

Scottish Certificate of Education

**Standard Grade Arrangements in  
Craft and Design**

Foundation, General and Credit Levels in and after 1989

1987

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## Introduction

The current syllabus and assessment arrangements for Craft and Design on the Standard Grade of the Scottish Certificate of Education were issued in August 1985, following consultation of interested bodies on proposals produced by a Joint Working Party of nominees of the Board and the Consultative Committee on the Curriculum.

In response to a substantial number of representations from teachers that the Standard Grade assessment arrangements were unduly onerous, the Scottish Education Department published a report by the Standard Grade Review of Assessment Group (SGROAG): "Assessment in Standard Grade Courses: Proposals for Simplification". A Short Life Working Group (SLWG) was established in each Standard Grade subject to revise the assessment arrangements in line with the SGROAG recommendations. The Report of the SLWG on Craft and Design was issued for comment in April 1987. The views submitted by interested bodies are gratefully acknowledged.

In preparing the Revised Arrangements, the Technical Subjects Panel, with assistance of the SLWG, has taken account of observations received and has amended the proposals as appropriate.

Standard Grade examinations in Craft and Design at Foundation, General and Credit Levels will be offered in and after 1989 on the basis of the Revised Arrangements detailed below.

The philosophy of the course in Craft and Design was based on the definition in SED Curriculum Paper 10 "Technical Education in Secondary Schools" (1972) of technical education as a "continuum, of activities leading from design, sketching and drawing to specification, craftwork and other production processes with consideration of relevant science, calculations, technology and sociology". It was also recognised that design is often considered to be predominantly concerned with aesthetic aspects. Little recognition has been given in the past to the teaching of design as a practical problem-solving discipline.

Much support was given to the view expressed by the Royal Society of Arts in its document "Education for Capability" (1980). This document emphasised the need for a third culture, other than the arts and sciences, dealing with practical education. Such a culture would be concerned with doing, making and organising and would place emphasis on craftsmanship and the making of artefacts; the design, manufacture and marketing of goods and services; and the creative arts.

These arguments have been accepted and the course has been devised to take account of the need to motivate the most able pupils by providing challenging situations in which intellectual and practical skills would be fully stretched. At the same time the need to motivate the least able, by responding sensitively and supportively and by providing opportunities for success, has not been overlooked.

The arrangements have been revised to reduce, as far as possible, the workload placed on teachers by the original assessment scheme. It is recognised that much of the technical education development work recently undertaken by teachers, and the associated resource material produced, can be put to good use in the design and construction of the new Standard Grade courses. In addition, support groups have been established to coordinate the production and distribution of a wide range of resource materials.

## **1 Rationale**

Craft and Design seeks to develop the intellectual capacity and practical skills of pupils through the process of designing and making. Central to this is the encouragement of pupils to develop the skills necessary to solve realistic problems and then to evaluate the solutions objectively.

The design problems encountered will extend over a wide range of activities from those emphasising practical applications of technology to those more concerned with aesthetic values. Solving such problems will require a progressive accumulation of knowledge, experience and the ability to communicate effectively. The activity of designing will require an understanding of human needs and values, and will provide opportunities for the realistic application of other disciplines.

Craft and Design provides the opportunity for improving the balance between theoretical and practical aspects of the curriculum. The integration of design and workshop experience offers a highly fertile environment for independent learning and has particular relevance to personal and social development.

The person who can both think and do is recognised as important to society. Craft and Design strives to provide opportunities for pupils to think creatively and inventively, to find realistic situations for organising their thinking, and to be successful in creating items which are uniquely their own. To create a piece of craftwork from initial design to manufactured product is a demanding task both practically and intellectually.

The course is practical; it offers direct experience; it encourages autonomous learning; it offers motivating activity through a blend of technological, vocational, creative and aesthetic aspects. It also prepares young people for tertiary education, a working life and leisure activities.

## **2 Aims of The Course**

- 2 1** The course in Craft and Design should present opportunities for pupils to solve practical problems through designing, making and evaluating.
- 2 2** The course should encourage pupils in the following.

### **To be aware of the contribution and influence of design and technology on their own lives and on society**

The pupils' awareness of the contribution to and influence of design and technology on their own lives and on society will enable them to see the relationship between the curriculum and everyday life. This awareness can be on a number of levels. At an elementary level it may be the control exercised over the immediate personal environment by the use of tools and materials. At another level it may be the contribution of technology to the economic, social and leisure life of the community or it may be the technological nature of the society in which they live. The realisation of this aim should greatly strengthen pupils' perception of the wider implications of Craft and Design as a subject of life-long value.

### **To develop attitudes desirable in society**

Teachers of Craft and Design have special opportunities and responsibilities to foster and encourage in pupils a favourable attitude towards cooperation, tolerance, patience, tenacity and effort together with attributes such as dependability, adaptability and reliability. In addition, through the study and application of design principles, pupils will be influenced to be more discriminating in terms of manufactured products.

### **To work with confidence in a technical environment with due regard for health and safety**

This aim relates to the confidence developed in the workshop through working with tools, machines and equipment and the implication of transfer to the wider field of everyday life. It also recognises that confidence is tempered by due regard for personal health and safety in the workshop and regard for the well-being of others.

### **To derive enjoyment and satisfaction from practical work in a variety of materials**

Craft and Design, because of its practical "learning-by-doing" approach, is a subject in which pupils can experience enjoyment and satisfaction while acquiring the knowledge and skills to work successfully in a variety of materials. The mastery of skills involved in the working of these materials can contribute greatly to the pupil's feeling of personal adequacy, self-respect and self-confidence.

### **3 Objectives of The Course**

The work of the course should be planned and organised by the teacher to ensure that all pupils acquire the following.

#### **Ability to solve practical problems using design and technology**

This is the basis of the course - the application of design skills and knowledge in solving practical problems. Problems should be set in various guises and at different levels. Solving problems may involve: creative application of technology, materials, processes and skills; the application of skills and knowledge to new situations; new skills and knowledge to solve familiar problems. The teacher has a responsibility to develop problem solving as a theme running throughout the course and to ensure that pupils are given the design skills necessary to produce functionally sound and aesthetically pleasing solutions.

#### **Ability to communicate technical information**

The development of an ability to communicate (give, receive and share) technical information and ideas applicable to Craft and Design is an essential link in the learning chain. The course includes aspects of communication such as graphical skills and verbal skills, and may include computer graphics and practical demonstration skills.

#### **Knowledge and understanding of the technology applicable to practical work**

In this context the term technology is used in a comprehensive manner to cover materials, tools, equipment, machines, constructions and processes. The level and scope of the required knowledge and understanding of this technology are those which are relevant to practical work associated with school workshop facilities.

#### **An acceptable standard of craftsmanship in a range of materials and relevant technical skills**

Skills should be developed in an interesting and stimulating manner which enables pupils to proceed with confidence and safety. This will encourage a feeling for the balance of skills, knowledge and effort that goes into craftsman-like work.

#### **Ability to make critical evaluations of products**

The subject should promote in pupils an ability to be critical of their own work, encouraging them to strive towards developing their full potential in all aspects of the course. This ability will provide pupils with the confidence and experience to enable them to evaluate consumer products and decide in favour of those which are both well designed and well made.

## 4 Assessable Elements and Learning Outcomes

### 4 1 Assessable Elements

The elements, or principal areas of learning, under which Craft and Design will be assessed have been identified from the course objectives and are as follows:

Knowledge and Understanding;  
Designing;  
Practical Abilities.

Although listed separately, these elements interrelate in the teaching situation to form a continuum of study. However, for purposes of course construction and assessment through Grade Related Criteria, they are treated separately.

### 4 2 Learning Outcomes

#### 4 2 1 Introduction

For each assessable element, learning outcomes have been identified for use in course construction. These learning outcomes are statements of optimum performance, describing what a pupil should aim to be able to do by the end of a learning experience. How well the pupil performs in this respect will be measured by use of the appropriate Grade Related Criteria.

#### 4 2 2 Knowledge and Understanding

The pupil should be able to show knowledge and understanding of:

- 1 common materials, their properties and uses;
- 2 [common forms of supply and relative costs of common materials;] **deleted 1992**
- 3 manufacturing processes, their uses and applications;
- 4 surface finishing;
- 5 common hand tools and their use;
- 6 common machine tools and equipment and their use;
- 7 [the specification of hand tools and hardware, for the purpose of purchase or selection;] **deleted 1992**
- 8 the process of designing;
- 9 the principal factors which influence design;
- 10 the stages of planning for manufacture;
- 11 safe working practices. \*

\* *Safety must be given due regard in a practical subject, hence the knowledge and display of safe practices must permeate the course.*

#### 4 2 3 Designing

The pupil should also be able to:

- 1 compile a design folio, giving regard to overall structure and presentation;
- 2 communicate information and ideas by means of sketches and drawings;
- 3 communicate information and ideas in writing using an appropriate technical vocabulary;
- 4 analyse a problem, situation or need, to identify relevant restrictions and design considerations;
- 5 prepare a design specification of the requirements to be met;
- 6 investigate ideas for solutions to meet the specification;
- 7 justify the decisions taken in arriving at a chosen situation;
- 8 plan the manufacture of the chosen solution;
- 9 evaluate the solution.

*The pupil should also be able to identify a design problem or need, but this will not be assessed for certification. (see 6 1.)*

#### 4 2 4 Practical Abilities

The pupil should be able to:

- 1 display craftsmanship in constructing and assembling artefacts;
- 2 measure and mark out accurately;
- 3 use hand tools, machine tools and equipment skilfully and safely; \*
- 4 perform manufacturing processes skilfully and safely; \*
- 5 demonstrate appropriate finishing skills.

*The pupil should also be able to demonstrate craft skills in a variety of materials, but the extent of this variety will not be assessed for certification. (see 5 2 2.)*

\* *Safety must be given due regard in a practical subject, hence the knowledge and display of safe practices must permeate the course.*

## **5 Course Construction**

### **5 1 Introduction**

- 5 1 1 The course will be resource-based and pupil-centred. This will enable pupils to undertake work appropriate to their abilities and interests. Each centre should develop a course based on the learning outcomes and catering for pupils' needs. It is recommended that classes are formed as mixed ability groups rather than separated out into different Levels.

Every effort should be made to stimulate and encourage the least able pupils, through tasks in which they can experience success. On the other hand, the most able pupils should be presented with work which is both challenging and intellectually demanding.

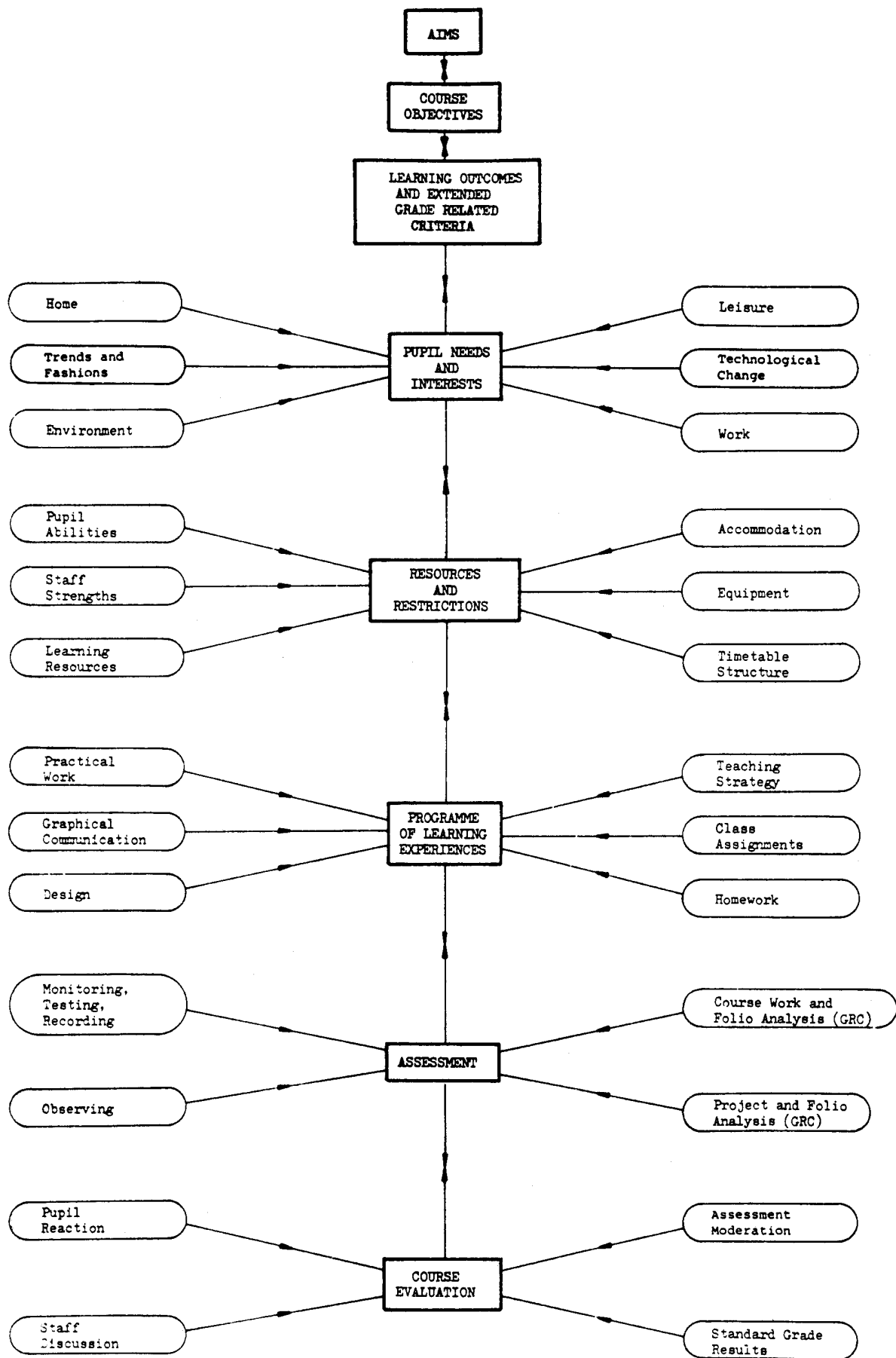
Teachers approaching course design for the first time should do so with a full knowledge and understanding of the course objectives, learning outcomes and Extended Grade Related Criteria. The essence of the course is the solving of practical problems, the realisation of the design as a finished product and its subsequent evaluation.

To be successful in this course pupils require a working knowledge of common workshop materials, their properties, and the ways in which they can be shaped, formed and joined. The pupils also require knowledge and understanding of design principles, procedures and techniques.

In devising courses, teachers should include a variety of teaching approaches, eg resource-based learning, individual research and development of design ideas and group-based evaluation of manufactured products. Further information on such topics are available through Local Authority advisory services, in the in-service packs for Craft and Design issued by the Scottish Curriculum Development Service and in materials produced through the Central Support Group for Craft and Design and the BP Design Fellowship.

Full advantage should also be taken of resources outwith the classroom. The value of educational/industrial visits and the use of guest speakers to lend added relevance to school-based activities cannot be over-estimated.

- 5 1 2 To achieve the optimum programme of work, many factors relating to objectives, resources, accommodation, staffing and the ethos of the school should be taken into consideration. The diagram on the following page highlights these and should prove a useful planning device to those undertaking course design.



## 5 2 Course Work

### 5 2 1 Introduction

Course work is the term used to describe the broad-based exploration of designing and making which should be pursued in S3 and the early part of S4. It provides pupils with a sound basis of experience from which to undertake major project work.

Evidence and experience suggest that maximum benefit emerges when course work is founded on the design brief approach (see Section 6). This approach encourages pupils towards independence in their work through a structured and systematic understanding of practical problem solving.

### 5 2 2 Course Work Folio

Just as the quality of craftsmanship should be encouraged in the craft aspects, so too folio presentation should be to the highest standards attainable by the pupil. The folio should therefore contain a rich and varied collection of investigative, developmental, research, planning and evaluative material of the pupil's own selection or preparation. These materials should be logically collated, to demonstrate the thought processes involved, and attractively presented to maximise the impact on the reader. In effect, if high standards are set and expected, this is communicated to the pupil, whether in product manufacture or folio production and presentation.

All Course Work Folios must be retained as evidence for possible enhancement of the grade awarded for Designing (see 8 5 2).

### 5 2 3 Course Work Artefacts

The range of course work artefacts, produced as solutions to design briefs, should involve a variety of materials and cover all the learning outcomes for the Practical Abilities element. In order to achieve this coverage, briefs may require to be aimed specifically at particular outcomes.

Throughout the course, pupils should strive for a progressively higher standard of craftsmanship. The class teacher is the most important resource available to pupils and as such the teacher should readily give guidance when required. In so doing, successful results will be achieved and pupils will be encouraged and motivated. The introduction of new technology such as computer-aided design and computer-aided manufacture (CAD/CAM) offers opportunities to stimulate pupils and to show the vocational relevance of this aspect of the course.

Assessment of course work artefacts will not normally contribute to the assessment for certification. However, where a candidate fails to produce a final Project, course work artefacts may be utilised instead (see paragraph 8 5 3). Only in such instances will the centre require to retain these artefacts.

### **5 3 Knowledge and Understanding**

The two years of a pupil's experience in Craft and Design are underpinned by a growing knowledge and understanding of the multiple processes, materials and techniques of the course, woven through both the Designing and Practical Abilities elements. The success of the course, for both teacher and pupils, may depend on the extent to which active learning approaches, such as design-brief-related assignments or resource-based learning, are deployed to provide the necessary knowledge and understanding. Text handouts should not form part of the Course Work Folio.

An indication of the depth of treatment required for this work is given in the specimen question papers issued with this document. Further insight can be gained from study of the Extended Grade Related Criteria for this element.

## **6 The Design Brief Approach**

- 6 1** The design brief approach is recommended because within each design task it is possible to introduce aspects from each assessable element and to give pupils the opportunity to cover the course objectives. This highlights the fact that the whole course is aimed towards problem solving, through the design, manufacture and evaluation of artefacts.

The term "design brief" usually refers to the initial statements which describe a design problem, situation or need, but in order to satisfy the learning outcomes of the course (see 4 2), it is advised that design briefs are structured in a variety of ways. These may range from a restricted situation, in which there are constraints with regard to materials, processes and time, to a totally open situation in which the design brief is written by the pupil.

When the course is being constructed a variety of teaching approaches should be incorporated. From the study of various design situations pupils may have to identify a particular need or problem and write their own design brief or they may be given the design brief in a structured assignment. It should be noted, however, that irrespective of the approach adopted it is the analysis of the problem which is to be assessed and not the identification of the problem.

Design tasks, set with restricted resources, can provide a starting point for introducing pupils to the design process. It is possible for the teacher to provide a range of resources, for guided investigation and debate, which may lead less able pupils or stimulate able pupils to produce their own ideas and solutions. Careful course construction and the controlled use of restrictions will help to create a balanced course in terms of materials, processes, design development and folio presentation.

- 6 2** Pupils should be encouraged to carry out initial research in order to analyse the nature of the design problem and hence the exact requirements of the design. These requirements can be set out as a "design performance specification". This should not be a description of the product but should be a statement of the expected performance of the product. The statement could include such considerations as whether the solution is to be used indoors or outdoors, whether it is to be portable or fixed, whether it is subject to wear or not, and whether it is subject to loading or not, and should include any cost limitations, requirements for storage, environmental considerations or any other special feature.

It will be against this specification that any subsequent evaluation will have to be made.

- 6 3** As each design task is completed, the pupil's work and the learning outcomes should be analysed and evaluated by the teacher to verify the success of the task and to determine whether or not changes are necessary in the teaching approach and/or resource materials provided for the task.

Constant evaluation of this nature will encourage the development of a bank of support material and will also develop the skills of the teacher in this area.

- 6 4** A variety of design process "models" may be used in designing. It is immaterial which model is used provided that the learning outcomes are covered satisfactorily, the Extended Grade Criteria are considered, and teachers and pupils are comfortable in the use of the chosen model.

## 7 Project and Project Folio

- 7 1 Each candidate should design and manufacture a Project and produce a Project Folio. Projects need not be elaborate pieces of work.

It is intended that each Project will normally require 20-25 hours to manufacture. A similar amount of time should be spent on the preparation of the Project Folio, much of which must be completed prior to the manufacture stage.

### 7 2 The Project Folio

The Project Folio should consist mainly of a compilation of the candidate's notes and sketches gathered together **before** the manufacture of the Project and an evaluation of this finished product. The Folio should indicate the candidate's thinking on analysing a problem or need and solving it using appropriate materials, methods, processes and skills. It should also contain reference to any alterations to the design, difficulties encountered, or changes in the method of manufacture.

The following points regarding the format of the Folio should be considered:

A3 paper size may be found to be the most suitable; for convenience sheets may be stapled together, fitted into a ring folder, or held in a plastic slide binder;

up to 12 sides of A3 size paper should suffice;

the candidate's name and title of Project should be recorded on the cover page;

the problem, situation or need should be stated;

a design specification should be produced giving consideration to the exact requirements of the design (see 6 2);

candidates should record initial ideas, probably by means of elementary sketches or illustrations, indicating features which are worthy of development: these ideas should be developed and refined towards a final solution;

a working drawing or sketch of the solution must be included, showing appropriate details of construction;

planning for manufacture should be evident and should include a sequence of operations and a cutting list;

during construction, notes should be kept of problems encountered and subsequent design amendments;

in evaluating the effectiveness and overall quality of the design of the project, candidates should be encouraged to view their solution to the problem objectively by referring back to the specification and suggesting possible improvements.

### 7 3 The Project

Candidates should give thought to their choice of Project early in S4, to enable them to discuss it fully with their teacher to ensure that Projects are appropriate to their abilities and experience. At a later stage, such discussion may lead to modification of the candidate's design prior to manufacture.

Many Projects have in the past resulted in large artefacts which reflect traditionally crafted solutions to design problems. While this approach is still valid, the scope of a Project need not be radically different from that of course work projects.

### 7 4 Completion of Project and Project Folio

To allow teachers time to assess each candidate's work, centres should aim to have work completed by the Easter Holiday in the year of the examination.

In some **exceptional cases**, candidates may fail to produce Projects and/or the associated Project Folios. Whilst every effort should be made to obtain such work, it is acceptable for assessment at grades 6 and 7 to be based on S4 course work projects and course work folios.

In centres which are selected for moderation, candidates must not be allowed to work on their Projects or Folios between the time of internal assessment and the time of external moderation of that assessment. In preparation for the moderator's visit, teachers should complete pro forma reports on the work produced by candidates in the nominated sample (see Appendix).

## 8 Assessment For Certification

### 8 1 Introduction

Assessment has an important contribution to make to the teaching and learning process, but such assessment is not the concern of this section. Advice and guidance on assessment in this connection will be issued in due course.

### 8 2 Certification

Candidates will be assessed by a system common to all Levels.

The Certificate will record an overall award on a 7-point scale of grades, grade 1 being the highest. The Certificate will also record attainment in each assessable element. The overall award will be derived from the mean of the element grades, **each element having equal weighting**.

### 8 3 Summary of Assessment Arrangements

The assessment arrangements for each element will be as follows.

<i>Element</i>	<i>Internal Assessment for Certification</i>	<i>External Moderation</i>	<i>External Assessment</i>
Knowledge and Understanding	(Estimate of Performance)	-	Grade awarded in the external examination
Designing	Grade awarded for the Project Folio and supported, where necessary, by performance in the Course Work Folio	by Visiting Moderator	-
Practical Abilities	Grade awarded for manufacture of the Project	by Visiting Moderator	-

### 8 4 Grade 7 and No Overall Award

For any element, grade 7 will indicate that the candidate has, in the element concerned, completed the course but has not demonstrated achievement of any specified level of performance as defined by the Grade Related Criteria.

The Board will regard the submission of an estimate grade for an externally assessed element as evidence that the course has been completed in that element.

Candidates who have not complied with the assessment requirements in any element (eg due to unauthorised absence from the external examination) will be deemed not to have completed the course, in that element. Such candidates **will not receive a grade** for that element and hence **will not receive an overall award** for the subject. In such cases, however, grade(s) for the other element(s) will be recorded on the Certificate.

## 8 5 Internal Assessment for Certification Purposes

In S4 part of the year will be given over to the design and manufacture of the Project; assessment of the Project and Project Folio becomes the focal point towards the end of the course. All internal assessment for certification purposes must be based on the Extended Grade Related Criteria for the appropriate element (see Section 9).

### 8 5 1 Assessing Knowledge and Understanding

Written tests should be administered to all candidates. Each test should assess performance in a sample, rather than all, of the learning outcomes for the Knowledge and Understanding element. Major tests may best be set on the same format as the external examination, ie three discrete question papers, however, it is quite valid to use other formats. The results of the tests should be used to guide the teacher in determining an estimate of each candidate's performance in the external examination.

Presenting centres must submit to the Board, by 31 March of the year of the examination, an estimate grade for each candidate for Knowledge and Understanding. The teacher should determine the estimate grades on the basis of each candidate's work. Estimates may be used by the Board for its internal procedures, including such cases as absence from external examinations, adverse circumstances and appeal. Evidence in support of these estimates should be retained by centres for submission to the Board if required.

### 8 5 2 Assessing Designing

With regard to folio work, it is expected that most candidates will display their best work in the Project Folio but it is recognised that this folio may not contain the candidate's best work in all aspects of this element. Consequently, in assessing Designing, the procedure adopted should be as follows:

examination of the Project Folio to determine a provisional grade for **overall performance**;

scrutiny of the Course Work Folio to support or enhance that grade.

Discrete grades for performance in each learning outcome (LO) should not be assessed; a holistic judgement will suffice. Assessment of Designing may be satisfactorily achieved without the need for evidence of performance to be available in each of the nine learning outcomes in the Project Folio. At a minimum, at Foundation Level, it would suffice for evidence to be available for one of LOs 1-3, one of LOs 4-6 and one of LOs 7-9.

Candidates who fail to submit a Project Folio for internal assessment should be assessed on the evidence produced in their Course Work Folios, but such assessment should be restricted to grade 6 or 7.

All project Folios and Course Work Folios should be retained by centres for possible scrutiny by a Visiting Moderator.

### 8 5 3 Assessing Practical Abilities

In assessing performance in this element, emphasis should be placed on positive achievement rather than on errors or deficiencies. Each candidate's best work should be recognised. Teachers should use the Extended GRC to determine which Level is appropriate for the standard of craftsmanship and the degree of independence displayed in organisation and planning (see 9 10). They should then confirm that the amount of work done and the degree of difficulty of the tasks attempted are commensurate with that Level, on the basis of what can reasonably be expected of a candidate within the time given to this element in the course.

Having ascertained the Level to be assigned to this **overall performance**, the teacher must decide (using 9 10 2 - 9 10 5) whether the candidate's work merits the upper or lower grade available at that Level. This too should be a holistic judgement rather than the average of several discrete grades.

Candidates who fail to produce a Project for internal assessment should be assessed on their performance in producing course work projects but such assessment should be restricted to grade 6 or grade 7.

All Projects should be retained by centres for possible scrutiny by a Visiting Moderator.

### 8 5 4 Submission of Grades

The Board will require the following information to be submitted for each candidate, in the year of presentation:

an estimate grade for Knowledge and Understanding	)	by 31 March to the Board
a grade for Designing	)	in April/ May
	)	as directed
a grade for Practical Abilities	)	by the Board

### 8 5 5 Moderation of Internal Assessment of Designing and Practical Abilities

In April/May of the year of presentation, Visiting Moderators appointed by the Board will visit selected presenting centres to review the internal assessment of performance in the Designing and Practical Abilities elements. The Moderator will scrutinise the assessment of the Projects, Project Folios and Course Work Folios produced by a sample of candidates, usually 12.

The success of the moderation procedure depends on the following:

the assessment of all class groups within a centre being coordinated to a common standard;

the teacher and Moderator both applying the appropriate Extended GRC holistically;

the teacher conveying any additional information, that may be of importance to the Moderator, on a report form (see Appendix).

Based on the Moderator's findings, the internal assessment will be deemed acceptable or otherwise. If it is found to be unacceptable, say in one element at one Level, then the teacher and Moderator will discuss the problem in detail before the teacher reassesses all the work awarded at that Level in that particular element. This procedure requires that all Projects, Project Folios and Course Work Folios be available in the centre on the day of the visit, although not set out initially for the Moderator.

## **8 6 External Assessment**

### **8 6 1 External Examination**

The external written examination will test performance in the Knowledge and Understanding element. Three separate papers, each of 1 hour's duration, will be offered, one at each Level: Foundation, General and Credit. There will be a break between consecutive papers.

At the time of presentation, centres will be required to indicate the Level(s) of the external papers which each candidate will attempt, as follows:

- Foundation Level only;
- or** Foundation and General Levels only;
- or** General and Credit Levels only.

This presentation does not imply any restriction on grades available for Designing and Practical Abilities.

Candidates presented at two Levels are not obliged to attempt both papers but are strongly advised to do so, since, other than as a result of an appeal, candidates can only be awarded one of the grades assessed by the paper(s) attempted, or grade 7.

The following table may be helpful as a guide to presentation.

<i>Expected External Grade</i>	<i>Presentation Level(s)</i>	<i>Grades Assessed</i>
7, 6	Foundation	6, 5
5, 4	Foundation and General	6, 5, 4, 3
3, 2, 1	General and Credit	4, 3, 2, 1

This arrangement allows in each case for a grade award higher or lower than expected (except at grades 1 and 7 respectively). A candidate expected to achieve grade 6 may choose to be presented for both the Foundation and General papers; or a candidate expected to achieve grade 3 may choose to be presented for the Foundation and General combination of papers, thereby accepting that grade 2 or grade 1 will not be possible.

Candidates who attempt papers at two Levels will be given the better of the two grades achieved on these papers. Performance at one Level will **not** be taken into account in grading at the other Level.

Marks will be allocated to each question and a total mark obtained. The two grades associated with each Level will be distinguished by setting two cut-off scores. The lower score will reflect a satisfactory overall standard of performance, the upper score a high overall standard of performance.

## 8 6 2 Content of the External Examination

Candidates are expected to acquire Knowledge and Understanding of the subject through the design activities and practical craftwork of the course.

The syllabus is presented in two parts - a list of main processes and a detailed list of tools, etc, within these main processes. Where appropriate, some entries have been listed in more detail in an attempt to limit the depth of treatment.

**This syllabus applies to the Knowledge and Understanding element only and should not restrict work done for the other two elements.**

<b>PROCESS</b>	<b>CONTENT</b>
Design	the design process

	identification of function and evaluation of good/bad design appearance/aesthetics specifications colour, line, shape, form, proportion, planning manufacture, cutting list, material list
Anthropometrics Ergonomics	understanding relevance of size differences awareness of importance of ergonomics in relation to hands, limbs, eyes and sitting, standing and working positions
Finishing	preparation of surfaces appropriate to the material knowledge of stages in the finishing process knowledge of common finishes
Joining metal	awareness of welding and electrical soldering knowledge of adhesives pop-rivets, nuts, bolts, self-tapping screws
Joining wood	carcase joints - rub, dowel, housing, knock-down fittings frame joints - dowel, mortise and tenon, lap screws, nails, adhesives
Shaping metal	filing, forging, drilling, sawing, shearing, casting
Turning metal	parallel and step turning in 3-jaw chuck, drilling taper turning using compound slide
Shaping wood Turning wood	sawing, chiselling, sanding, boring between centres use of gouge, parting tool
Assembly	cramping/clamping, squaring, testing for winding
Plastics	cutting, filing, polishing, bending, joining, cementing awareness of vacuum-forming
Heat treatment	knowledge of annealing, hardening and tempering
Selection of materials	knowledge of a range of common materials - woods, metals and plastics

TOOL		PROCESS
Anvil		forging
Bending bars		sheet-metal work
Bits	auger Flat Irwin/Fostner	boring

Bit brace	Rose	countersinking boring
Bradawl		boring, screwing
Callipers	inside odd-leg outside	measurement marking-out measurement
Casting	cope crucible drag gasses riser runner	casting (terminology)
Chisel	bevel-edge firmer mortise	shaping wood
Cork block		finishing
Cramps	G sash	assembly
Dies (split-circular)		threading
Dividers		marking-out
Drill	hand Pedestal power (hand)	drilling metal/plastic/wood
End cutter	(rivets)	joining metal
File card		shaping metal
Files	Abra bastard half-round needle round second-cut smooth square Surform	shaping metal/plastic/wood shaping metal
Fluidiser		shaping wood plastic coating
Forge		forging, heat treatment
Glue gun		adhesives

<b>TOOL</b>		<b>PROCESS</b>
Goggles		safety
Hammer	ball-pein Claw Warrington	shaping/joining metal joining wood
Heater	oven strip	shaping plastics
Iron (electric)		finishing wood
Lathe	metal	turning metal

Lathe work	Wood	turning wood
		Lathe work (terminology)
	compound slide	
	cross-slide	
	dead centre	
	driving fork	
	head stock	
	live centre	
	tailstock	
	toolrest	
	toolpost	
	facing tool	turning metal
	knurling tool	
	parting tool	
	roughing tool	
	gouge	turning wood
	parting tool	
Mallet		shaping wood
	hide	shaping metal
Marking gauge		marking-out
Micrometer (outside)		measurement
Mortise gauge		marking-out
Mortising machine		joining wood
Orbital sander		finishing wood
Plane	jack	shaping wood
	smoothing	
Pilers		general usage
Punch	centre	marking-out/drilling metal
	Nail	joining wood
Router (2-handed)		joining wood
Rule		measurement

TOOL		PROCESS
Saw	bandsaw	shaping wood
	coping	
	jigsaw	
	panel	
	tenon	
	hacksaw	
	junior	shaping metal
Sawing board/block		general woodwork
Screwdriver slot		joining
	crosshead	

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Scriber		marking-out
Snips (straight)		shaping metal
Soldering bolt		soft soldering (electrical)
Taps		threading
Try-square		marking-out/checking squareness
Twist drills (parallel)		shaping metal/plastic/wood
Vice	bench	general woodworking
	engineer's	general metalwork
	hand	
	machine	
Welding		awareness of welding/spot welding

## **9 Grade Related Criteria**

### **9 1 Definition**

Grade Related Criteria (GRC) are positive descriptions of performance against which a candidate's achievement is measured. Direct comparisons are not made between the performance of one candidate and that of another.

### **9 2 Application of GRC**

GRC are defined at three Levels of performance: Foundation, General and Credit.

Awards will be reported on six grades, two grades being distinguished at each Level. The upper of the two grades at a given Level will be awarded to candidates who meet the stated criteria demonstrating a high standard of performance; the lower grade to those who demonstrate a lower but still satisfactory, standard of performance.

There will be a seventh grade for candidates who complete the course but fail to meet the criteria for any Level.

### **9 3 Types of GRC**

Summary GRC are broad descriptions of performance. They are published as an aid to the interpretation of the profile of attainment by candidates, parents, employers and other users of the Certificate.

Extended GRC are more detailed descriptions of performance. They are intended to assist teachers in making their assessments for each element, and to be used by external Moderators of such assessments and by examiners in conducting external assessment.

### **9 4 Knowledge and Understanding - Summary Grade Related Criteria**

#### Foundation Level

The candidate has demonstrated knowledge of the safe use of common tools, materials and processes and of basic design principles and the main stages in planning for manufacture.

#### General Level

The candidate has demonstrated knowledge and understanding of the properties, uses and forms of supply of common materials; the safe use of common tools and manufacturing and finishing processes; general design principles and planning for manufacture.

#### Credit Level

The candidate has, through reasoned argument, demonstrated an extensive knowledge and understanding of the properties and uses of common materials; the use and adjustment of tools; the use and application of manufacturing and finishing processes; design principles and planning for manufacture.

## **9 5 Designing Element - Summary Grade Related Criteria**

### Foundation Level

With frequent guidance, the candidate has demonstrated application of design principles in the production of a design folio. The folio has included the essential features, but has been limited in terms of structure and presentation.

### General Level

With occasional guidance, the candidate has demonstrated competence in the application of design principles in the production of a design folio. The folio has effectively communicated the candidate's research, design decisions and planning for manufacture.

### Credit Level

Showing in most cases independence, the candidate has demonstrated comprehensive application of design principles in the production of a design folio. The folio has been impressive in terms of visual impact, structure, research, design decisions and planning for manufacture.

## **9 6 Practical Abilities - Summary Grade Related Criteria**

### Foundation Level

With frequent guidance in organisation and planning, and showing due regard to safety, the candidate has produced work which demonstrates attainment of an acceptable though modest standard of craftsmanship.

The difficulty of the tasks and the amount of work done have been taken into account.

### General Level

With occasional guidance in organisation and planning, and showing due regard to safety, the candidate has produced work which demonstrates attainment of a good standard of craftsmanship.

The difficulty of the tasks and the amount of work done have been taken into account.

### Credit Level

Showing in most cases independence, initiative, good organisation, careful planning and due regard to safety, the candidate has produced work which demonstrates attainment of a very good standard of craftsmanship.

The difficulty of the tasks and the amount of work done have been taken into account.

## 9 7 Description of Grades

These describe performance within Levels. They apply to each element.

- |         |  |
|---------|--|
| Grade 6 | The candidate has met the criteria for Foundation Level, demonstrating a satisfactory overall standard of performance. |
| Grade 5 | The candidate has met the criteria for Foundation Level, demonstrating a high overall standard of performance.         |
| Grade 4 | The candidate has met the criteria for General Level, demonstrating a satisfactory overall standard of performance.    |
| Grade 3 | The candidate has met the criteria for General Level, demonstrating a high overall standard of performance.            |
| Grade 2 | The candidate has met the criteria for Credit Level, demonstrating a satisfactory overall standard of performance.     |
| Grade 1 | The candidate has met the criteria for Credit Level, demonstrating a high overall standard of performance.             |

## 9 8 Knowledge and Understanding - Extended GRC

### *Learning Outcome*

Foundation Level (grades 6, 5)

*The pupil should be able to show knowledge and understanding of:*

The candidate can:

1 *common materials, their properties and uses;*

identify common materials and show knowledge of basic properties, eg by matching given materials to a list of appropriate uses;

2 *common forms of supply and relative costs of common materials;*

**(deleted 1992)**

3 *manufacturing processes, their uses and applications;*

show knowledge of common manufacturing processes, eg by matching processes to given applications;

4 *surface finishing;*

show knowledge of the basic steps in the preparation for and application of various simple finishes;

state briefly why a finish is necessary;

5 *common hand tools, and their use;*

show knowledge of the use of common hand tools, eg by selecting the appropriate tool for a particular task;

6 *common machine tools and equipment, and their use;*

show knowledge of the use of common machine tools and equipment, eg by selecting the appropriate tool for a particular task;

7 *the specification of hand tools and hardware, for the purpose of purchase or selection;*

**(Deleted 1992)**

8 *the process of designing;*

show a basic knowledge of the process of designing, eg by arranging the steps of a simple design process;

9 *the principal factors which influence design;*

show a basic knowledge of the factors which influence design, eg by identifying obvious design faults;

10 *the stages of planning for manufacture;*

show a basic knowledge of planning procedures, eg by arranging the principal steps in a sequence of operations, or by completing a simple cutting list from a given drawing;

11 *safe working practices.*

show knowledge of safe working practices.

Descriptions of grades are given in 9 7.

In addition, the candidate can:

show knowledge and understanding of properties of material, eg strength, hardness, durability, flammability, by suggesting appropriate materials for given uses;

show knowledge and understanding of the common forms in which materials are supplied, eg bars, tubes, boards, powders; **(deleted 1992)**

show knowledge and understanding of the relative costs of common materials;

show knowledge and understanding of common manufacturing processes, eg by giving an outline description, or by suggesting appropriate processes for given situations;

show knowledge and understanding of surface finishing, eg by selecting appropriate finishes, or by listing in sequence the steps in preparing for and applying a finish;

show knowledge and understanding of the use of common hand tools, eg by suggesting appropriate hand tools for given uses;

show knowledge and understanding of the use of common machine tools and equipment, eg by suggesting appropriate machine tools or equipment for given uses; **(deleted 1992)**

show knowledge and understanding of the process of designing eg by preparing a design specification for a given situation;

show knowledge and understanding of the factors which influence design, eg by giving reasons for making a choice from given alternatives;

show knowledge and understanding of the stages of planning for manufacture, eg from a working drawing, plan a sequence of operations required for the manufacture of an artefact, or produce a cutting list of the materials required for an artefact;

show knowledge and understanding of safe working practices.

In addition, the candidate can:

show detailed knowledge and understanding of properties of materials, eg by proposing and justifying the selection of materials for specified uses;

show detailed knowledge and understanding of common manufacturing processes, eg by giving reasons for choosing a particular process;

show detailed knowledge and understanding of surface finishing, eg by proposing and justifying the selection of finishes;

show detailed knowledge and understanding of the use of common hand tools, eg by describing clearly how they may be adjusted;

show detailed knowledge and understanding of the use of common machine tools and equipment, eg by describing clearly how they may be adjusted;

give a technical description, such as required for purchasing of common tools and items of hardware, eg files, screws, hack-saw blades

show detailed knowledge and understanding of the process of designing, eg by explaining how a designer might tackle one particular aspect of a brief;

show detailed knowledge and understanding of the factors which influence design, eg by appraising a given product in terms of function, proportion, appearance, economics or ergonomics.

Description of grades are given in 9 7.

## 9 9 Designing - Extended GRC

### *Learning Outcome*

Foundation Level (grades 6, 5)

*The pupil should be able to:*

With frequent guidance, the candidate has produced a design folio which includes where appropriate:

1 *compile a design folio giving regard to overall structure and presentation;*

evidence of limited structuring and presentation;

2 *communicate information and ideas by means of sketches and drawings;*

simple sketches or drawings, principal dimensions where necessary;

3 *communicate information and ideas in writing using an appropriate technical vocabulary;*

information and ideas simply recorded in writing;

4 *analyse a problem, situation or need to identify relevant restrictions and design considerations;*

evidence of investigation resulting in the identification of obvious restrictions;

5 *prepare a design specification of the requirements to be met;*

a functional specification;

6 *investigate ideas for solutions to meet the specification;*

elementary investigation of possible solutions to meet the specification;

7 *justify the decisions taken in arriving at a chosen solution;*

basic reasons for the choice of one solution;

8 *plan the manufacture of the chosen solution;*

a list of the component parts;

a sequence of the principal operations;

9 *evaluate the solution.*

a simple statement as to the functional suitability of the solution;

a statement of problems encountered in manufacture.

Descriptions of grades are given in 9 7.

General Level (grades 4, 3)

With occasional guidance, the candidate has produced a design folio which includes where appropriate:

evidence of effective structuring and presentation;

detailed sketches or drawings, and dimensions;

information and ideas clearly recorded in writing;

evidence of investigation resulting in the identification of relevant restrictions and design considerations;

a design specification listing functional and aesthetic requirements;

investigation of ideas for solutions, varying in concept or in construction;

investigation into suitability of materials and manufacturing methods;

reasons for decisions taken in arriving at a chosen solution;

a cutting list of the materials required;

a sequence of operations for manufacture;

a statement commenting on the success or otherwise of the design and manufacture of the artefact;

a statement suggesting improvements, if applicable.

Credit Level (grades 2, 1)

Showing in most cases independence, the candidate has produced a design folio which includes where appropriate;

evidence of effective structuring and impressive visual impact;

well presented sketches or drawings showing dimensions and intricate detail;

information and ideas logically sequenced and clearly recorded in writing;

evidence of detailed investigation resulting in the identification of relevant restrictions and design considerations;

a detailed design specification;

investigation of ideas for solutions showing creative input;

investigation into choice of materials, costs and manufacturing methods; ergonomics and aesthetics;

well argued reasons for decisions taken in arriving at a chosen solution;

cutting list of the materials required;

a detailed sequence of operations for manufacture;

a well argued evaluation of the final product in terms of the original specification.

Descriptions of grades are given in 9 7.

## 9 10 Practical Abilities - Extended GRC

### *Learning Outcomes*

*The pupil should be able to:*

- 1 *display craftsmanship in constructing and assembling artefacts;*
- 2 *measure and mark out accurately;*
- 3 *use hand tools, machine tools and equipment skilfully and safely;*
- 4 *perform manufacturing processes skilfully and safely;*
- 5 *demonstrate appropriate finishing skills.*

### Foundation Level (grades 6, 5)

With frequent guidance in organisation and planning, and showing due regard to safety, the candidate has produced work which demonstrates attainment of an acceptable though modest standard of craftsmanship.

In this work there is evidence of:

sufficient accuracy in measurement, shaping and construction to produce serviceable results;

some skill in the use of hand tools, machine tools and equipment;

some skill in carrying out manufacturing processes;

production, where appropriate, of finished surfaces free from gross blemishes;

In assessing Practical Abilities the degree of difficulty of the tasks attempted and the amount of work done must be taken into account.

Descriptions of grades are given in 9 7.

With occasional guidance in organisation and planning, and showing due regard to safety, the candidate has produced work which demonstrates attainment of a good standard of craftsmanship.

In this work there is evidence of:

sufficient accuracy in measurement, shaping and construction to produce functionally sound results generally free from significant faults;

skill in the safe use of hand tools, machine tools and equipment;

skill in carrying out manufacturing processes;

production, where appropriate, of well prepared and competently finished surfaces;

In assessing Practical Abilities the degree of difficulty of the tasks attempted and the amount of work done must be taken into account.

Showing in most cases independence, initiative, good organisation, careful planning, and due regard to safety, the candidate has produced work which demonstrates attainment of a very good standard of craftsmanship.

In this work there is evidence of:

accuracy in measurement, shaping and construction, producing functionally sound and aesthetically pleasing results generally free of faults;

precision in the use of hand tools, machine tools and equipment;

a high degree of skill in carrying out manufacturing processes;

production, where appropriate, of well prepared surfaces finished to a very good standard.

In assessing Practical Abilities the degree of difficulty of the tasks attempted and the amount of work done must be taken into account.

Description of grades are given in 9 7.

Report on Project and Folio Work

Candidate's Name \_\_\_\_\_

Title of Project \_\_\_\_\_

In the candidate's interest, presenting centres are requested to complete the following. This information should summarise the candidate's performance in both the manufacture of the project and in compiling the related Folios.

Enter a tick in the appropriate box.

Candidate's ability with regard to:

	Frequent guidance	Occasional guidance	Mostly independent
the degree of independence in Project work;			
the degree of independence in Folio work;			
organisation and planning of tasks;			
	Foundation	General	Credit
the quality of practical work not evident in the final assembly, eg joints.			

Further comments on the manufacture of the Project, which would be of interest to the Board, can be inserted below, as appropriate.

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Work of exceptional quality and/or difficulty

The undernoted should not be regarded as the candidate's own work