SYLLABUS

Cambridge O Level
CDT: Design and Communication
7048

For examination in November 2014

Contents

1. Introduction

1.1 Why choose Cambridge?

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

Developed for an international audience

Cambridge O Levels have been designed for an international audience and are sensitive to the needs of different countries. These qualifications are designed for students 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.

Recognition

Every year, hundreds of thousands of learners gain the Cambridge qualifications they need to enter the world's universities.

Cambridge O Level is internationally recognised by schools, universities and employers as equivalent to UK GCSE. Learn more at **www.cie.org.uk/recognition**

Excellence in education

We understand education. We work with over 9000 schools in over 160 countries who offer our programmes and qualifications. Understanding learners' needs around the world means listening carefully to our community of schools, and we are pleased that 98% of Cambridge schools say they would recommend us to other schools.

Our mission is to provide excellence in education, and our vision is that Cambridge learners become confident, responsible, innovative and engaged.

Cambridge programmes and qualifications help Cambridge learners to become:

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

Support in the classroom

We provide a world-class support service for Cambridge teachers and exams officers. We offer a wide range of teacher materials to Cambridge schools, plus teacher training (online and face-to-face), expert advice and learner-support materials. Exams officers can trust in reliable, efficient administration of exams entry and excellent, personal support from our customer services. Learn more at **www.cie.org.uk/teachers**

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

We are a part of Cambridge Assessment, a department of the University of Cambridge and a not-for-profit organisation.

We invest constantly in research and development to improve our programmes and qualifications.

1.2   Why choose Cambridge O Level?

Cambridge helps your school improve learners' performance. Learners develop not only knowledge and understanding, but also skills in creative thinking, enquiry and problem solving, helping them to perform well and prepare for the next stage of their education.

Schools worldwide have helped develop Cambridge O Levels, which provides an excellent preparation for Cambridge International AS and A Levels.

Cambridge O Level incorporates the best in international education for learners at this level. It develops in line with changing needs, and we update and extend it regularly.

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.

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 **international@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 **international@cie.org.uk** to find out how your organisation can become a Cambridge school.

2.   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 October/November examination session.

This syllabus is not available to private candidates.

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 International Level 1/Level 2 Certificates and Cambridge IGCSE syllabuses are at the same level.

3. Syllabus aims

3.1 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.

4. Curriculum 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	• 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	• select the most suitable section, draw whole or part sections taken on the principle vertical and horizontal planes
Sketching	• 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	• read drawings and interpret given information
Division	• divide lines and angles
Geometrical figures	• understand the use of an appropriate geometrical construction in order to draw regular plane linear shapes (triangles, quadrilaterals, pentagons, hexagons and octagons)
The circle	• understand parts of a circle, and use appropriate geometrical construction in order to draw circles, tangents and tangential arcs
Ellipse	• construct ellipses by an accurate method (trammels will be permitted)
Loci	• draw the paths of points in the manner of simple plane mechanisms (linkages will have a maximum of four elements)

Presentation	• 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	• produce isometric views of circles and arcs (isometric scales will not be required)
Planometric	• produce planometric views of circles and arcs (no scaling will be required)
Perspective	• produce estimated perspective drawings, using one or two vanishing points
Oblique	• draw oblique views of circles and arcs (both cavalier and cabinet)
Exploded views	• 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	• 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	• draw the linear helix, the cycloid and simple plate cams (uniform velocity and retardation)
Developments	• draw developments of right prisms, cylinders, pyramids and cones (complete and truncated)
Intersections	• produce views of simple prisms and cylinders intersecting at right angles with axes in line
Auxiliary views	• draw objects in first auxiliary views at set square angles (30°, 45° and 60°), including true shape of cut surfaces
Convey information	• 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	• 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	• 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
- on control panels - directional - in shops - in streets	- on clothes - on instruments and control panels - on maps - on products - on road signs - in vehicles - used by companies and organisations
Packaging	
Candidates should be familiar with packaging used in ways such as the following: - to protect items - to communicate information about a product - to advertise and help sell products	Examples of items to be packaged might include: - food - cosmetics - toys - small gift items - small electrical products - records, tapes and CDs
Lines and planes in projection	
This area is covered by the sections on auxiliary views and orthographic projection.	

5.   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.

5.1   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
(a) Problem identification – the candidate's interpretation of the problem presented in a statement, i.e. the brief		**5**
Candidate failed to identify a suitable problem.	0	
Candidate either (i) needed help to identify a problem, or (ii) had no help but the resulting problem is unsuitable for design development.	2	
Candidate identified and described unaided a problem appropriate for design development.	5	
(b) Research and analysis – the ordering of information relevant to the presentation of a solution		**15**
Research consists of copied material, without any evident purpose.	3	
Research has not been initiated independently, or is incapable of forming a planned programme, or the candidate has required considerable assistance and frequent direction.	6	
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	9	
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.	15	

	Mark	Maximum mark
(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.		**10**
The candidate's specification is not evident.	0	
The candidate's specification is very shallow.	2	
The candidate's specification is vague, not specific to the problem	4	
The candidate's specification is not wholly specific, containing some irrelevant material.	6	
The candidate's specification is specific, but does not completely identify all the constraints imposed in the problem.	8	
The candidate's specification is concise, definitive, and is drawn up with obvious reference to the preceding research and analysis.	10	
(d) Proposals for a solution – the synthesis and communication of a number of proposals for a solution.		**20**
Limited to a single unsupported proposal, the communication of which was largely effective.	5	
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.	10	
Consists of a number of distinct proposals which are unsupported and communicated in an ineffective manner.	15	
Consists of a number of distinct well-supported proposals which are communicated in an effective manner.	20	

	Mark	Maximum mark
(e) Realisation – the realisation and presentation of a final solution.		**40**
Solution is obviously not a viable solution, but is recognisable as an attempt to define a solution.	8	
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	
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	
Solution is substantially free of omission and, for the most part, fulfils the specification. It has been presented in a clear, descriptive manner.	32	
Solution is well conceived, clearly and attractively defined, and fully satisfies the specification.	40	
(f) Evaluation – evaluation of the solution, considering the factors raised in (c).		**10**
Evaluation is for the most part irrelevant.	2	
Evaluation is superficial.	4	
Evaluation is an honest attempt to appraise the solution, but lacks objectivity providing only unsupported judgement.	6	
Evaluation is almost complete, consisting of some unsupported judgement.	8	
Evaluation is thorough, objective, relevant and concise, and provides useful material capable of further development.	10	
Maximum marks available:		**100**

5.2 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.

Coursework Assessment Summary Forms (a copy of which may be found at the back of this syllabus) 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.

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Please read the instructions overleaf before completing this form.

| Centre Number | | | | | Centre Name | | | November | 2 | | | |

Candidate Number	Candidate Name	Teaching Group/Set	(a) Problem Identification (max 5)	(b) Research & Analysis (max 15)	(c) Specification for Solution (max 10)	(d) Proposals for Solution (max 20)	(e) Realisation (max 40)	(f) Evaluation (max 10)	Total Mark (max 100)	Internally Moderated Mark (max 100)

Teacher completing this form (BLOCK CAPITALS)		Date						
Name of Moderator (BLOCK CAPITALS)		Date						

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A.   Instructions for completing Coursework Assessment Summary Forms

1. Complete the information at the head of the form.

2. List the candidates in an order which will allow ease of transfer of information to a computer-printed Coursework mark sheet at a later stage (i.e. in candidate index number order, where this is known; see item B.1 below). Show the teaching group or set for each candidate. The initials of the teacher may be used to indicate group or set.

3. Enter each candidate's marks on this form as follows:

    (a) There are columns for individual skills; enter the marks initially awarded (i.e. before internal moderation took place).

    (b) In the column headed 'Total Mark'; enter the total mark awarded before internal moderation took place.

    (c) In the column headed 'Internally Moderated Mark', enter the total mark awarded after internal moderation took place.

4. Both the teacher completing the form and the internal moderator (or moderators) should check the form and complete and sign the bottom portion.

B.   Procedures for external moderation in Mauritius

1. University of Cambridge International Examinations sends computer-printed Coursework mark sheets (MS1) to the Mauritius Examinations Syndicate in early October showing the names and index numbers of each candidate.

2. External moderation of internal assessment will be carried out by moderators appointed by the Mauritius Examinations Syndicate on behalf of Cambridge.

    The Mauritius Examinations Syndicate will communicate with Centres regarding procedures regarding external moderation and sampling.

    It is the responsibility of the Mauritius Examinations Syndicate to ensure that the final moderated marks are recorded on the computer-printed Coursework mark sheets (MS1).

C.   Procedures for external moderation in the rest of the world

1. Please refer to the *Cambridge Administrative Guide* available on our website.

2. Cambridge reserves the right to ask for further samples of Coursework.

3. Send, with the sample work, instructions given to candidates and information as to how internal moderation was carried out.

7. Additional information

7.1 Guided learning hours

Cambridge O Level syllabuses are designed on the assumption that candidates have about 130 guided learning hours per subject over the duration of the course. ('Guided learning hours' include direct teaching and any other supervised or directed study time. They do not include private study by the candidate.)

However, this figure is for guidance only, and the number of hours required may vary according to local curricular practice and the candidates' prior experience of the subject.

7.2 Recommended prior learning

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

7.3 Progression

Cambridge O Level Certificates 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.

7.4 Component codes

Because of local variations, in some cases component codes will be different in instructions about making entries for examinations and timetables from those printed in this syllabus, but the component names will be unchanged to make identification straightforward.

7.5 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, Grade A* being the highest and Grade 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.

Percentage uniform marks are also provided on each candidate's statement of results to supplement their grade for a syllabus. They are determined in this way:

- A candidate who obtains…
    … the minimum mark necessary for a Grade A* obtains a percentage uniform mark of 90%.
    … the minimum mark necessary for a Grade A obtains a percentage uniform mark of 80%.
    … the minimum mark necessary for a Grade B obtains a percentage uniform mark of 70%.

… the minimum mark necessary for a Grade C obtains a percentage uniform mark of 60%.

… the minimum mark necessary for a Grade D obtains a percentage uniform mark of 50%.

… the minimum mark necessary for a Grade E obtains a percentage uniform mark of 40%.

… no marks receives a percentage uniform mark of 0%.

Candidates whose mark is none of the above receive a percentage mark in between those stated, according to the position of their mark in relation to the grade 'thresholds' (i.e. the minimum mark for obtaining a grade). For example, a candidate whose mark is halfway between the minimum for a Grade C and the minimum for a Grade D (and whose grade is therefore D) receives a percentage uniform mark of 55%.

The percentage uniform mark is stated at syllabus level only. It is not the same as the 'raw' mark obtained by the candidate, since it depends on the position of the grade thresholds (which may vary from one session to another and from one subject to another) and it has been turned into a percentage.

7.6   Support and resources

Copies of syllabuses, the most recent question papers and Principal Examiners' reports for teachers are on the Syllabus and Support Materials CD-ROM, which we send to all Cambridge International Schools. They are also on our public website – go to **www.cie.org.uk/olevel**. Click the **Subjects** tab and choose your subject. For resources, click 'Resource List'.

You can use the 'Filter by' list to show all resources or only resources categorised as 'Endorsed by Cambridge'. Endorsed resources are written to align closely with the syllabus they support. They have been through a detailed quality-assurance process. As new resources are published, we review them against the syllabus and publish their details on the relevant resource list section of the website.

Additional syllabus-specific support is available from our secure Teacher Support website **http://teachers.cie.org.uk** which is available to teachers at registered Cambridge schools. It provides past question papers and examiner reports on previous examinations, as well as any extra resources such as schemes of work or examples of candidate responses. You can also find a range of subject communities on the Teacher Support website, where Cambridge teachers can share their own materials and join discussion groups.

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