Edexcel International
London Examinations
GCE Ordinary Level

Coursework Guide

London Examinations Ordinary Level GCE in Computing (7105)

First Examination May 2002

London Examinations
from Edexcel International

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1. Introduction

This coursework guide complements the syllabus and specimen paper for the Ordinary Level Computing examination (7105), first examination in 2002.

This guide is also available on the Edexcel International web site. (www.edexcel.org.uk/international). Please check the site regularly for updates to this guide and additional support material.

To satisfy the coursework requirements, candidates must submit a report on the use of a computer to solve a problem. The candidate must identify the problem and solve it by using a commercial software package, or by using a computer program written by the candidate for the purpose, or by a combination of these methods.

Candidates' reports must be submitted to Edexcel International (London Examinations) by 1 May in the year of the examination. All reports must be accompanied by a statement, signed by both the teacher and the candidate, to the effect that the report submitted is the candidate's own work. (See Appendix C, page 13, for the coursework declaration form to be used).

Requirements for coursework submission are contained within the syllabus and are included in this guide as Appendix A. This guide will assist in clarifying those requirements and should further help teachers to:

- understand what is required for the coursework project;
- guide candidates in choosing suitable problems for the project;
- provide appropriate supervision and guidance to candidates;
- explain to candidates how the coursework will be assessed.

The coursework requires the candidate to do the following:

- identify and analyse a problem, or a set of related problems;
- design a solution to the chosen problem, by choosing and using appropriate computing tools;
- implement the design of the solution;
- test the solution;
- evaluate the solution to the problem.

The coursework will be assessed on the basis of the written report. Detailed assessment criteria are included as Appendix B and should be made available to candidates at the beginning of the course.

2. Content of the report

2.1 Problem analysis and specification

2.1.1 Problem description

Candidates are expected to present a description of the chosen problem. The description should explain the context clearly and identify all the issues involved. Candidates should also explain the reasons for choosing the problem. This explanation should be well focused – no additional credit will be given for a detailed discussion of other problems considered and rejected.

A good problem description will contain a general statement and a restatement that suggests the important points as far as a computer solution is concerned.

2.1.2 Analysis and specification

Candidates should be encouraged to:

- explain the problem from the user's point of view;
- identify all the sub-tasks involved;
- consider the present situation;
- restate the problem in terms of the solution by computer;
- explain the inputs to the system and the desired outcomes;
- state their criteria for success.

The above points can be addressed by candidates answering the following questions:

- What is the problem? What sub-problems need to be solved in order to provide a complete solution?
- How are things done now? What difficulties does this cause?
- How can I restate the problem so that a computer based solution can be attempted?
- What will the inputs to the computer system be? How should they be specified?
- What will the outputs be?
- What are my desired outcomes – what would a solution to the problem look like?
- How will I know when I have succeeded? What questions will I ask at the end?

2.2 Design and planning of solutions

In this section of the report candidates should consider more than one possible way of attempting a solution. The following questions should be considered:

- What does the proposed solution/software need to do?
- What software could be used? (a list with advantages and disadvantages)
- What software would be best? (explain why)
- What software will be used? (an explanation would be expected if this is not the same as the above)
- If a program is to be written by the candidate, what is the justification?

If a commercial package is to be used, the following points should be considered:

- What are the hardware requirements imposed by the software chosen?
- What hardware will be used?
- How will the software be used to attempt the solution to the problem? What is the plan for the solution of the problem(s)?

  This section is very important. Candidates should give a clear description of how the chosen software will be used to solve the problem. They should avoid explaining features of the software that will not be used in the solution.

- How will the data be captured and how will the data need to be specified? Are there any alternatives? If so, why choose this specification?

If a program is to be written, the design section of the report should include:

- a description of the algorithm(s) used to solve the problem;
- a description of the data structures used in the program.

For both types of project the following questions should also be considered:

- How will the input data be validated?
- What form will the output take? How will this be achieved? If there are multiple outputs, can the need for them be justified?
- How will the solution be tested? What test data will be used, and what output would it be expected to give?

The design section of the report should leave the reader in no doubt about how the problem is to be solved and how the solution is to be tested. Each listing, printout and input document should be annotated to explain its purpose and its importance.

2.3 Implementation of design

In this section candidates should produce evidence that they have tried to follow their design plans. Evidence should be in the form of **annotated** printouts to illustrate the progress of the solution, and to show clear links between output and the design plans. **Media other than paper should not be submitted.** All output presented should be relevant to the solution of the problem.

In preparing this section, candidates should ensure that each of the following questions has been considered:

- Have I included evidence of all aspects of the solution? Is there a listing of the program, if one has been written?
- Is all output original, dated and relevant? Is the relevance explained? Does the annotation link the output to the original problem?
- Have I explained any necessary changes to my original design?

Candidates should **not** produce 'as much output as possible'. There should be sufficient output to show all aspects of the solution and to demonstrate that a solution has been produced. Printouts of material contained in sample files within the software used are not necessary, such as graphs in Excel or tables in Access. **Output irrelevant to the coursework requirements will gain no marks, and should not be included.**

2.4 Testing of the solution

The results of the testing should be included in this section. Annotation should explain how the testing output is linked to the original plans. Similarly, the results of validation checks should be shown to correspond with those mentioned in the design section. Any differences between predicted output and actual printouts should be explained, as should any modifications made to the solution as a result of these differences.

In this section candidates should consider the following questions:

- Have I fully tested my solution? Is the evidence clear and annotated?
- Do my actual results match those I predicted or expected?
- Did testing lead to modifications to my solution? Have I explained them?
- How can I be confident that my solution has been successful?

This is frequently a weak section in coursework reports. Candidates tend to describe a number of validation checks without connecting them to the solution presented. Test data is frequently omitted. Without test data and predicted results it is more difficult to argue that a solution is completely successful.

2.5 Evaluation of the solution

In this section of the report the focus should be on the effectiveness of the presented solution and the ability of the software to solve the original problem. An evaluation of the software used or the program written should be included, but only in terms of how it helped to solve the problem. A general review of the software is not required – examiners will only be interested in the candidate's opinions of **relevant** aspects of the software used or program written.

In this section candidates should consider the following questions:

- Have I succeeded in solving the problem? If not, why not? Have I satisfied my stated success criteria? If not, why not? (Reference 2.1.2)

- Have I produced sufficient evidence to show how well I have succeeded in solving the problem, or to highlight the difficulties encountered?

- Are there any weaknesses in my solution? Are there ways in which the solution could be made more effective?

- Did the software used perform as required? Was it easy to use? If not, what were the weaknesses? Would other software have performed better or been a better choice?

The majority of candidates give insufficient care to this section. Statements such as "I enjoyed solving this problem/using this package" should be avoided.

It is important to know that full marks can be obtained for an evaluation of a solution that has been unsuccessful – providing the reasons for the lack of success are clearly explained.

3. Presentation of the report

The report should be presented in a single, lightweight A4 folder, taking note of the points set out below. The first page of the report should be the completed coursework declaration form. See Appendix C, page 13.

- The report should be organised in five sections, under the following headings:
    - Problem analysis and specification;
    - Design and planning of solutions;
    - Implementation of design;
    - Testing of the solution;
    - Evaluation of the solution.
- The report, exclusive of computer output, should be **no more** than 30 sides of A4 paper. Examiners are looking for quality rather than quantity, and are primarily concerned with whether the coursework requirements have been met. The total length of the coursework will depend upon how much relevant output is necessary. All submitted printouts should be relevant to the solution to the problem, and annotated to show their relevance.
- Disks or CD-ROMs should **not** be submitted. The only possible addition to the paper report and output would be photographic evidence of screen output.
- The report must be original and the candidate's own work. Both the teacher and the candidate should authenticate it as such. A sample of the declaration form is included as Appendix C.
- All material included in the coursework reports must be original copy and **not** a photocopy.
- All output should be dated, preferably by the computer in a header or footer.
- Correcting fluid should not be used.

4. Advice on choosing an appropriate problem

In choosing a suitable problem to be solved, candidates should bear the following general principles in mind:

- The problem should reflect the interest of the candidate or someone known to the candidate. A better outcome is likely if the candidate has a keen interest in the chosen topic.
- The problem should be appropriate and realistic, and a solution should be within the capability of the resources available to the candidate. For example, it would be unwise to attempt a solution to "Air traffic control at a major international airport".

- The candidate should be confident that the chosen problem **can** be solved. While it is possible for very good marks to be obtained for projects which do not produce a complete solution, it would be an advantage if a solution can be obtained within the time available.

5. Advice on choosing appropriate tools and/or software

In choosing suitable tools and/or software to solve the problem, candidates should bear the following general principles in mind:

- The problem should decide the tools and/or software used for the solution, rather than vice-versa. Edexcel understands that some centres and candidates are limited in terms of choice and availability of software. The project should, however, at least give the impression that the choice of tools and/or software was based on the original problem. For example, it is not advisable for the candidate to state "We were told to use Excel for our project so I decided to…"

- As stated in the syllabus, the problem can be solved using commercial software, or a program written by the candidate, or a combination of the two. Candidates who choose to write their own software will need to justify that decision.

  The coursework should not be seen only as an opportunity for candidates to demonstrate their programming skills. If candidates do decide to write a program they should be advised that the quality and sophistication of the programming will carry a relatively small proportion of the total marks for the assessment. If a candidate, for example, chooses to write a word processing program, they must justify why they did so, in favour of the innumerable word processing packages readily available. Examiners advise that, if a commercial package is adequate to solve the chosen problem, the candidate should be discouraged from writing a sophisticated new program.

- The coursework should be focused on solving a problem. This will, in most cases, involve the use of commercial packages. Candidates should be aware of the need to describe how the software was used **to solve the problem**. Little credit will be given for describing features of the software that have not been used.

6. Plagiarism and shared work

Supervisors must ensure that candidates know that they must **not** copy from any source without acknowledgement. This would include textbooks, a sample report provided by the centre or the work of another student. Supervisors must identify, on the coursework declaration form, any aspects of a coursework report that is not considered to be the candidate's own work.

Candidates must **not** submit joint coursework reports.

Appendix A – Syllabus Section 3: Problem Solving and the Written Report

Candidates must use a computer to solve a problem. They should be able to select appropriate hardware and software and justify their choice, describe fully the methods used in solving the problem and offer a complete evaluation of the effectiveness of the solution produced.

While questions raising general points about problem solving may be set on the written paper, it is anticipated that much of the assessment of this part of the syllabus will be achieved through the coursework.

To satisfy the coursework requirements candidates must submit a report on the use of a computer to solve a problem.

The candidate must identify the problem and solve it by using a commercial software package, or by using a computer program written by the candidate for the purpose, or by a combination of these methods.

The report should be presented in a single lightweight A4 folder, and should be no more than 30 sides. *Candidates should be aware that marks for coursework are awarded for quality rather than quantity*. The report should be presented in FIVE sections corresponding to the five assessment criteria described in sections 3.1 – 3.5.

3.1 Problem analysis and specification

Candidates should specify a problem from the user's point of view and restate it from the analyst's viewpoint. Candidates should break the problem down into sub-tasks, describe the desired outcomes and establish criteria for success.

3.2 Design and planning of solutions

Candidates should discuss possible ways of solving the problem. They should state what software is available for their use and, if they have a choice of suitable software, justify their final choice. It is recognised that candidates do not always have access to the "ideal" software for a particular solution. Where this is the case candidates should state with suitable justification what, in their opinion, the ideal software would be.

Where commercial software is to be used, candidates should include:

a) a description of the hardware requirements imposed by the choice of software, and the hardware actually used
b) a description of the data to be used and the methods of data capture
c) a full description of how the software is to be used to solve the problem. A user manual covering all aspects of the software's capabilities is not required.

Where a program is to be written, candidates should:

a) state the language to be used and justify the reasons for the choice
b) produce an algorithmic design for their intended solution
c) describe the files and data structures to be used in the program
d) describe how the inputs to the program will be validated
e) explain the test data to be used and state the expected results.

3.3 Implementation of design

Candidates should describe their attempt to solve the problem and must provide suitable evidence of their attempt.

Where commercial software is used, candidates should:

a) explain how the output was specified
b) produce clearly annotated output that is relevant to the problem
c) describe any amendments that were made to the original design documented under 3.2.

Where a program is to be written, candidates should:

a) produce a clearly annotated listing of the program
b) produce annotated output that covers all aspects of the solution
c) describe any amendments made to the original design plans documented under 3.2.

3.4 Testing of the solution

Candidates should provide evidence that they have tested their attempt at a solution to the problem. Evidence of testing should be clearly linked to the testing plans described earlier, and the expected output should be compared to the actual output.

3.5 Evaluation of the solution

Candidates should offer a full evaluation of the effectiveness of the solution, and of the means by which it was produced.

In their evaluation candidates should:

a) discuss the effectiveness of the solution
b) describe any shortcomings of the solution and suggest possible remedies and further developments
c) discuss the quality of the man-machine interface.

Appendix B - Coursework assessment criteria

The coursework will be externally assessed according to the following syllabus criteria:

Problem analysis and specification (15 marks)

13 – 15 marks
The problem is clearly identified and broken down into sub-problems. There is a clear indication as to how the potential solver sees the tasks. A full discussion of the problems posed by current methods is presented. The candidate identifies in detail the desired outcomes as seen by the person attempting to solve the problem and states clearly the criteria by which the solution will be evaluated.

10 – 12 marks
The problem and all associated sub-problems are clearly specified, from the viewpoints of both the user and the person solving the problem. There is a discussion of current methods and the difficulties they pose. The desired outcomes are stated in reasonable detail and usable success criteria are discussed.

7 – 9 marks
The problem is identified and broken down into sub-problems, as seen by the person attempting to solve it. There is some discussion of current methods and their disadvantages. Desired outcomes are identified and some attempt is made to produce success criteria, by which the solution will be evaluated.

4 – 6 marks
A problem in context is identified and some attempt is made to restate it in terms of the person attempting to solve the problem. There may be some discussion of current methods and of the desired outcomes, or of identified success criteria.

0 – 3 marks
A problem is identified within a described context.

Design and planning of solutions (25 marks)

21 – 25 marks
The candidate has presented, with clear justification, details of appropriate systems, tools and techniques that will be used to solve the problem. A clear plan of the complete design of the solution is presented in an appropriate form. There is a very clear indication of the methods of validation and testing to be used, with details of test data and expected results.

16 – 20 marks
The candidate has presented with some justification appropriate systems, tools and methods. The design of the solution and the requirements of the system are presented in such a way that it can be seen how the problem will be solved. There is a clear indication of the validation and testing methods to be used, with some mention of test data.

11 – 15 marks
The candidate lists a range of tools and makes some attempt to justify the choices made. The method of solution is described. There is some indication that validation and testing have been considered.

6 – 10 marks
The candidate suggests a range of hardware and software tools to be used, makes appropriate choices, and outlines a design for the solution.

0 – 5 marks
The candidate lists the hardware and software tools to be used and indicates how the problem is to be tackled.

Implementation of design (30 marks)

25 – 30 marks
The candidate has used the designed system to produce a complete solution to the problem. There is a comprehensive collection of evidence to support the solution. This includes listings and output for programming projects, and clearly annotated output for projects using commercial software. Documentation and annotation links the output clearly to the original problem. The candidate has discussed and carried out all modifications to the original design as a result of difficulties encountered during the implementation and testing.

19 – 24 marks
The candidate has used appropriate tools and techniques with clear understanding to produce an effective solution. There is clear evidence to support the solution of the problem and this is presented with documentation and annotation that relates it to the problem. There is some discussion of the difficulties encountered and any modifications that were made to the original design.

13 – 18 marks
The tools and techniques identified in the design section have been used to good effect to produce a solution to the problem. There is some evidence to support the solution – a program listing with annotated output, or output from a package that has been clearly specified and is relevant to the problem. There is some discussion of any amendments to the original design that were necessary.

7 – 12 marks
The candidate has used the design plans to attempt a solution. There is some evidence that a program has been written (listing/hard copy) or that a software package has been used (relevant output), and that this relates to the problem being solved.

0 – 6 marks
The candidate has made an unsuccessful attempt to solve the problem by writing a program, or has used the software package to reasonable effect without relating it to the problem presented.

Testing of the solution (10 marks)

9 – 10 marks
Testing plans are followed comprehensively and a complete record of test results is included. Results are evaluated against predicted outcomes, and necessary modifications discussed and implemented.

7 – 8 marks
Testing plans are carried out and there is evidence that most cases have been considered. Results are compared against predictions and necessary modifications discussed.

5 – 6 marks
Testing is described and carried out according to testing plans in the design. Some evidence to support the testing, and an attempt to compare actual results with expected results. Some discussion of possible modifications as a result of testing.

3 – 4 marks
Some testing is described and carried out, and there is evidence to support it. Some mention of appropriate amendments is made.

0 – 2 marks
The candidate has made some attempt to test the proposed solution.

Evaluation of the solution (20 marks)

17 – 20 marks
The candidate produces a complete evaluation of the solution of the problem. Evidence is produced and linked to all the stated success criteria to justify the conclusions about the effectiveness of the solution. Weaknesses and all possible further developments are fully discussed. The effectiveness of the software in solving the problem, and the quality of the man-machine interface are also fully discussed.

13 – 16 marks
The candidate discusses the effectiveness of the solution linking the success criteria to the output to justify conclusions. Weaknesses and possible further developments are discussed. There is a discussion of the effectiveness of the software used, and a full evaluation of the man-machine interface.

9 – 12 marks
The candidate uses evidence to evaluate the solution against some of the success criteria and considers weaknesses and/or further development. There is some discussion of the ability or otherwise of the software to solve the problem, and an evaluation of the man-machine interface.

5 – 8 marks
The candidate attempts to discuss the effectiveness of the solution, referring to desired outcomes. There is some mention of either the capabilities of the software or the man-machine interface.

0 – 4 marks
The candidate considers either the effectiveness of the solution or the capabilities of the software.

GCE Ordinary Level Computing (7105)

Coursework Declaration Form

This form **must** be completed and signed by the candidate and supervisor, and attached as the first page of the report before submission.

The completed coursework report must reach Edexcel International (London Examinations) by **1 May** in the year of the examination. Edexcel International will provide the centre with an address label for this purpose.

Candidate Name (Block Capitals) .....

.....

Centre Name (Block Capitals) .....

.....

Candidate Number ..... **Centre Number** .....

Coursework Supervisor (Block Capitals) .....

Declaration by the candidate

I declare that this coursework and the accompanying report are my own unaided work. Any assistance has been acknowledged and sources are identified.

Signature of candidate ..... Date .....

Supervisor comments

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Signature of supervisor ..... Date .....

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