

SYLLABUS

Cambridge O Level
Design and Technology
6043

For examination in November 2017, 2018 and 2019

Changes to syllabus for 2017, 2018 and 2019

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

You are advised to read the whole syllabus before planning your teaching programme.

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1. Introduction

1.1 Why choose Cambridge?

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

Our programmes set the global standard for international education. They are created by subject experts, are rooted in academic rigour, and provide a strong platform for progression. Over 10 000 schools in 160 countries work with us to prepare nearly a million learners for their future with an international education from Cambridge.

Cambridge learners

Cambridge programmes and qualifications develop not only subject knowledge but also skills. We encourage Cambridge learners to be:

- **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.

Recognition

Cambridge O Level is internationally recognised by schools, universities and employers as equivalent in demand to Cambridge IGCSE® (International General Certificate of Secondary Education). There are over 700 000 entries a year in nearly 70 countries. Learn more at www.cie.org.uk/recognition

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

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 students 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 Design and Technology?

Candidates following the Cambridge O Level Design and Technology syllabus focus on problem-solving design activities which culminate in using practical skills to create models and artefacts. Candidates gain knowledge of, and practical experience in using, a range of materials which includes plastics, wood and metal and appropriate modern technologies. Candidates will also develop skills such as communication, initiative, resourcefulness, enquiry and ingenuity.

Prior learning

Candidates beginning this course are not expected to have studied Design and Technology 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 A* to C in Cambridge O Level Design and Technology are well prepared to follow courses leading to Cambridge International AS and A Level Design and Technology, 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

We send Cambridge syllabuses, past question papers and examiner reports to cover the last examination series 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 Endorsed resources

We work with publishers providing a range of resources for our syllabuses including print and digital materials. Resources endorsed by Cambridge go through a detailed quality assurance process to ensure they provide a high level of support for teachers and learners.

We have resource lists which can be filtered to show all resources, or just those which are endorsed by Cambridge. The resource lists include further suggestions for resources to support teaching.

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

For Cambridge O Level Design and Technology, candidates take two compulsory components.

Components	Weighting
<p>Paper 1 Technology 2 hours 30 minutes</p> <p>Part A (28 marks) Ten short-answer questions.</p> <p>Part B (72 marks) Section 1: Tools and materials Candidates choose two out of four questions (each question 18 marks).</p> <p>Section 2: Processes Candidates choose two out of four questions (each question 18 marks).</p> <p>100 marks Externally assessed</p>	50%
<p>Paper 2 Design project Coursework</p> <p>Project themes are set by Cambridge and are notified to schools in January for examinations taken in November. It is important that candidates have the opportunity to access facilities that allow them to realise their products.</p> <p>The project will comprise two interrelated parts: Part A The design folio (60 marks) Part B The design artefact (40 marks).</p> <p>100 marks Internally assessed/externally moderated</p>	50%

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 Cambridge O Level Design and Technology syllabus aims to:

- promote problem-solving design activity
- develop appropriate technical skills to enable the realisation of solutions to design problems
- develop knowledge of a range of materials and the appropriate manipulative skills
- develop an understanding of some aspects of technological activity
- develop appropriate graphical skills to enable full engagement in design activity
- develop awareness of possible hazards associated with practical workshop activities and to encourage habits of safe working.

4.2 Assessment objectives

A01 Investigate, research, identify and define design problems

- Identify clearly, from a problem situation, a specific need for which a solution is required.
- Define and analyse a problem by considering any relevant functional, aesthetic, human, economic and environmental factors.
- Investigate, research, collect and record relevant information.

A02 Apply knowledge to new situations

- Demonstrate the ability to apply previously learned knowledge to solve problems or provide solutions.
- Exercise judgement relating to appropriate functional, technological and aesthetic factors.

A03 Explore and develop ideas

- Develop ideas towards a final solution.

A04 Formulate production plans and manufacture artefacts

- Plan and organise the work procedures and processes involved in the realisation of a solution.
- Realise a solution in appropriate material(s), using suitable techniques.
- Demonstrate knowledge of materials, by showing an understanding of their characteristics in relation to using appropriate techniques and processes.

A05 Understand technological and cultural responsibilities

- Demonstrate a knowledge and awareness of the technological and cultural environment.

A06 Evaluate performance

- Evaluate design ideas, test and evaluate design solutions.

A07 Effectively communicate

- Demonstrate ability to use various media and techniques to communicate information.

4.3 Relationship between assessment objectives and components

The approximate weightings allocated to each of the assessment objectives are summarised below.

Assessment objective	Paper 1	Paper 2	Weighting for qualification
AO1 Investigate, research, identify and define design problems	5%	5%	10%
AO2 Apply knowledge to new situations	22.5%	5%	27.5%
AO3 Explore and develop ideas	2.5%	5%	7.5%
AO4 Formulate production plans and manufacture artefacts	10%	20%	30%
AO5 Understand technological and cultural responsibilities	2.5%	5%	7.5%
AO6 Evaluate performance	2.5%	5%	7.5%
AO7 Effectively communicate	5%	5%	10%
Total	50%	50%	100%

5. Description of papers

5.1 Paper 1 Technology

2½ hours, 100 marks

This paper is sent to Cambridge for marking. The paper represents 50% of the marks available for the overall syllabus and is marked out of 100.

The paper is a formal, timed examination in which candidates will be required to show their knowledge and understanding of materials, processes and tools associated with the use of metal, plastic and wood in the production of artefacts made to satisfy needs. They will be expected to call upon experience of working these materials (see core content) and to demonstrate that their knowledge of at least one of the identified materials has been extended beyond that of the core experience.

Candidates are expected to study the three types of material – metal, plastic and wood – with one material being treated as the first discipline. They should also have a good working experience of a second material, and some knowledge of the third is expected.

Candidates will be expected to give evidence of regard for the environment and sustainability in their answers.

Part A (28% of Paper 1 marks)

Ten questions requiring short answers, based on a wide knowledge of materials, processes, tools, equipment terminology, graphic representation and interpretation.

Part B (72% of Paper 1 marks)

Section 1 Tools and materials
Section 2 Processes

Candidates must answer two out of four questions from Section 1 and two out of four questions from Section 2.

Candidates are free to make use of coloured pencils for the communication of ideas in their answers. The examination will use metric units.

5.2 Paper 2 Design project

The Design Project is completed by the candidate in response to a project theme which is set by Cambridge International Examinations and issued in January each year.

The project will consist of two parts:

Part A The design folio

Part B The design artefact

The paper represents 50% of the marks available for the overall syllabus and is assessed out of a maximum of 100 marks. Assessment criteria are set out in Section 7 of the syllabus.

Part A The design folio

The candidate is expected to explore a theme, set by Cambridge, in order to identify a design problem area which is then further analysed to identify a specific design brief. The design brief is developed and clarified by the candidate to a point where the candidate can manufacture an artefact.

The folio shows progression from the initial analysis of the theme through to a detailed design brief and specification. Once the problem brief has been clarified, the candidate generates a range of ideas which are then evaluated by the candidate to allow the development of a final proposed solution; details of materials, sizes and construction methods need to be included at this stage. This work then leads the candidate to develop a detailed production plan (which could be presented in the form of a flow diagram) which is further elaborated by sketches to clarify some of the critical stages.

The folio should finally include a section on evaluation and testing which follows the completion of the artefact. The candidate should identify a method which can be used to test the artefact and so allow the performance to be checked against the original specification which was set out at the design brief stage of the folio. Conclusions leading to proposals for further development are also expected.

The candidate should use appropriate graphical methods throughout the folio, including shading and colour where appropriate. Sequential, exploded or enlarged sketches may help to clarify detail. Notes should generally be succinct and used where details are not clear from graphical representation.

To aid effective communication and to ensure the folio can provide comprehensive evidence for the assessment objectives, it is important that candidates are advised to set out their folio in a clear and logical format.

Part B The design artefact

The candidate is expected to complete the developed design solution (artefact) to demonstrate refined workmanship, sensitive use of materials and appropriate construction methods.

Candidates need not restrict their design solutions to the three main materials identified in the syllabus (metal, plastic and wood). The syllabus encourages a wide knowledge of developing technologies which may, for example, include simple control systems, electronic circuits, pneumatics, and the general application of mechanical principles.

6. Syllabus content

In order to meet the requirements of the assessment, all candidates should have followed the core syllabus in order to gain a sound working knowledge and understanding of metal, plastic and wood. This syllabus should be completed before the adoption of the final project, which it is expected will call for further research and specialisation. With this in mind, the syllabus aims to encourage the inclusion of other materials and technologies when appropriate.

It is hoped that teachers will endeavour to involve pupils in discussion and debate whenever appropriate.

Safety

It is assumed that a proper and appropriate concern for safety codes and practices will be maintained throughout a course following this syllabus.

Design and technology in society

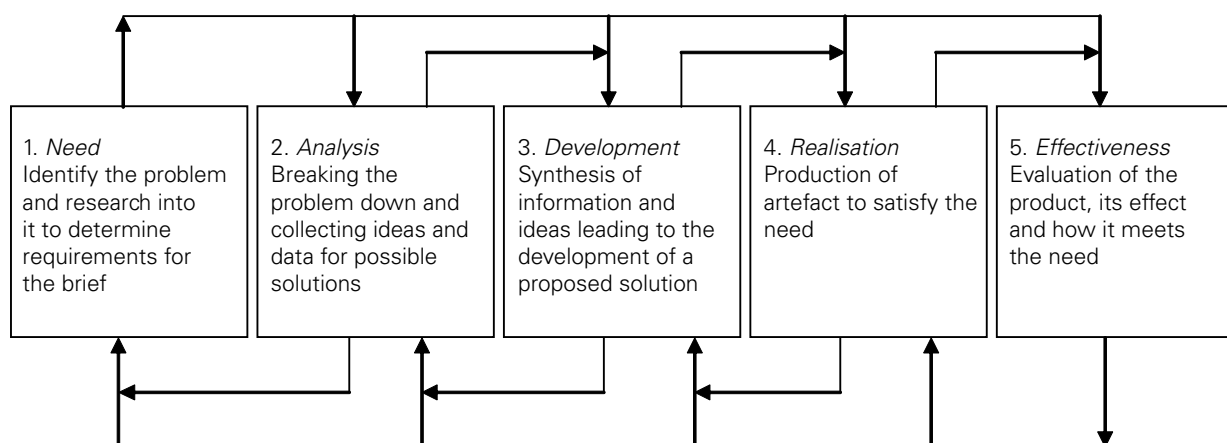
It is important that candidates obtain an appreciation of aesthetics and a pride in craftsmanship, along with understanding of the responsibility and place of the designer craftsman and technologist in society and industry. Some effects of the rapid developments in technology on the individual, and future trends and expectations, should be considered.

Syllabus

1. Design

1.1 Design method

Designing is concerned with creating change and is undertaken in many different ways. It involves rational thought undertaken in a logical sequence, but it also involves intuitive responses. For this examination, design is concerned with problem-centred situations calling for solutions that can be realised through manufactured artefacts. The solutions may be arrived at through diverse methods, but each will include the statement of a BRIEF, ANALYSIS, SYNTHESIS and EVALUATION. A convenient model to help pupils engage in design activity might be:



The arrows show that it is not always a linear series, that there is frequent looping back, particularly an ongoing reappraisal of the nature of the need. The arrows at the top showing forward links indicate, for example, that when considering the nature of the need (box 1) the resources available for realisation (box 4) and the constraints must be kept in mind. Similarly, the likely effects (box 5) need to be anticipated at every stage.

Essential to the activity is the ability to use graphical techniques. There is often a need to model in other ways, so as to visualise a possible solution or part solution.

The production stage calls for logical planning of the practical processes and the evaluation must be as objective as possible including, where appropriate, quantifiable testing.

1.2 Design Content

<i>Aesthetics</i>	A basic appreciation of the use of line, shape, form, proportion, space, colour and texture.
<i>Anthropometrics and ergonomics</i>	An appreciation of the concept of ergonomics and the incorporation of anthropometric data in design, where appropriate.
<i>Information</i>	Practice in gathering relevant information by searching out data from reference sources and enquiry through research and observation. The influence of natural forms on the man-made environment. The influence of materials and processes on the shape of man-made artefacts.
<i>Awareness</i>	A basic understanding of common mathematical shapes in product design, the use of triangulation and the modular principle. A basic appreciation of design evolution through a recognition of how designers respond, as time progresses, to changing pressures and influences.

Teachers and candidates are asked to take particular note of the Assessment Objectives, the Teacher's Guide to Assessment, and the Criteria for the Assessment of the Project.

1.3 Graphics

The ability to show ideas and constructions by pictorial drawing, exploded and sectional views by recognised methods, the principle aim being to achieve fluency. This does not preclude the ability to produce measured orthographic drawings, where appropriate.

The use of ink, colouring media, line, shape, form and texture should be encouraged, so that candidates come to understand the importance of good presentation. Explanations using sequential sketches and flow diagrams are required.

2. Technology	
2.1 Materials	
General physical and working properties and the applications of common constructional materials, especially metal, plastic and wood. Simple comparative testing leading to the reasoned selection of materials. A broad understanding with practical experience, rather than an in-depth knowledge of any particular material, technology or media. Examples of areas which should be covered are given as guidance. In addition, candidates should develop an understanding of environmental and sustainability issues relating to the sourcing, working and disposal of each group of materials.	
2.2 Theoretical knowledge	
<i>Metals</i>	<p>Ferrous – mild steel and high carbon steels.</p> <p>Non ferrous – aluminium and the alloy Duralumin, along with the common casting alloys such as lead free pewter.</p> <p>Copper and its alloys. Zinc, lead and tin.</p> <p>A knowledge of different and appropriate properties and uses, rather than of methods of manufacture.</p>
<i>Plastics</i>	<p>Thermoplastics – nylon, polythene, polyvinylchloride, acrylic and polystyrene.</p> <p>Thermosets – polyester resin including G.R.P., melamine, urea and phenol formaldehyde.</p>
<i>Wood</i>	<p>Natural timbers – classification, advantages and disadvantages in use. Seasoning, storage and care of timber during use and construction.</p> <p>Processed wood – plywood, blockboard, chipboard, medium density fibreboard, veneer and hardboard.</p>
<i>'Smart' materials</i>	<p>Shape memory alloys [SMAs], piezoelectric materials, quantum-tunnelling composite, electroluminescent materials, colour-change materials to include thermochromic and photochromic types.</p> <p>A working knowledge of basic properties and applications rather than in-depth scientific knowledge.</p>

2.3 Practical processes		
Experience in the use of hand and machine tools, operations and processes should cover the major materials – metal, plastic and wood – in sufficient detail to enable candidates to fulfil the realisation of their designs with sensitivity and manipulative skill, to produce artefacts showing a high degree of design awareness and of craftsmanship and regard for the environment and sustainability.		
Area of activity	Core knowledge and capability	Expansion – extended knowledge and capability
<p>1. Preparation of materials Knowledge of available forms, types, sizes – efficient conversion/cutting ready for use – datum surfaces/lines for future use – preparation for machine processes.</p>	Appropriate selection and safe use of hacksaw, guillotine, tenon saw, cross cut and panel saws.	<p>Safe support of work. Selection and safe use of purpose-built portable powered tools such as hand held drills, jigsaws, sanders and planers.</p> <p>Securing work to face-plates, lathe chucks or between centres. Use of machine vices.</p> <p>Filing/planing of datum edge/surface.</p>
<p>2. Setting/marking out Measuring and/or marking of work, so that future operations can be carried out successfully, accurately and speedily with minimum of waste.</p>	Rule, try-square, marking fluid, scribe, chinagraph pencil, fineline permanent marker, marking knife and pencil. Centre punch.	Marking of datum line, by surface plate and scribing block or calipers. Vernier gauge. Micrometer. Dividers, marking gauge and mortise gauge. Use of templates.
<p>3. Shaping (a) Deforming/reforming Methods which rely on a rearrangement of material, rather than its removal, to give the desired shape, form or contour.</p>	Hollowing, bending, forming by the application of heat and pressure, simple casting – gravity and die casting, steam bending and lamination.	Principles in the use of moulds, formers and dies. Vacuum forming, blow moulding, press forming. Casting to form by heat, pressure, chemical process or in combination.
<p>(b) Wastage/addition Various forms of cutting and removal of, or joining and adding to, a material, to give the desired shape, form or contour.</p>	Hand snips, saws, files, rasps, basic planes and abrasive cutters. Simple hole boring by hand and machine. Hand threading and tapping.	Pilot, clearance, tapping and counterbored holes. Screw cutting. Turning of metals to include facing off, reducing, taper turning, centre drilling, drilling and knurling. Wood turning to include between centres and use of faceplate. Special purpose planes, chisels, gauges, saws, abrasive mops, discs and belts, in addition to special files and rasps.
<p>4. Special treatments Those which change the molecular structure of a material so as to make it more suitable for the work it is needed to perform.</p>	Annealing, case hardening, hardening and tempering.	Annealing of metals during working. Heat treatment of mild steel and tool steel (HCS). Plastic memory. Steaming and bending times for timbers. Adhesive types, curing time and relative strengths.

<p>5. Joining and assembly Those methods of fabricating and fitting together with the various parts of a job to form the desired structure, or give the required movement, to enable it to perform its task satisfactorily, both permanent and temporary.</p>	<p>Methods of frame and box (carcase) construction. Permanent and temporary fixtures. Fittings and adhesives.</p>	<p>Use of jigs, formers and holding devices to assist these methods. Application of 'knock down' and 'self-assembly' fittings as used with processed timber. Locking and pinning methods and friction fixings.</p>
<p>6. Finishing The preparation for, and application of, the surface treatment necessary for the material to perform its designed role most satisfactorily.</p>	<p>Surface finishes available, or made, to withstand both interior and exterior use. Environmental considerations relating to the selection, use and disposal of finishing materials.</p>	<p>Special finishes available to withstand corrosion, heat, liquids, stains, etc. Applied finishes as well as the role of 'as bought' finishes (oils, paints, lacquers, stains, dip-coating, satin polishes, etc.).</p>

2.4 Supporting technologies

The technologies of structures, pneumatics, mechanisms, electronics, materials processing and micro-computing are increasingly being used in Design and Technology departments, as aids in graphics, design, control and realisation. Candidates should, whenever possible or appropriate, be given the opportunity to keep abreast of developments in these areas (both within school and industry), and to make use of that knowledge within their projects.

The inclusion of commercially produced circuit kits and mechanical or structural components, to extend the scope of projects, is not prohibited, but their use should not inhibit candidates from fully demonstrating their individual design and making capabilities in the target materials. If candidates intend to make use of this opportunity, they will need to have a working knowledge of the principles involved in the particular technology to be incorporated.

7. Project assessment

7.1 Organisation of assessment

- Design folios should be presented in paper format and no larger than A3 size.
- Teachers are expected to act as advisers throughout the project period.
- Candidates will not be penalised if drawings show evidence of use during the manufacturing stages.
- The folio will be assessed by the candidate's teacher.
- The teacher's assessment for both Part A and Part B should be recorded on the *Summary Coursework Assessment Form*, a copy of which can be downloaded from www.cie.org.uk/samples
- It is expected that practical work will be completed by 15 October.
- **It is essential that the design folio contains sufficient photographs of the artefact, including detailed views, to support the awarding of the marks for the artefact in Part B.**
- **Centres must not send design artefacts to Cambridge.**

Assessment scheme

Part A The design folio	Marks
General analysis of the theme	5
Formulation of design brief resulting in a specification	10
Generation and exploration of ideas	10
Detailed development of the proposed solution	15
Production planning	10
Communication	10
Total (Part A)	60
Part B The artefact	
Artefact realisation	30
Evaluation	10
Total (Part B)	40
Total (Paper 2 Design project)	100

7.2 Moderation

Internal moderation

When more than one teacher is making internal assessments in a Centre, the Centre must make arrangements for all candidates' work to be assessed to a common standard. Instructions and timescales for all other Centres making estimated entries are in the *Cambridge Administrative Guide*, available on our website.

The internally moderated marks for all candidates must be recorded on the Summary Coursework Assessment 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. 6043) and your Centre number, after which it will take you to the correct form. Follow the instructions when completing the form.

External moderation for Centres in Mauritius

Moderators appointed by the MES, on behalf of Cambridge International Examinations, will carry out external moderation of internal assessment. The MES 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 Centre-based assessment.

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

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

Further information about external moderation may be found in the *Cambridge Handbook* and the *Cambridge Administrative Guide*.

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

7.3 Estimated entries

Centres must make estimated entries for this syllabus. Estimated entries for Centres in Mauritius are handled by the Mauritius Examinations Syndicate (MES).

7.4 Resubmission of coursework and carrying forward internally assessed marks

Information about resubmission of coursework and carrying forward internally assessed marks can be found in the *Cambridge Administrative Guide*.

7.5 Teachers' guide to assessment

The assessment overall is to reflect:

- (i) the depth of research and the ability to respond creatively to the problem identified from the theme set by Cambridge
- (ii) the appropriateness and quality of the techniques and methods used to develop and complete the making of the artefact
- (iii) the ability to make a critical analysis of the overall design journey.

The following guidance is offered to assist the marking of the Design Project.

Part A: The design folio	
	Candidates should:
General analysis of the theme	<ul style="list-style-type: none"> show, through a general exploration of the theme, an ability to identify more than one potential design problem area.
Formulation of design brief resulting in a specification	<ul style="list-style-type: none"> demonstrate an ability to clarify, through research, a problem area to include the creation of a precise design brief and relevant specification points.
Generation and exploration of ideas	<ul style="list-style-type: none"> show an ability to explore a number of responses to the design brief and to clearly communicate this through sketches and notes.
Detailed development of the proposed solution	<ul style="list-style-type: none"> develop idea/s to a point where the artefact can be made. record reasoned decisions about form, materials and construction resulting in the production of detailed drawings and a materials list.
Production planning	<ul style="list-style-type: none"> produce a sequential production plan, setting out key processes and identifying appropriate materials, tools and equipment.
Communication	<ul style="list-style-type: none"> use a variety of techniques which together allow the design thinking recorded in the folio to be clear and concise. (This will involve a variety of sketching, drawing and annotation approaches which may use colour and shading to enhance the overall communication.)
Part B: The artefact	
	Candidates should:
Artefact realisation	<ul style="list-style-type: none"> produce an artefact which demonstrates an ability to manipulate materials sensitively and apply technologies where appropriate. (Quality of finish and workmanship will reveal the skill level achieved.)
Evaluation	<ul style="list-style-type: none"> write an evaluation which includes an analysis of the performance of the artefact in relation to the original design brief and specification. (Testing of the artefact should be reported with recommendations for further development.)

7.6 Criteria for the assessment of the project

Part A The design folio

Criterion	Description	Mark range	Maximum mark
General analysis of the theme	Thorough investigation with several potential design problem areas identified.	4–5	5
	Relevant investigation with one or more potential design problem areas identified.	2–3	
	Superficial research which remains unfocussed, no design problem areas identified.	1	
	No creditable work.	0	
Formulation of design brief resulting in a specification	Concise design brief, with evidence of relevant investigation which identifies the design need and the intended users, leading to a precise list of measurable specification points.	8–10	10
	Consideration of the design need or intended users, leading to a specification which includes the key features of the proposed product.	4–7	
	A statement of what is to be made with unfocussed specification points.	1–3	
	No creditable work.	0	
Generation and exploration of ideas	A wide range of appropriate potential solutions. Detailed evaluation and development of the ideas with some consideration of the specification.	8–10	10
	A range of appropriate potential solutions. Some aspects of some ideas explored.	4–7	
	A limited range of ideas with a tendency to focus on a single concept. Little or no evaluation of ideas.	1–3	
	No creditable work.	0	
Detailed development of the proposed solution	Clarification of details using testing and modelling where appropriate, resulting in reasoned decisions about form, materials and construction. Inclusion of detailed drawings and materials list.	11–15	15
	As a result of some investigation, appropriate decisions about form, materials and construction. Detailed drawings and a materials list.	6–10	
	Some decisions about form, few details regarding materials or construction decisions. A drawing giving basic details.	1–5	
	No creditable work.	0	

Criterion	Description	Mark range	Maximum mark
Production planning	All main stages identified and presented in an effective order for the processes required including the materials, tools and equipment required.	8–10	10
	A clear plan showing the main stages of production with the key materials, tools and equipment identified.	4–7	
	Basic list of some processes with some tools and materials identified.	1–3	
	No creditable work.	0	
Communication	The overall folio effectively communicates information using a variety of techniques including colour and shading and annotation. Presentation of information is clear and concise.	8–10	10
	The folio uses a variety of techniques to effectively communicate information; drawing, sketching and annotation are effective. Some colour and shading used.	4–7	
	The folio uses a limited range of techniques; drawing, sketching and annotation lack detail.	1–3	
	No creditable work.	0	

Part B The artefact

Criterion	Description	Mark range	Maximum mark
Artefact realisation	The artefact is completed to a high standard with precision and accuracy. It meets the overall requirements of the original design brief and the majority of the specification points.	21–30	30
	The artefact is complete and functions as intended. There may be some blemishes and inaccuracies. It meets the overall requirements of the design brief and most of the specification points.	11–20	
	The artefact exhibits a reasonable standard, is mainly complete and satisfies some of the aspects of the original design brief.	1–10	
	No creditable work.	0	
Evaluation	Objective testing with reference to the design brief and specification points. Detailed conclusions leading to proposals for further development.	8–10	10
	Some testing with appropriate comment on some of the specification points. Some thoughts on further development.	4–7	
	Little or no evidence of testing. General points with little reference to specification points.	1–3	
	No creditable work.	0	

8. 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/examsOfficers**

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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