in chemical reactions

C7. Chemical reactions

7.1 Rate of reaction

7.2 Redox

C8. Acids, bases and salts

8.1 The characteristic properties of acids and bases

8.2 Preparation of salts

8.3 Identification of ions and gases

C9. The Periodic Table

9.1 Periodic trends

9.2 Group properties

9.3 Transition elements

9.4 Noble gases

Chemistry syllabus content continued

C10. Metals
10.1 Properties of metals
10.2 Reactivity series
10.3 Extraction of metals

C11. Air and water

C12. Organic chemistry
12.1 Fuels
12.2 Hydrocarbons

Physics

P1. Motion

P2. Matter and forces
2.1 Mass and weight
2.2 Density
2.3 Effects of forces

P3. Energy, work and power
3.1 Energy
3.2 Energy resources
3.3 Work
3.4 Power

P4. Simple kinetic molecular model of matter
4.1 States of matter
4.2 Molecular model
4.3 Evaporation

P5. Matter and thermal properties

P6. Transfer of thermal energy
6.1 Conduction
6.2 Convection
6.3 Radiation
6.4 Consequences of energy transfer

P7. Waves
7.1 General wave properties

P8. Light
8.1 Reflection of light
8.2 Refraction of light
8.3 Thin converging lens

P9. Electromagnetic spectrum

P10. Sound

P11. Electricity
11.1 Electrical quantities
11.2 Electric charge
11.3 Current force and potential difference
11.4 Resistance
11.5 Electrical energy
11.6 Dangers of electricity

P12. Electric circuits
12.1 Circuit diagrams
12.2 Series and parallel circuits

Cambridge IGCSE Physical Science (0652)

Overview of changes for first assessment in November 2017

The structure of the assessment has changed. The practical option, Paper 4: Coursework has been withdrawn. A new multiple-choice paper for extended candidates has now been included.

The syllabus has been revised to align it with the equivalent model of assessment for Cambridge IGCSEs in Biology, Chemistry and Physics for 2016, including updates to the assessment objectives and guidance on practical assessment.

Syllabus content – Learners will study the following topics:

Chemistry

C1. The particulate nature of matter

C2. Experimental techniques

C3. Atoms, elements and compounds

3.1 Atomic structure and the Periodic Table
3.2 Bonding: the structure of matter

C4. Stoichiometry

C5. Chemical reactions

5.1 Production of energy
5.2 Energetics of a reaction
5.3 Rate of reaction
5.4 Redox

C6. Acids, bases and salts

6.1 The characteristic properties of acids and bases
6.2 Types of oxides
6.3 Preparation of salts
6.4 Identification of ions
6.5 Identification of gases

C7. The Periodic Table

7.1 Periodic trends
7.2 Group properties
7.3 Transition elements
7.4 Noble gases

C8. Metals

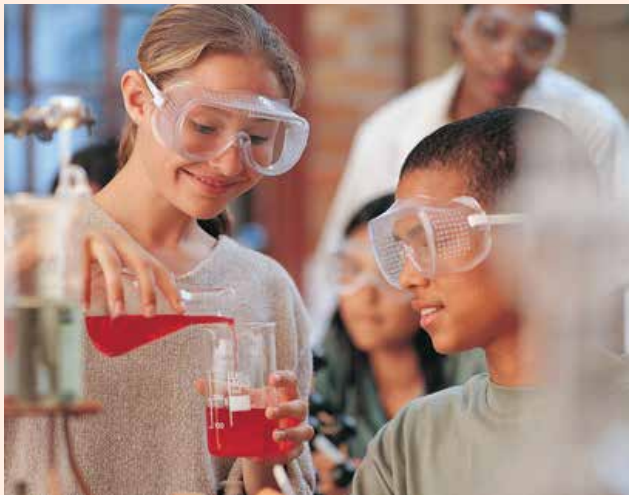
8.1 Properties of metals
8.2 Reactivity series

C9. Air and water

C10. Lime and limestone

C11. Organic chemistry

11.1 Names of compounds
11.2 Fuels
11.3 Homologous series
11.4 Alkanes
11.5 Alkenes
11.6 Alcohols



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Cambridge IGCSE Physical Science (0652)

Physical Science syllabus content continued

Physics

P1. General physics

1.1 Length and time
1.2 Speed, velocity and acceleration
1.3 Mass and weight
1.4 Density
1.5 Forces
1.6 Energy, work and power

P2. Thermal physics

2.1 Thermal properties
2.2 Transfer of thermal energy

P3. Properties of waves, including light and sound

3.1 General wave properties
3.2 Light
3.3 Sound

P4. Electricity and magnetism

4.1 Simple phenomena of magnetism
4.2 Electrostatics
4.3 Electricity
4.4 Electric circuits
4.5 Practical electric circuitry
4.6 Electromagnetic effects
4.7 Cathode rays and the cathode-ray oscilloscope (c.r.o.)

P5. Atomic physics

5.1 Radioactivity
5.2 The nuclear atom

Assessment

Assessment for Biology, Chemistry, Physics, Combined Science, Co-ordinated Sciences and Physical Science all follow the same assessment objectives and structure outlined below.

Assessment objectives

AO1 Knowledge with understanding (50% weighting)

AO2 Handling information and problem solving (30% weighting)

AO3 Experimental skills and investigations (20% weighting)

Assessment structure

All candidates must take three papers:

- core candidates take Paper 1, Paper 3 and either Paper 5 or Paper 6
- extended candidates take Paper 2, Paper 4 and either Paper 5 or Paper 6.

Biology, Chemistry, Physics and Combined Science

Paper	Candidates	Assessment objectives	Duration	Weighting
Paper 1 A multiple-choice paper consisting of 40 items of the four-choice type.	Core	AO1 and AO2	45 mins	30%
Paper 2 A multiple-choice paper consisting of 40 items of the four-choice type.	Extended	AO1 and AO2	45 mins	30%
Paper 3 A written paper consisting of short-answer and structured questions.	Core	AO1 and AO2	1 hour 15 mins	50%
Paper 4 A written paper consisting of short-answer and structured questions.	Extended	AO1 and AO2	1 hour 15 mins	50%
Paper 5 Practical test.	All candidates take Paper 5 or Paper 6	AO3	1 hour 15 mins (Combined Science is 1 hour 30 mins)	20%
Paper 6 Alternative to practical.		AO3	1 hour	20%

Co-ordinated Sciences (Double award)

Paper	Candidates	Assessment objectives	Duration	Weighting
Paper 1 A multiple-choice paper consisting of 40 items of the four-choice type.	Core	AO1 and AO2	45 mins	30%
Paper 2 A multiple-choice paper consisting of 40 items of the four-choice type.	Extended	AO1 and AO2	45 mins	30%
Paper 3 A written paper consisting of short-answer and structured questions.	Core	AO1 and AO2	2 hours	50%
Paper 4 A written paper consisting of short-answer and structured questions.	Extended	AO1 and AO2	2 hours	50%
Paper 5 Practical test.	All candidates take Paper 5 or Paper 6	AO3	2 hours	20%
Paper 6 Alternative to practical.		AO3	1 hour	20%

Physical Science

Paper	Candidates	Assessment objectives	Duration	Weighting
Paper 1 A multiple-choice paper consisting of 40 items of the four-choice type.	Core	AO1 and AO2	45 mins	30%
Paper 2 A multiple-choice paper consisting of 40 items of the four-choice type.	Extended	AO1 and AO2	45 mins	30%
Paper 3 A written paper consisting of short-answer and structured questions.	Core	AO1 and AO2	1 hour 15 mins	50%
Paper 4 A written paper consisting of short-answer and structured questions.	Extended	AO1 and AO2	1 hour 15 mins	50%
Paper 5 Practical test.	All candidates take Paper 5 or Paper 6	AO3	1 hour 30 mins	20%
Paper 6 Alternative to practical.		AO3	1 hour	20%

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- Cambridge science
- Cambridge languages
- Cambridge humanities and social sciences
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