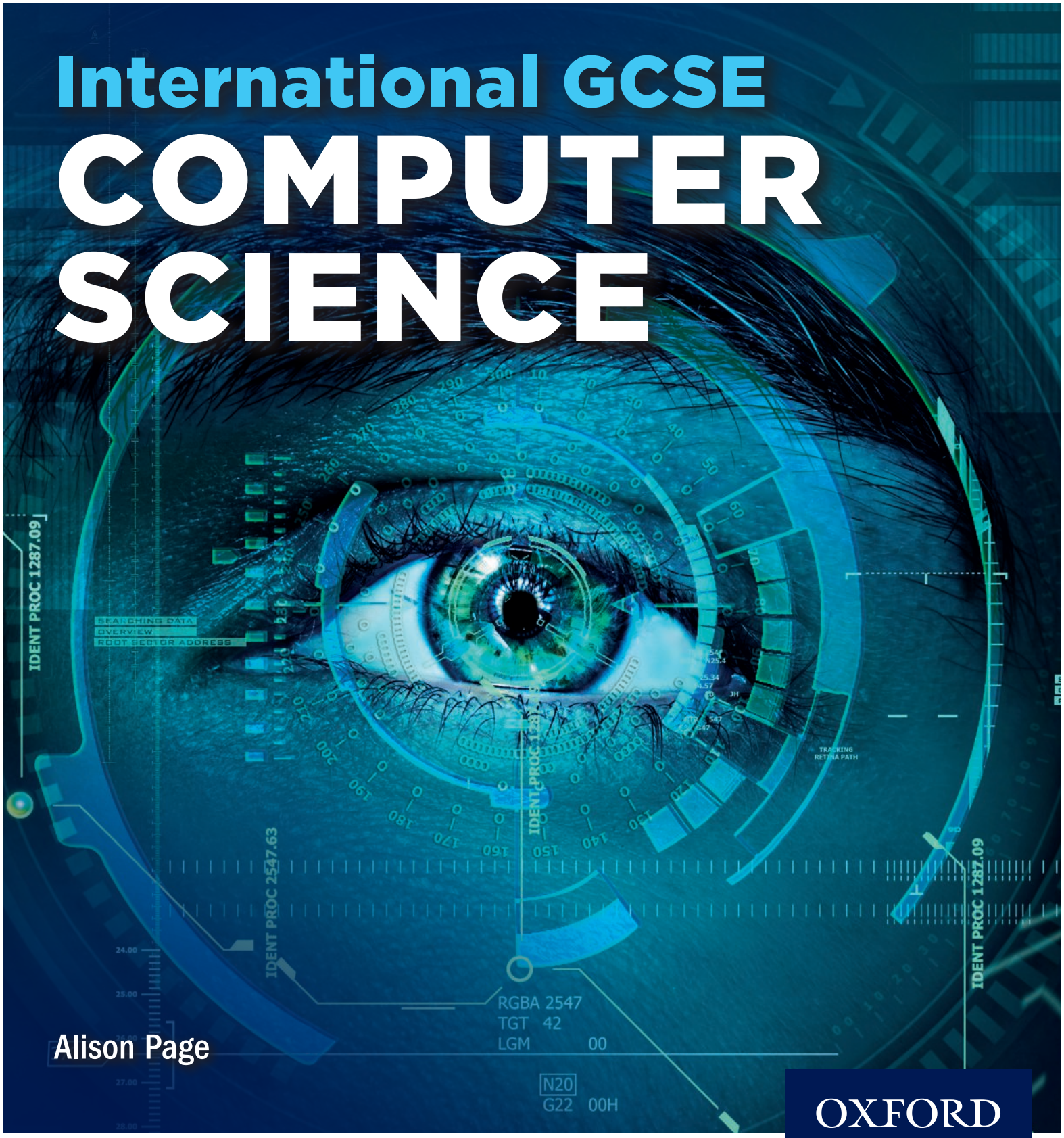
Published for
OXFORD INTERNATIONAL
AQA EXAMINATIONS

International GCSE
COMPUTER SCIENCE



Alison Page

OXFORD

Contents

Introduction

If you are studying Computer Science for the Oxford AQA International GCSE, then this book is designed for you. Its purpose is to help you achieve your best in the course and examination, equipping you with the knowledge you need to study the subject at a higher level.

The book matches the syllabus exactly and consists of eleven chapters: chapters 1-3 cover exam paper 1 of the syllabus (**Programming**), while chapters 4-11 cover exam paper 2 (**Concepts and Principles of Computer Science**).

To help you make the most of this student book, the following features are used to organise the content:

Syllabus reference

The explicit syllabus reference allows you to frame your learning and build connections between different topics.

Introduction

The short introduction will make it clear what you will learn in each lesson.

Example

Examples are given to show you what your screen should look like or to give step-by-step guidance on what to do.

Test yourself & Learning activity

The "Test yourself" and "Learning activity" questions will help you check your understanding after each lesson and give you further opportunities to practise what you have learnt.

Extension activity

The Extension Activities go beyond the requirements of the syllabus and will not be tested in the examination. They are intended to give you a broader understanding of computer science and hopefully you'll find them good practice.

Programming

In this student book, Python is used as an example programming language. There are many other programming languages and your teacher might have chosen a different one. However, the features you will learn about are found in almost all languages.

Syllabus reference

3.2.2 Programming concepts

Students should be able to write programs.

1.1 Begin programming

Introduction to Python

Introduction

This book will help you to learn about Computer Science. The first thing you will learn is how to write computer programs. As you learn to write programs, you will learn more about how a computer works.

You will learn to write programs in the Python programming language.

Begin programming

In this chapter you will learn how to write computer programs. The Python programming language is used as an example. There are many other programming languages. The features you will learn about are found in almost all languages. You will write Python programs that use variables, loops, and other key features. Programs written in other languages also have these features.

To extend your understanding of programming you could work independently to learn about an additional language and see how it compares to Python. This is not essential.

What is Python?

Python is a programming language. You can write programs in the Python language. Then you can run the programs. You will control the actions of the computer.

You do not have to pay to use Python. You can download Python onto your own computer at home. That means you can practise programming outside of classroom time. To download Python go to the main Python website:

https://www.python.org/

Choose "Downloads" from the menu.

Versions

There are several versions of Python. Each version has a different number. Some start with 2, for example 2.7.10. Some start with 3, for example 3.5.3. In this book we use version 3. You can download and use any version as long as it begins with 3.

Integrated development environment (IDE)

Like many programming languages, Python comes with an integrated development environment (IDE). The Python IDE is called IDLE. An IDE is similar to a word processor. An IDE lets you type up your program and save it like a document. However, a typical IDE has extra features you don't find in a word processor. For example, IDLE:

- uses colour to show different features of the program code

This code assigns the value 23 to the variable `Age`:

```
Age = 23
```

This code assigns the value `"Bond"` to the variable `CodeName`:

```
CodeName = "Bond"
```

Declaring variables

In some programming languages you must create a variable with a special command before you can use it. When you create the variable you give it an identifier and a data type (find out more about data types on page 16). The variable is empty – it doesn't have a value. Creating a variable is called 'declaring' or 'initialising' the variable. In Python, you do not need to declare variables using a special command. Just start using the variable when you need it in your program. A variable is declared when you assign a value to it for the first time.

Output a variable

You have learned that a print command will output a value. You can put the name of a variable into the print command. The computer will output the value stored in the variable:

```
print(Age)
print(CodeName)
```

When you output a variable you do not put quote marks round the variable name. You don't want the computer to print out the name of the variable as a word. You want it to print the value that is stored in the variable.

You can combine a string and a variable in the same output command. Put a comma between them:

```
print("Your code name is ", CodeName)
```

Test yourself

1. What is the name for code that represents a data value?
2. Give the command to assign the value 19.99 to the variable `TicketCost`.
3. Give the command to output the value stored in the variable `TicketCost`.
4. Here are four variable names. For each one say whether it is a good or bad variable name and say why.
   - **a** `Character Name`
   - **b** `firstName`
   - **c** `5Star`
   - **d** `myvariable`
   - **e** `Star*Rating`

Learning activity

Open the computer game program you started writing in the last lesson.

1. Create a variable called `Score`.
2. Assign the value 0 to this variable.
3. Add a command to print out the variable.

Syllabus reference

3.3.5 Character encoding

Understand what a character set is and be able to describe this character encoding method: 7-bit ASCII.

Understand that character codes are commonly grouped and run in sequence within encoding tables.

Additional information

Students should be able to use a given character encoding table to: convert characters to character codes, convert character codes to characters.

3.3.8 Data compression

Be able to calculate the number of bits required to store a piece of uncompressed data in ASCII.

5.1 Character encoding

Character codes

Introduction

Computers work with all types of data, including numbers, text, images and sound. All these different types of data must be held in binary form inside the computer. When data is held in binary form it is called digital data. In this lesson you will learn how text characters are stored using a code called ASCII.

Digital data

"Digital" is used to refer to a value that can be represented in digits as a number of units. A digital value does not vary in a smooth curve, but can be represented by a series of distinct values. All data held inside a computer is digital because the values are held as a pattern of on/off switches. We can represent these values as binary numbers.

Text data

The computer stores text using a number code system. Every text character is given a code number. The first widely used system of text coding was called ASCII. ASCII stands for American Standard Code for Information Interchange. The first version of ASCII was produced in the USA in 1963.

ASCII has a code number for each of the common text characters on the standard American computer keyboard. There are different codes for upper-case and lower-case letters. There are codes for the other characters that can be typed on the keyboard such as punctuation.

ASCII codes

The ASCII code system is sequential. That means the number codes go up in number order. ASCII number codes can be represented as decimal, binary or hexadecimal values. The table shows the ASCII codes for some of the upper-case letters of the alphabet. The code numbers are show in decimal, binary and hexadecimal.

Character	Decimal	Binary	Hexadecimal
A	65	100 0001	41
B	66	100 0010	42
C	67	100 0011	43
D	68	100 0100	44
E	69	100 0101	45
F	70	100 0110	46
G	71	100 0111	47
H	72	100 1000	48
I	73	100 1001	49

Syllabus reference

3.7.3 Structured query language (SQL)

Use the SQL commands `UPDATE` and `DELETE FROM` to edit and delete data in a database.

Edit data with SQL

Introduction

You have learned to add data to a SQL table using the `INSERT` command. In this section you will learn to delete records from a table. You will learn to make changes to the values in a table. These actions can be carried out with SQL commands.

The `DELETE FROM` command

You can delete all the records from a data table. Then you will be left with nothing but an empty table. For example, at the start of a new football season, the match records from the previous season might be deleted.

The command to delete all records is `DELETE FROM`. Complete the command by giving the name of the table:

```
DELETE FROM Match
DELETE FROM Player
```

The `WHERE` command

SQL has a command that lets us pick out one or more records from the table. It is the `WHERE` command. This command is always followed by a logical test. The computer will pick the records where the result of the logical test is True.

Here is a general example:

```
WHERE field = value
```

Look at the table below. It contains data about replacement hard drives for computers.

Product Code	Product Name	Supplier	Description	Cost
HD001	Canvio Basics 1TB hard drive	Toshiba	Portable External Hard Drive 2.5 Inch USB 3.0 - Black	47.98
HD002	Maxtor M3 1 TB hard drive	Seagate	USB 3.0 Slimline Portable Hard Drive - Black	49.23
HD003	M3 Slimline 2 TB hard drive	Samsung	USB 3.0 Portable Hard Drive - Black	207.00

Here is an example of a `WHERE` command:

```
WHERE Supplier = "Seagate"
```

This tells the computer to find records `WHERE` the supplier is Seagate. We must put the value `"Seagate"` in quote marks because it is a text field.

The computer finds this record.

Product Code	Product Name	Supplier	Description	Cost
HD002	Maxtor M3 1 TB hard drive	Seagate	USB 3.0 Slimline Portable Hard Drive - Black	49.23