

SYLLABUS

Cambridge O Level
CDT: Design and Communication
7048

For examination in November 2016

Changes to syllabus for 2016

This syllabus has been updated, but there are no significant changes.

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1. Introduction

1.1 Why choose Cambridge?

Recognition

Cambridge International Examinations is the world's largest provider of international education programmes and qualifications for learners aged 5 to 19. We are part of Cambridge Assessment, a department of the University of Cambridge, trusted for excellence in education. Our qualifications are recognised by the world's universities and employers.

Cambridge O Level is internationally recognised by schools, universities and employers as equivalent in demand to Cambridge IGCSE® (International General Certificate of Secondary Education). Learn more at www.cie.org.uk/recognition

Excellence in education

Our mission is to deliver world-class international education through the provision of high-quality curricula, assessment and services.

More than 9000 schools are part of our Cambridge learning community. We support teachers in over 160 countries who offer their learners an international education based on our curricula and leading to our qualifications. Every year, thousands of learners use Cambridge qualifications to gain places at universities around the world.

Our syllabuses are reviewed and updated regularly so that they reflect the latest thinking of international experts and practitioners and take account of the different national contexts in which they are taught.

Cambridge programmes and qualifications are designed to support learners in becoming:

- **confident** in working with information and ideas – their own and those of others
- **responsible** for themselves, responsive to and respectful of others
- **reflective** as learners, developing their ability to learn
- **innovative** and equipped for new and future challenges
- **engaged** intellectually and socially, ready to make a difference.

Support for teachers

A wide range of materials and resources is available to support teachers and learners in Cambridge schools. Resources suit a variety of teaching methods in different international contexts. Through subject discussion forums and training, teachers can access the expert advice they need for teaching our qualifications. More details can be found in Section 2 of this syllabus and at www.cie.org.uk/teachers

Support for exams officers

Exams officers can trust in reliable, efficient administration of exams entries and excellent personal support from our customer services. Learn more at www.cie.org.uk/examsOfficers

Not-for-profit, part of the University of Cambridge

We are a not-for-profit organisation where the needs of the teachers and learners are at the core of what we do. We continually invest in educational research and respond to feedback from our customers in order to improve our qualifications, products and services.

Our systems for managing the provision of international qualifications and education programmes for learners aged 5 to 19 are certified as meeting the internationally recognised standard for quality management, ISO 9001:2008. Learn more at www.cie.org.uk/ISO9001

1.2 Why choose Cambridge O Level?

Cambridge O Levels have been designed for an international audience and are sensitive to the needs of different countries. These qualifications are designed for learners whose first language may not be English and this is acknowledged throughout the examination process. The Cambridge O Level syllabus also allows teaching to be placed in a localised context, making it relevant in varying regions.

Our aim is to balance knowledge, understanding and skills in our programmes and qualifications to enable candidates to become effective learners and to provide a solid foundation for their continuing educational journey.

Through our professional development courses and our support materials for Cambridge O Levels, we provide the tools to enable teachers to prepare learners to the best of their ability and work with us in the pursuit of excellence in education.

Cambridge O Levels are considered to be an excellent preparation for Cambridge International AS and A Levels, the Cambridge AICE (Advanced International Certificate of Education) Group Award, Cambridge Pre-U, and other education programmes, such as the US Advanced Placement program and the International Baccalaureate Diploma programme. Learn more about Cambridge O Levels at www.cie.org.uk/cambridgesecundary2

Guided learning hours

Cambridge O Level syllabuses are designed on the assumption that learners have about 130 guided learning hours per subject over the duration of the course, but this is for guidance only. The number of hours required to gain the qualification may vary according to local curricular practice and the learners' prior experience of the subject.

1.3 Why choose Cambridge O Level CDT: Design and Communication

Cambridge O Levels are established qualifications that keep pace with educational developments and trends. The Cambridge O Level curriculum places emphasis on broad and balanced study across a wide range of subject areas. The curriculum is structured so that candidates attain both practical skills and theoretical knowledge.

This syllabus aims to develop the skills of problem solving, designing and graphic communication. Candidates have the opportunity to develop their own ideas as they produce an investigative folio in answer to a problem or issue. This may involve work in two or three dimensions, so candidates learn the use of

a range of views and perspectives for use in everyday design areas. Particular examples might include packaging, symbols, logos, signs, etc.

Cambridge O Level CDT: Design and Communication provides an ideal basis for further study, and prepares candidates for their future within a rapidly changing technological society.

Prior learning

Candidates beginning this course are not expected to have studied CDT: Design and Communication previously.

Progression

Cambridge O Levels are general qualifications that enable candidates to progress either directly to employment, or to proceed to further qualifications.

Candidates who are awarded grades C to A* in Cambridge O Level CDT: Design and Communication are well prepared to follow courses leading to Cambridge International AS and A Level Design and Technology (Graphics option), or the equivalent.

1.4 How can I find out more?

If you are already a Cambridge school

You can make entries for this qualification through your usual channels. If you have any questions, please contact us at **info@cie.org.uk**

If you are not yet a Cambridge school

Learn about the benefits of becoming a Cambridge school at **www.cie.org.uk/startcambridge**. Email us at **info@cie.org.uk** to find out how your organisation can register to become a Cambridge school.

2. Teacher support

2.1 Support materials

Cambridge syllabuses, past question papers and examiner reports to cover the last examination series are on the *Syllabus and Support Materials* DVD, which we send to all Cambridge schools.

You can also go to our public website at **www.cie.org.uk/olevel** to download current and future syllabuses together with specimen papers or past question papers and examiner reports from one series.

For teachers at registered Cambridge schools a range of additional support materials for specific syllabuses is available online from Teacher Support, our secure online support for Cambridge teachers. Go to **<http://teachers.cie.org.uk>** (username and password required).

2.2 Resource lists

We work with publishers providing a range of resources for our syllabuses including textbooks, websites, CDs, etc. Any endorsed, recommended and suggested resources are listed on both our public website and on Teacher Support.

The resource lists can be filtered to show all resources or just those which are endorsed or recommended by Cambridge. Resources endorsed by Cambridge go through a detailed quality assurance process and are written to align closely with the Cambridge syllabus they support.

2.3 Training

We offer a range of support activities for teachers to ensure they have the relevant knowledge and skills to deliver our qualifications. See **www.cie.org.uk/events** for further information.

3. Assessment at a glance

All candidates take Papers 1 and 2.

Paper 1: Written examination (2¾ hours)

15 minutes reading time

Section 1 – 30 marks

In-depth application of a variety of skills.

Candidates must answer one question from a choice of two.

Section 2 – 50 marks

Applying reasoned consideration to direct problems of graphic communication.

Candidates must answer two questions from a choice of four (25 marks each).

Weighting: 70% of total marks

Paper 2: Project

Candidates will select a problem from the themes set by Cambridge.

The candidate will compile an investigative folio, answering a problem selected from the themes, during a period of two terms. The folio will contain all evidence of problem solving and realisation. The maximum size of the folder is A3.

Teachers may direct as much time as they wish for candidates to investigate their chosen theme. Candidates may seek help and guidance from their teacher as their investigation develops.

Candidates should use colour, where appropriate, to aid clarity and presentation.

The folio will be marked by the candidate's teacher, using the assessment criteria in section 5.1.

The form necessary for the recording of marks is included in section 6.1.

Details regarding external moderation of coursework are in section 5.2.

Weighting: 30% of total marks

Availability

This syllabus is examined in the November examination series.

This syllabus is not available to private candidates.

Detailed timetables are available from **www.cie.org.uk/examsOfficers**

Cambridge O levels are available to Centres in Administrative Zones 3, 4 and 5. Centres in Administrative Zones 1, 2 or 6 wishing to enter candidates for Cambridge O Level examinations should contact Cambridge Customer Services.

Combining this with other syllabuses

Candidates can combine this syllabus in an examination session with any other Cambridge syllabus, except:

- syllabuses with the same title at the same level

Please note that Cambridge O Level, Cambridge IGCSE and Cambridge International Level 1/Level 2 Certificate syllabuses are at the same level.

4. Syllabus aims and assessment objectives

4.1 Syllabus aims

The aims of the syllabus are the same for all candidates. The aims set out below describe the educational objectives of a course in Design and Communication. They are not listed in order of priority.

- To foster awareness, understanding, persistence and expertise in those areas of creative thinking which can be expressed and developed through investigation and research, planning, designing, realising and evaluating.
- To encourage the acquisition of a body of knowledge applicable to solving practical/technological problems operating through processes of analysis, synthesis and realisation.
- To stimulate the development of a range of appropriate graphical techniques and processes, including model-making.
- To stimulate the development of a range of communication skills which are central to design, realisation and evaluation.
- To encourage candidates to relate their practical work to their personal interests and abilities.
- To promote the development of curiosity, enquiry, initiative, ingenuity, resourcefulness and discrimination.
- To offer a broad and balanced perspective of the range of technological applications, in order to provide an understanding of their capabilities and limitations.
- To encourage technological awareness and to foster attitudes of cooperation and social responsibility.
- To stimulate the exercising of value judgements of an aesthetic, technical and economic nature.

5. Syllabus content

Candidates should have experience of working to drawing standards and conventions such as:

- PD 7308 Engineering drawing for schools and colleges
- PD 7307 Graphic symbols for use in schools and colleges
- PD 7303 Electrical and electronic graphical symbols for use in schools and colleges
- BS 1192 Recommendations for building drawing practical
- BS 4058 Data processing flowchart symbols, rules and conventions

	Candidates should be able to:
Orthographic projections	<ul style="list-style-type: none"> • give information, or use given information, in both first and third angle projection (dimensions and drawings of detail and simple assemblies of parts from information given in orthographic or pictorial form will be required, including parts lists)
Sectional views	<ul style="list-style-type: none"> • select the most suitable section, draw whole or part sections taken on the principle vertical and horizontal planes
Sketching	<ul style="list-style-type: none"> • understand and produce free-hand sketches which communicate ideas, thoughts and information from written, visual or tabular data, and presented in pictorial, formal pictorial, plane or orthographic modes
Interpretation of information	<ul style="list-style-type: none"> • read drawings and interpret given information
Division	<ul style="list-style-type: none"> • divide lines and angles
Geometrical figures	<ul style="list-style-type: none"> • understand the use of an appropriate geometrical construction in order to draw regular plane linear shapes (triangles, quadrilaterals, pentagons, hexagons and octagons)
The circle	<ul style="list-style-type: none"> • understand parts of a circle, and use appropriate geometrical construction in order to draw circles, tangents and tangential arcs
Ellipse	<ul style="list-style-type: none"> • construct ellipses by an accurate method (trammels will be permitted)
Loci	<ul style="list-style-type: none"> • draw the paths of points in the manner of simple plane mechanisms (linkages will have a maximum of four elements)

Presentation	<ul style="list-style-type: none"> demonstrate use of shading, colouring and other techniques for emphasis apply an understanding of light, shade and shadow to give increased credibility to pictorial drawing communicate the material and surface finish of a given product
Isometric	<ul style="list-style-type: none"> produce isometric views of circles and arcs (isometric scales will not be required)
Planometric	<ul style="list-style-type: none"> produce planometric views of circles and arcs (no scaling will be required)
Perspective	<ul style="list-style-type: none"> produce estimated perspective drawings, using one or two vanishing points
Oblique	<ul style="list-style-type: none"> draw oblique views of circles and arcs (both cavalier and cabinet)
Exploded views	<ul style="list-style-type: none"> draw exploded views of objects in line along one axis only (in the examination paper, however, information may be presented on more than one axis)
Use of drafting aids	<ul style="list-style-type: none"> use drawing aids to develop good drafting techniques (Radius aids, flexi curves, ellipse aids and nut templates will be permitted in the examinations, unless stated otherwise in particular questions. During their course candidates should have experience in the use of technical pens, templates, lettering and other stencils.)
Geometrical loci	<ul style="list-style-type: none"> draw the linear helix, the cycloid and simple plate cams (uniform velocity and retardation)
Developments	<ul style="list-style-type: none"> draw developments of right prisms, cylinders, pyramids and cones (complete and truncated)
Intersections	<ul style="list-style-type: none"> produce views of simple prisms and cylinders intersecting at right angles with axes in line
Auxiliary views	<ul style="list-style-type: none"> draw objects in first auxiliary views at set square angles (30°, 45° and 60°), including true shape of cut surfaces
Convey information	<ul style="list-style-type: none"> construct and interpret histograms, pie diagrams, bar charts and graphs from data provided in a tabular or matrix form, to communicate quantity and distribution (candidates will be expected to produce flow charts to describe processes, operations or assemblies)

Analysis of products	<ul style="list-style-type: none">• analyse the construction and operation of uncomplicated products• research, analyse and consult relevant sources of information• recognise factors that will determine the preparation of a viable specification• synthesise and communicate proposals for solutions
Control	<ul style="list-style-type: none">• understand that most activities require some sort of control• understand the term control system• understand that in order for a system to work it needs an INPUT, CONTROL and OUTPUT• make use of the systems approach when designing solutions to control problems (the systems approach is to be used to explain a control situation, without going into detail of how it is to be done)

Notes for guidance

In the areas of product analysis and control, the most complex items that candidates would be expected to have experience of would be things such as:

- a torch
- a manually operated camera
- a bicycle
- a small pocket radio

Please note that knowledge about specific products will not be required in the examination, but candidates will be expected to show their ability to analyse products as part of their project work.

It is not intended that specific items in the areas listed below should be identified, but rather that examples based on them should be used as a way of teaching and applying the knowledge and skills developed as a result of studying the core content of the syllabus.

The following lists offer suggestions for areas of study, but they should not be considered definitive:

Signs	Symbols and logos
<ul style="list-style-type: none"> • on control panels • directional • in shops • in streets 	<ul style="list-style-type: none"> • on clothes • on instruments and control panels • on maps • on products • on road signs • in vehicles • used by companies and organisations
Packaging	
<p>Candidates should be familiar with packaging used in ways such as the following:</p> <ul style="list-style-type: none"> • to protect items • to communicate information about a product • to advertise and help sell products 	<p>Examples of items to be packaged might include:</p> <ul style="list-style-type: none"> • food • cosmetics • toys • small gift items • small electrical products • records, tapes and CDs
Lines and planes in projection	
<p>This area is covered by the sections on auxiliary views and orthographic projection.</p>	

6. Project assessment

Cambridge sets the project themes and will despatch them to schools in January for examinations taken in November. In order to receive the themes, Centres must make estimated entries for this syllabus. Estimated entries for centres in Mauritius are handled by MES. Instructions and timescales for all other centres making estimated entries are in the *Cambridge Administrative Guide*, available on our website.

6.1 Project assessment criteria

This paper presents the candidate with a number of problematic themes. The questions which pose these problems are open-ended, with a low level of directiveness. The candidates should have a good deal of freedom to determine the length and nature of their involvement with each element required in this high level design/problem-solving process.

	Mark	Maximum mark
<p>(a) Problem identification – the candidate’s interpretation of the problem presented in a statement, i.e. the brief</p> <p>Candidate failed to identify a suitable problem.</p> <p>Candidate either (i) needed help to identify a problem, or (ii) had no help but the resulting problem is unsuitable for design development.</p> <p>Candidate identified and described unaided a problem appropriate for design development.</p>	<p>0</p> <p>2</p> <p>5</p>	<p>5</p>
<p>(b) Research and analysis – the ordering of information relevant to the presentation of a solution</p> <p>Research consists of copied material, without any evident purpose.</p> <p>Research has not been initiated independently, or is incapable of forming a planned programme, or the candidate has required considerable assistance and frequent direction.</p> <p>Research has required significant initial assistance; thereafter little direction has been needed, but the candidate has either concentrated on a narrow area or given only shallow attention to a wider field.</p> <p>Research is well planned, broad and imaginative. The candidate has developed a programme without assistance, and this has resulted in information being structured and effectively communicated.</p>	<p>3</p> <p>6</p> <p>9</p> <p>15</p>	<p>15</p>

	Mark	Maximum mark
<p>(c) Specification for a possible solution – the candidate’s recognition of those particular factors in research that will determine a specification for presenting a possible solution.</p> <p>The candidate’s specification is not evident.</p> <p>The candidate’s specification is very shallow.</p> <p>The candidate’s specification is vague, not specific to the problem.</p> <p>The candidate’s specification is not wholly specific, containing some irrelevant material.</p> <p>The candidate’s specification is specific, but does not completely identify all the constraints imposed in the problem.</p> <p>The candidate’s specification is concise, definitive, and is drawn up with obvious reference to the preceding research and analysis.</p>	<p>0</p> <p>2</p> <p>4</p> <p>6</p> <p>8</p> <p>10</p>	<p>10</p>
<p>(d) Proposals for a solution – the synthesis and communication of a number of proposals for a solution.</p> <p>Limited to a single unsupported proposal, the communication of which was largely effective.</p> <p>Limited to a single proposal which is quite well supported and communicated in a reasonable manner; or a number of largely unsupported and similar proposals, communicated in an ineffective manner.</p> <p>Consists of a number of distinct proposals which are unsupported and communicated in an ineffective manner.</p> <p>Consists of a number of distinct well-supported proposals which are communicated in an effective manner.</p>	<p>5</p> <p>10</p> <p>15</p> <p>20</p>	<p>20</p>

	Mark	Maximum mark
<p>(e) Realisation – the realisation and presentation of a final solution.</p> <p>Solution is obviously not a viable solution, but is recognisable as an attempt to define a solution. 8</p> <p>Solution is recognisable as a solution, but can easily be faulted in respect of ideas, communication and quality, or because it fails to meet the specification. 16</p> <p>Solution is incomplete and requires additional material to meet the specification in full, but has been presented in a form which is easily understood. 24</p> <p>Solution is substantially free of omission and, for the most part, fulfils the specification. It has been presented in a clear, descriptive manner. 32</p> <p>Solution is well conceived, clearly and attractively defined, and fully satisfies the specification. 40</p>		40
<p>(f) Evaluation – evaluation of the solution, considering the factors raised in (c).</p> <p>Evaluation is for the most part irrelevant. 2</p> <p>Evaluation is superficial. 4</p> <p>Evaluation is an honest attempt to appraise the solution, but lacks objectivity providing only unsupported judgement. 6</p> <p>Evaluation is almost complete, consisting of some unsupported judgement. 8</p> <p>Evaluation is thorough, objective, relevant and concise, and provides useful material capable of further development. 10</p>		10
Maximum marks available:		100

6.2 Moderation

Internal moderation

When more than one teacher in a Centre is giving internal assessments, the Centre must make arrangements for all candidates to be assessed to a common standard.

External moderation for Centres in Mauritius

Moderators appointed by the Mauritius Examinations Syndicate will carry out external moderation of internal assessment, on behalf of Cambridge. The Mauritius Examinations Syndicate will then send a representative sample to Cambridge, once in-country moderation is complete.

External moderation for all other Centres

Cambridge will carry out external moderation of internal assessment.

Centres must submit candidates' internally assessed marks to Cambridge. The deadlines and methods for submitting internally assessed marks and coursework samples are in the *Cambridge Administrative Guide* available on our website.

The internally moderated marks for all candidates must be recorded on the Coursework Assessment Summary Form. This form, and the instructions for completing it, may be downloaded from **www.cie.org.uk/samples**. The database will ask you for the syllabus code (i.e. 7048) and your Centre number, after which it will take you to the correct form. Follow the instructions when completing the form.

Coursework Assessment Summary Forms must be enclosed with the coursework sample.

Further information about external moderation is in the *Cambridge Handbook* and the *Cambridge Administrative Guide*.

All records and supporting written work should be retained until after the publication of the results.

7. Other information

Equality and inclusion

Cambridge International Examinations has taken great care in the preparation of this syllabus and assessment materials to avoid bias of any kind. To comply with the UK Equality Act (2010), Cambridge has designed this qualification with the aim of avoiding direct and indirect discrimination.

The standard assessment arrangements may present unnecessary barriers for candidates with disabilities or learning difficulties. Arrangements can be put in place for these candidates to enable them to access the assessments and receive recognition of their attainment. Access arrangements will not be agreed if they give candidates an unfair advantage over others or if they compromise the standards being assessed.

Candidates who are unable to access the assessment of any component may be eligible to receive an award based on the parts of the assessment they have taken.

Information on access arrangements is found in the *Cambridge Handbook* which can be downloaded from the website www.cie.org.uk/examsofficer

Language

This syllabus and the associated assessment materials are available in English only.

Grading and reporting

Cambridge O Level results are shown by one of the grades A*, A, B, C, D or E, indicating the standard achieved, A* being the highest and E the lowest. 'Ungraded' indicates that the candidate's performance fell short of the standard required for grade E. 'Ungraded' will be reported on the statement of results but not on the certificate. The letters Q (result pending), X (no results) and Y (to be issued) may also appear on the statement of results but not on the certificate.

Entry codes

To maintain the security of our examinations, we produce question papers for different areas of the world, known as 'administrative zones'. Where the component entry code has two digits, the first digit is the component number given in the syllabus. The second digit is the location code, specific to an administrative zone. Information about entry codes can be found in the *Cambridge Guide to Making Entries*.

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