WORK OUT

to GCSE success...

Welcome to this Work Out on Computer Studies

USE THIS BOOK TO HELP YOU PASS

The overall purpose of this book is to help you pass GCSE Computer Studies.

*Good luck and
go for it!*

Graham Taylor

The Key Facts

Each chapter begins with a brief review of the key points for a given topic. Recent developments in the subject and areas where existing textbooks are inadequate are dealt with in more detail, so that you have a solid foundation on which to build.

Real Questions

The worked examples show you how to answer actual or typical exam questions. Where appropriate, the full answers are supported by hints and guidelines to show you how to tackle the problem and how to avoid pitfalls.

Real Self Check

Varied questions are also provided for you to work out for yourself and answers are given at the end of each chapter. Answers are in outline only where it is obvious what the question demands or where a worked example can be found in the text. It is important that you should try out these exercises for yourself before looking up the answers.

Mark Yourself and Check Your Grade

Mark your answers to the self-test questions using the right answers at the end of each chapter. Marks for individual questions are given in brackets at the end of the question. Exceptions are the multiple-choice questions – each of these is usually worth 1 mark. As you work through this book and do your revision, you will want to know what kind of grade in the GCSE exam your marks will give you. Throughout this book a number of the questions have been graded to help you do this. For details of how your Exam Boards will assess you, see page 4.

GOOD DESIGN TO HELP YOU...

Worked examples
of typical exam
questions

Subheads break
content into
manageable units

The key facts
for the exam

AN INTRODUCTION TO COMPUTER SYSTEMS

1 Introduction

Computers are essential tools in most walks of life. This chapter is designed to introduce you to some of the basic concepts.

After working through this chapter you will be able to:

- define a computer,
- distinguish elements of a computer system — the general nature and functions of each component,
- describe the main types of computer,
- see how a simple program works, and
- outline the contribution computers make to process control.

2 What is a Computer?

A computer is a device or set of devices which work under the control of a stored program (which can be changed), automatically accepting and processing data to produce information.

So a computer is:

- Automatic — It carries out instructions with minimum human intervention.
- Reprogrammable — It stores instructions (the program). These can be changed and another task performed.
- A data processor — It carries out operations on data (numbers or words) made up of a combination of digits to produce information.

Although a computer processes data, it does not 'think' for itself or understand it. If the data used by the computer is wrong (garbage) the result it produces will be wrong (garbage out).

Contrary to popular belief computers cannot do everything. Most computers are limited to four mathematical operations (+, -, ×, ÷) and three comparison operations (=, <, >).

Everything the computer does is done by using combinations of the above. Programming ingenuity makes the computer seem 'intelligent'.

3 The Elements of a Computer System

All computer systems, regardless of size, can be divided into four basic elements which perform certain tasks. These are shown in Fig. 1.1.

Storage

Q. What do you see as the most significant advantages and disadvantages of magnetic disks?

A. Advantages of magnetic disks:

- Currently the most popular storage method in business.
- Data can be accessed directly — there is no need to search through other records.
- Sequential processing is possible if needed (as with all DASDs).
- Very high capacity storage at low cost (per character stored).
- Disk packs are convenient to handle and store.

Disadvantages:

- Disk drives and disks are more expensive than tape drives and tapes respectively.
- Slower than newer forms of storage under development, e.g. magnetic bubble.
- Can be susceptible to dust, static electricity, head crashes, etc.

Disk storage is now used in most business situations and is particularly useful in on-line enquiry/response systems, where direct access is essential, e.g. reservation booking systems.

(b) Winchester (Hard) Disk

A Winchester disk is a hard disk developed by IBM for small business systems (see Fig. 3.6). It is now commonly referred to as a simply hard disk.

It is a single, sealed disk made of a hard, metallic material with an aluminium surface.

Lightweight read/write head floats just above the surface to such precision that data can be packed very tightly.

Capacity: much larger than a floppy disk (see next section). A 40 Mb hard disk is the equivalent of 55 720 kb floppies and capacities can be greater. To make practical use of this large storage space, parti-

tions can be set up which divide the disk space into more manageable sizes.

Back-up is by diskettes or tape streamer.

The advantages and disadvantages of Winchester hard disks are as follows:

Advantages

- Cheap
- Very reliable (hermetically sealed container).
- Small in size (5 1/8 in. 3 1/2 in. in-called 'mini-worms').
- Does not deteriorate as quickly as a floppy.
- More storage space and much faster access than a floppy. Users can install all their software on hard disk without the need to search for floppies when changing programs.

Disadvantages

- Inflexible — disks in sealed containers cannot usually be changed, although some manufacturers, e.g. Tandon, have introduced portable hard disks.
- The entire library of programs and data can be lost. Systematic backing up is therefore important.

Uses

- Widespread use with business microcomputers and networks.
- In 'tough' environments where there is dust, etc.

(c) Floppy Disks and Diskettes

Floppy disks are simple, low-cost form of disk storage.

A floppy disk is a single, flexible disk held in a protective cardboard jacket (Fig. 3.7).

Figure 3.6 A Winchester (hard) disk.

Diagrams of useful
or difficult ideas

Real GCSE questions:
Hone your skills on the
real thing

There are full
Answers and
Hints on
Solutions at
ends of
chapters

More questions
for you to try

Self-check test 2

Grade B

There are 12 marks for this section.

This test is in three graded sections. Each one is harder than the one before. You will get Grades F, C and A, respectively, if you can gain 75% of the marks for each section.

1. Tick two of these applications which use computer control.

APPLICATION	USES COMPUTER CONTROL
automatic pilot	Tick
theatre-bookings system	
producing postcards	
robots making a car	
printing class lists	

(MEG, 1990, Paper 1, Q4)

2. The diagram below shows the menu screen of a word-processing package.

A user typed in a document last week, and saved it on disk. The user now wishes to make some changes to it, save the new version, then print it. The correct disk has already been put in the disk drive.

(a) Give the order in which the menu options must be chosen.

Self-check pages
show you:

- how you are doing
- how you cope with higher grade material

WHAT THE EXAM BOARDS WANT . . .

Check Your Syllabus

Each exam group has its own *syllabus* or list of topics which should be studied. Although they differ in some ways (see topic areas opposite) they are all based on the same *aims* and *assessment objectives* which are defined in the *National Criteria for Computer Studies*.

It is important to check *your* syllabus right at the start. Why not write to your board, using their address on the next page and ask for a copy of their latest syllabus?

Different Papers — Different Grades (Usually)

GCSE exams now cover a wide range of abilities and this is taken into account in the syllabuses and exam papers.

Some boards (LEAG, MEG, NISEC, WJEC) have *differentiated papers*, i.e. you will take only those papers which are at the right level for you. This means that you could be eligible for a limited range of grades (say C to G so you *must decide beforehand in consultation with your teacher which papers to sit*. If you're a private candidate, look at past papers and pick what's best for you. Aim high, but be realistic. Better to get something than nothing at all.

The MEG has *differentiated sections* relating to the various grades, so you should concentrate on that part of the paper which is relevant to you.

NEA and SEG use *stepped questions*, i.e. the early parts of the questions are easy, and the latter parts more difficult.

SEG paper 1 (multiple choice) has 40 questions in ascending order of difficulty, though it's hard to tell!

What To Expect In Your Written Exam

There are three main types of question, as you'll see from the book:

- (a) *Short questions*. These are usually compulsory and cover a wide variety of topics which require short-note answers. This demands a comprehensive, if fairly basic, knowledge of most topics.
- (b) *Exercises*. These examine specific areas such as software or computer applications. Here your knowledge should be more detailed, as each question can be worth 15–25% of the paper.
- (c) *Case study*. Most syllabuses include a case study. This is an in-depth look at a particular application, e.g. the use of computers in public libraries. It may take up all or part of one exam paper. Usually the case is issued in advance of the exam. Study it thoroughly and predict what questions might be asked about it. More is said about case study technique in Chapter 14 and we run through a wide range of possible applications in this book.

Don't Neglect Coursework

During your course you will be assessed on your *practical use of the computer to solve problems*. This could involve writing a program or using a software package. Examination boards require you to submit project or coursework which accounts for 30% (or more) of the marks that go towards your final grade. See the table opposite and Chapter 14, which give you plenty of practical help in planning and doing your coursework.

HOW

THE BOARDS DIFFER

Examination syllabuses — by topic area	LEAG	MEG	NEA	SEG	WJEC	NISEC
Data representation	*	*	*	*	*	*
Hardware and media:	*	*	*	*	*	*
central processing unit	*	*	*	*	*	*
storage methods and devices	*	*	*	*	*	*
Input methods and devices:	*	*	*	*	*	*
collect, verify and validate data	*	*	*	*	*	*
Output methods and devices	*	*	*	*	*	*
Data communications	*	*	*	*	*	*
Files:	*	*	*	*	*	*
data structures	*	*	*	*	*	*
types of file	*	*	*	*	*	*
file organisation	*	*	*	*	*	*
file processing	*	*	*	*	*	*
Software:	*	*	*	*	*	*
types of computer operation	*	*	*	*	*	*
operating systems	*	*	*	*	*	*
translators	*	*	*	*	*	*
utilities	*	*	*	*	*	*
application packages	*	*	*	*	*	*
Programming techniques:	*	*	*	*	*	*
program writing	*	*	*	*	*	*
problem solving and errors	*	*	*	*	*	*
Computer applications:	*	*	*	*	*	*
commercial	*	*	*	*	*	*
technical, maths and science	*	*	*	*	*	*
information systems	*	*	*	*	*	*
control systems	*	*	*	*	*	*
educational	*	*	*	*	*	*
leisure and home	*	*	*	*	*	*
Systems analysis and design:	*	*	*	*	*	*
documentation	*	*	*	*	*	*
test and implement a system	*	*	*	*	*	*
The effects of information processing:	*	*	*	*	*	*
computers and society	*	*	*	*	*	*
data privacy and security	*	*	*	*	*	*
The tasks of computer personnel	*	*	*	*	*	*

Topics in the book which *do not* appear in specific examination syllabuses (*Note*: GCSE syllabuses are very similar; only small differences now exist. The emphasis has moved away from computer arithmetic and logic, and also programming, towards computer-based applications.

	LEAG	MEG	NEA	SEG	WJEC	NISEC
Representing data:						
binary fractions	*	*			*	*
octal and hexadecimal	*	*	*		*	
truth tables	*			*	*	
NOT, AND and OR logic	*			*	*	
Programming:						
simple program (but this will be useful for coursework)	*					

HOW

YOU WILL BE ASSESSED . . .

Assessment covers all the ways of finding out what you can do and how well you can do it, and it covers the methods by which you are graded according to your performance.

A combination of *written exams and coursework* is used to assess you against each objective.

Five Assessment Objectives

The assessment objectives, listed below, are what you will be tested on. Alongside them you will see their relative importance expressed as a weighting in percentage (%) terms.

You will be tested on your ability to: <i>Weighting</i> (in %)	
A demonstrate a knowledge and understanding of the techniques needed to solve problems related to practical applications	15–20
B use computers sensibly to produce solutions to appropriate problems and be able to document their solutions	25–30
C demonstrate a knowledge and understanding of the functions of the main hardware and software components of a computer system and their relationships with the representation of stored data and programs	15–20
D demonstrate a knowledge and understanding of the range and scope of computer applications	20–30
E demonstrate some understanding of the social and economic effects of the use of computerised systems on individuals, organisations and society	10–15

HOW

YOU WILL BE ASSESSED . . .

	LEAG	MEG	NEA	SEG	WJEC	NISEC
Number of written papers available	5	4	2	2	3	3
Number of papers sat	2 or 3	1 or 2	2	2	2	2
Combinations and possible grades: Paper numbers, then grades (all means all grades available)	1,2 D–G 3+4 C–F 3+4+5 A–F	1 G–F 2 E–C 3 B–A	1,2 all	1,2 all	1,2 C–G 2,3 A–E	1,2 C–G 2,3 A–E
Time taken (in hours)	3½ or 5	4	3¼	2½	3½	3½ or 4
Case study:						
in a written exam	Y	Y	Y	Y		Y
as a whole paper	Y	Y		Y		
details known in advance?	Y	Y	Y	Y		Y
Project (practical course work):						
number of projects required	1	1	1	1	2	up to 4
percentage of total marks	30	33.3	40	30	30	30

In general your ability to *use* computers (objective B) will be assessed by *coursework* (see Chapter 14); the other abilities are covered in written examination papers.

A Word About Grades

A wide range of abilities is now assessed (combining the whole spread of the old 'O' level and CSE, if you remember them) and the exam boards have different ways of determining your overall grade.

Grades range from A (top) to G or ungraded.

You get marks for what you can do rather than getting marks knocked off for what you can't do.

HOW YOU WILL BE GRADED . . .

To give an idea of what you need to aim for, brief explanations follow for grades F, C and A. Graded questions are given in the book to give you an idea of how you must do to achieve a particular grade. The final grade represents your overall average performance and may balance some poor grades against good ones.

Grade F

- A *basic* knowledge of terms and definitions.
- Some elementary analysis.
- Coursework:
  - Offer solution to *simple* problems using a limited range of techniques.
  - Only limited documentation and testing.

Grade C

- A *good grasp* of basic terms and definitions.
- Be able to *compare and contrast* ideas.
- Be able to apply principles of information processing to given applications.
- Design and describe computer-based systems which are broadly correct, except for minor deficiencies.

- Coursework:
  - Have attempted a *worthwhile* problem *reasonably well*.
  - Testing may be incomplete but will have covered the important aspects.
  - You should be aware of the limitations and be able to suggest improvements.
  - You may not have picked the best way of solving the problem, but it is reasonable and well explained.

Grade A

- A *wide body of knowledge* on the subject.
- Be able to apply it to a *wide variety* of applications.
- Be aware of benefits and limitations of computer use.
- Coursework:
  - Be able to solve *substantial* problems using appropriate solutions, and clear, concise and comprehensive documentation.
  - Testing is comprehensive.
  - Solution is objectively evaluated.

Addresses of the Six GCSE Exam Boards

London and East Anglian Group (LEAG)
c/o University of London School
Examination Board
University of London Publications Office
52 Gordon Square
London EC1E 6EE

Midland Examining Group (MEG)
c/o University of Cambridge Local
Examinations Syndicate
Syndicate Buildings
Hills Road
Cambridge CB1 2EY

Southern Examining Group (SEG)
c/o The Associated Examining Board
Stag Hill House
Guildford
Surrey GU2 5XJ

Northern Ireland Schools Examinations
Council (NISEC)
Examinations Office
Beechill House
Beechill Road
Belfast BT9 4RS

Northern Examining Association (NEA)
c/o Joint Matriculation Board
Oxford Road
Manchester M15

Welsh Joint Education Committee
(WJEC)
245 Western Avenue
Cardiff CF5 2YX

REVISION

THE TEN COMMANDMENTS

The following hints will help you to organise your revision in such a way that it becomes enjoyable and productive so that you can give of your best — and that's what you should always aim for!

Remember that the purpose of exams is to test your knowledge and understanding of the subject.

1 **T I P** Obtain your syllabus and recent examination papers from your teacher/lecturer, or else order them from the relevant exam board (see page 6). Be aware of any recent changes in the structure and content of the syllabus.

2 **T I P** *Make sure that all your course notes are complete* — did you miss any classes? Borrow a friend's or teacher's if some are missing.

3 **T I P** Revise and edit your notes so that they are *clear and concise* and *understandable to you*.

4 **T I P** Gradually *summarise* them by noting the main points. Log these onto a few sheets of paper or postcards. Learn and revise frequently; do they act as prompts to trigger off your memory? If not, refer back to your original notes and think again!

5 **T I P** *Plan ahead. Work out a programme of revision and stick to it.* You need to allocate time each week for revision and you need to plan which topics you are going to cover.

6 **T I P** Revise the course topic by topic. The chapter headings and the order given in the contents of this book should be helpful.

7 **T I P** Work through the questions at the end of each chapter.

8 **T I P** Work through the progress tests in the body of this book.

9 **T I P** Work through past exam papers under exam conditions by giving yourself a time limit and not looking at your notes. **Keep practising!!!**

10 **T I P** *Be inquisitive.*

- Don't be afraid to ask if you're uncertain about something.
- Share problems and solutions with friends doing the subject.
- Talk to people who work in computers.
- If all else fails, ask your teacher or lecturer!!!
- Visit computer exhibitions, libraries, look at computer magazines and go on computer visits.

Remember!!! The Examiner is on Your Side, Really

Students frequently have an image of the examiner as an avenging demon — implacable and merciless. This is understandable, but quite fallacious. Examiners usually bend over backwards to interpret the rules leniently. Almost all the talk at an examiners' meeting is devoted to the borderline failures and how they can be made to pass. Supposing the pass mark is 40%, then the examiners will pore over the papers of candidates with 35–39%, searching for extra marks. Anyone with 40% or 41% is as safe as houses!

SURVIVING EXAMINATIONS

A FURTHER TEN COMMANDMENTS!

1 **T I P** Be well prepared — you can't make up for lack of knowledge or poor preparation no matter how lucky you are with the questions!

2 **T I P** Check that you've got all your 'kit' with you — pens, ruler, calculator, etc.

3 **T I P** Get to the exam in good time and stay there until the end — brainwaves and inspiration often come in the last minute of an exam as well!

4 **T I P** Read the instructions at the beginning of the paper carefully.

5 **T I P** Work out the time you must give to each question and stick to it. Follow any advice given on how long to spend on each question or section. As a rule, the first few marks on any question are the quickest and easiest to obtain.

6 **T I P** If you do run out of time towards the end of the exam, it may be possible to answer the question in note form. At least you will gain some marks this way!

7 **T I P** Attempt to answer **all** the questions required. You can't be given marks for questions that you haven't done. It is much more likely that you will get a higher grade by giving correct answers to parts of all the requires questions, rather than answering just a few, however fully. This follows from Point 5.

8 **T I P** Read the questions carefully. Where you have a choice, tick the ones that you will attempt.

9 **T I P** It's a bonus if you can write neatly and set out your work clearly. This will get the examiner on your side. You can't get marks if your script is illegible.

10 **T I P** Where appropriate, give examples and draw diagrams, pictograms, flowcharts, etc. This helps communications and may cheer up the examiner!

Why then, do Some Students Fail?

There are several sure-fire ways of failing an exam and most involve not answering the questions asked:

1. Write nothing at all and leave after half an hour.
2. Forget to read the instructions telling you *which* questions to attempt.
3. Fail to attempt all of the questions because you spent *too much time* on a *few* of them.
4. Read the questions *too quickly* and answer the question you *think* you've read.
5. Answer a question that you've revised for, but not the one on the paper (in spite of vague similarities). You may hope that you'll get the examiner's sympathy — but you won't!

All of these points are commonsense ones about exam techniques. They are important, so remember them.

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