IT

ENTRY LEVEL CERTIFICATE

Computing

Teachers' Handbook

R353

Version 1

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OCR

CONTENTS

INTRODUCTION

WHAT IS THE PURPOSE OF THIS HANDBOOK

Our Computing Entry Level qualification has been designed for first teaching in September 2012.

This is an exciting, broad-based specification for you and your learners which aims to bring Computing to life, engage learners and encourage them to achieve more. The practical possibilities have no limit.

OCR offers a range of support materials, developed following extensive research and consultation with teachers. We've designed them to save you time when preparing for the new specification and to support you while teaching it.

It is important to make the point that this Teacher Handbook plays a secondary role to the specification itself. The Entry Level Certificate in Computing specification is the document on which assessment is based: it specifies what content and skills need to be covered. At all times therefore, the Teacher Handbook should be read in conjunction with the specification. If clarification on a particular point is sought, then that clarification must be found in the specification itself.

OVERVIEW OF OCR ENTRY LEVEL CERTIFICATE IN COMPUTING

This qualification consists of one unit which is broken down into three strands.

Entry Level Computing R353

Hardware, Software and Logic 24 marks (30% of qualification)	OCR set end of item tests, each approx. 15 minutes in duration, to be taken after teaching a topic.
Programming 40 marks (50% of qualification)	Programming task Internally assessed, externally moderated.
Trends in Computing 16 marks (20% of qualification)	Presentation Internally assessed, externally moderated.

All three strands must be submitted along with a total mark across the strands out of 80.

CURRICULUM GUIDANCE

The Entry Level Certificate in Computing should introduce candidates to the fundamental concepts of Computing. It is designed to provide candidates with realistic targets, encouraging them to develop computing skills.

It is important that candidates have sufficient depth of knowledge and understanding combined with developed practical skills, to meet the demands of the internal assessment. The Entry Level Computing specification provides learners with opportunities to become more familiar with practical applications of computing.

This Entry Level qualification is designed to enable candidates to progress either directly to employment or to Foundation Level courses within the National Qualifications Framework. The schemes of assessment address some similar criteria to our GCSE Computing specifications; this enables the more able learner to progress to GCSE Computing.

The course is suitable for delivery in non-school settings, however, it is essential that all guidance is followed to ensure the authenticity of work submitted and to guard against plagiarism. All practical work marked as part of the internal assessment should be undertaken in supervised conditions and marked with reference to the assessment criteria.

SUBJECT SPECIFIC GUIDANCE

STRAND 2.1 HARDWARE, SOFTWARE AND LOGIC

Overview
The specification for unit 2.1 sets out the body of knowledge from which the examination will be based. This examination will be internally assessed and externally moderated.

There is a certain amount of correspondence between the content of unit 2.1 and the other two units in the specification, due to this, centres may wish to mix the assessments within the other units.

These assessments can be carried out as one test of 45 minutes or broken down into three individual tests of 15 minutes each. If the candidate completes the assessment early they can stop and the assessment can be marked, there is no need for the candidates to sit the assessments for the full time allocated.

Hardware, Software and Logic 24 marks (30% of qualification)	OCR set end of item tests, each approx. 15 minutes in duration, to be taken after teaching a topic.

In preparation for the assessment, teachers must allow sufficient teaching time to increase the candidate's depth of knowledge and understanding.

The tests are available for downloading from Interchange.

They are marked by the teacher using mark schemes provided by OCR and submitted to OCR together with all other strands.

Specific guidance on individual topics:
Hardware
It is highly recommended that, where possible, candidates should be physically handling, installing and testing the hardware devices studied, or at least, watching demonstrations of them. They should also research current specifications of personal computer systems on the market.

Candidates should have knowledge and understanding of:
- components of a computer
- internal components of a computer and their function
- peripherals and their function.

Candidates should be able to:
- identify the components of a computer, eg input, output and storage devices
- identify the basic function of the common internal components of a computer, eg motherboard, CPU, RAM, ROM, graphics cards, sound cards, hard disks
- identify the basic functions of common peripherals, eg camera, keyboard, microphones, monitor, mouse, scanner, speakers, printer

Software
Candidates should be given the opportunity to have first-hand experience of the software in this topic, especially system software.

Candidates should have knowledge and understanding of:
- functions of an operating system
- types of application software in different contexts
- types of system software in different contexts
- types of utility software in different contexts

Candidates should be able to:
- state why an operating system is needed, including its functions
- describe the difference between application software and system software
- state the purpose of different application software, eg presentation, desktop publishing (DTP), spreadsheet, database, image editing, web browsing, word processing
- state the purpose of different system utilities, eg computer security (antivirus, spyware protection and firewalls), disk organisation (formatting, file transfer, and defragmentation), and system maintenance (system information and diagnosis, system clean-up tools, automatic updating)

Logic
Candidates should be able to convert binary numbers and state the output of logic gates. As part of this topic, candidates will be given a sequence of instructions to put into the correct order. The sequence will be based on solving a problem with a computer system or performing a task using a computer system.

Candidates should have knowledge and understanding of:
• binary numbers
• types of application software in different contexts
• logic gates
• sequencing of instructions.

Candidates should be able to:
• convert between binary and denary numbers from 0 to 15
• state the output of different logic gates AND, OR and NOT
• sequence instructions into a logical order.

Suggested Delivery
There are various methods for completing the assessments required in this qualification. Teachers can set the assessments for topic 2.1 when they think the candidate is ready. The assessments can be set as one test of 45 minutes or broken down into three 15 minute assessments, again, if the candidate completes the assessment early there is no requirement to sit for the full time allocated.

The theory can be taught as three separate topics before taking each of the relevant topics assessment; taught as part of a larger theory section and all three assessments sat at the end; or taught as part of the two coursework based sections of this qualification and the assessments sat at the end. The method of delivery is up to the teachers' discretion.

The assessments can be chosen by the teacher on Interchange, and be internally marked. OCR will then externally verify the marks awarded. This is different from externally assessed tests because the assessments will be initially marked by teachers in the centres and then a selection will be moderated by OCR.

STRAND 2.2 PROGRAMMING

Overview
The programming task can be solved in Scratch instead of a tradition text based language.

Teacher Preparation and Instructions

Hardware	Standard Specification hardware requirements only, no additions required for this task.
Software	This task will require access to Scratch which is available free of charge http://info.scratch.mit.edu/Scratch_1.4_Download

The specimen task can be found at: http://www.ocr.org.uk/images/82531-programming-specimen.pdf (Second task on the document)

This can be adapted to best suit the candidates in a centre. It is the responsibility of the teacher to ensure that the task allows the candidate to demonstrate the full range of skills required.

Before setting candidates the task it is recommended that the teacher works through it themselves so they can anticipate any areas their students may find particularly challenging.

Commenting in Scratch can be done by clicking on the work area and selecting add comment
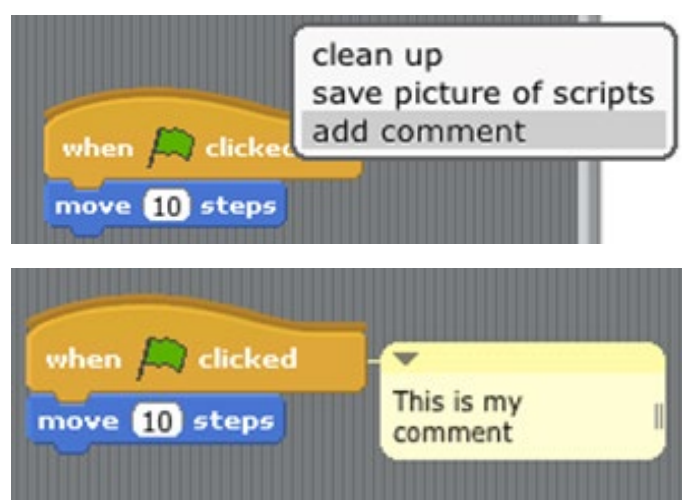
There is an expectation that Candidates will:
• plan a Scratch program to solve a given problem
• develop a program in Scratch according to the steps given in the task
• after each step test their program works, giving

evidence of it running
- once the program is complete test it and document their testing
- evaluate how well the program works

Specific Skills, Knowledge and Understanding
How to plan work:
Create a plan of the program they are to make. This could be done using flowcharts or pseudocode. It must be a design. It is not acceptable to present the completed solution or reverse engineered code as a plan.

How to use programming language to create an outcome:
Use constructs within Scratch to create a specified program. Specifically:
- outputting to the screen (this could be by making sprites speak, move or draw on the screen)
- storing data in and extracting it from variables
- the IF block
- iteration using the Repeat…Times or Repeat…Until block
- boolean block
- arithmetic blocks
- commenting

How to Test and Evaluate:
Test if the program works. Whilst testing at this level isn't expected to be exhaustive it should be enough to ascertain that the code works for any expected situations.

How to Give Evidence:
Give evidence of programs running. This could be video or screenshots. Print copies of their code either directly from Scratch or using screenshots.

Assessment
The Programming task is assessed in the same way whether it is solved using a text based language or Scratch.

It is important to keep in mind that not every candidate will be expected to produce a fully working solution. Near working and partial solutions can still get credit as described on the mark scheme.

There is no weighting placed on the efficiency of programs. If candidates have used the listed constructs to achieve the specified outcome, then they meet the criteria, regardless of efficiency.

Some candidates are likely to require more support than others. The level of support will determine the mark band the candidate is awarded. If a candidate requires some support in doing part of the task and then can demonstrate the same skill later on in the task with limited support they can then access the higher set of marks.

Evidence of code can be provided in the form of screenshots or code printouts.

Evidence of the programs running and testing can also be provided through screenshots, video or witness statements.
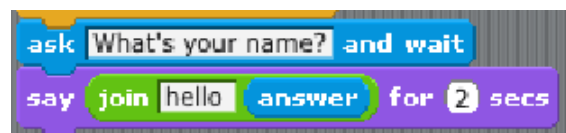
In Scratch, certain constructs can be used in more than one way. Providing the blocks used solve the given task, there is no preference as to which is used.

For example:
Storing input from a variable can be done in the following way:

This could be just as easily achieved by:

In the same way

are both equally valid ways of showing addition and can both be interpreted as statements that contain an arithmetic operator.

Scratch is developed by the Lifelong Kindergarten Group at the MIT Media Lab. See http://scratch.mit.edu

STRAND 2.3 TRENDS IN COMPUTING

Candidate Material

You will be looking at an area where changes have occurred in a computing technology. You need to show what you have found out. You can collect your research as a poster, leaflet, presentation or any other way your teacher allows. You will then present what you have found out to your teacher. You should try and use appropriate terms in your research.

1. (a) Choose a computing technology that interests you.
   (b) Describe the technology you have chosen.
   (c) Describe what changes have taken place in this technology.

2. (a) Find some examples of the technology you are looking at and describe what impact these examples have had.
   (b) Describe how these examples are different.

3. Technology can have social, ethical and legal effects. Describe two examples of these effects that your technology has had.

Overview
This unit requires candidates to look at changes in computing technology, how it has been used and the impact it has had. They will choose and research a computing technology and then present their findings to their assessor.

Candidates should be encouraged to find a topic that interests them. They may, however, need guidance to ensure they choose one that will allow them to access all the assessment criteria.

Examples candidates could look at include (but are not limited to):
- mobile phones
- Vvdeo games consoles
- social networks
- satellite navigation systems
- computer generated imagery
- online retail
- robotics
- computers in sports
- computers and music
- virtual reality
- language translation

Teacher Preparation and Instructions

Hardware	Standard Specification hardware requirements only, no additions required for this task. Candidates may wish to have access to a scanner and/or digital camera though these are not prerequisites for the task.
Software	Candidates may require access to presentation software or a desktop publishing package.

Guidance may need to be given to candidates as they are selecting their topic to ensure there will be opportunities to meet all the assessment criteria.

Presentation software, video and audio recordings are equally acceptable ways for candidates to present their findings. The evidence should be supported by witness statements detailing how the candidate has met the assessment criteria.

There is an expectation that Candidates will:
- describe a development in computing
- describe different examples of the use/application of that technology and their impact
- use technical terms when describing their development
- describe examples of ethical, social and legal considerations related to their chosen development

Specific Skills, Knowledge and Understanding
- find information from different sources
- summarise their findings using presentation or desktop publishing software
- understand the terms ethical, social and legal
- reference any sources they have used

Assessment Guidance
It should be kept in mind that the presentation is just the medium through which they are sharing their findings. Credit is for how well their research matches the assessment criteria and not for the quality of the presentation. Candidates should be advised to plan how they spend their time accordingly.

Witness statements should be used to support the presentation material as evidence. If a candidate hasn't met a criterion during a presentation, questioning could be used to probe their understanding of it. This must be recorded on a witness statement to provide evidence of the criterion being met.

GUIDANCE ON THE PRODUCTION OF THE OUTCOME

Completing the tasks

It is recommended that evidence is produced in several sessions, each focusing on a specific task within the overall task or scenario. These may be interspersed with opportunities to learn sector knowledge and develop appropriate practical skills.

Each candidate must produce individual and authentic evidence for each of the tasks.

Centres may give support and guidance to candidates. This support and guidance should focus on checking that candidates understand what is expected of them. It is not acceptable for centres to provide model answers.

In general, candidates must be guided on the use of information from other sources to ensure that confidentiality and intellectual property rights are maintained at all times. It is essential that any material directly used from a source is appropriately and rigorously referenced.

Presentation of work

Candidates must observe certain procedures in the production of assessments:
- screenshots, tables and graphs may be produced using appropriate ICT. These should be inserted into the written work at the appropriate place
- any copied material must be suitably acknowledged
- quotations must be clearly marked and a reference provided wherever possible

Work submitted for moderation or marking must be marked with the:
- centre number
- centre name
- candidate number
- candidate name
- unit code and title
- assignment title

Work submitted on paper for moderation or marking must be secured by treasury tags.

Work submitted in digital format (CD or online) must be in a suitable file structure as detailed in Appendix C of the specification.

RESOURCES

There are a huge number of resources on the web and these, of course, are changing all the time. In particular, teachers are reminded that groups such as CAS (Computers at School) and the American CSTA (Computer Science Teachers Association) http://www.csta.acm.org/ are active in putting members in touch with up to the minute and exciting resources to back up the teaching of what is perhaps the most vibrant subject available to students.

Raspberry Pi:
The official Raspberry Pi website has forums and updates on developments. It is also a great place to see what people have been creating with the Raspberry Pi.
www.raspberrypi.org

We have been working in collaboration with Raspberry Pi and with leading practitioners to create resources to support the use of the Raspberry Pi in the classroom. You will find tutorials, a series of Classroom Challenges, a Resources Link detailing suitable external resources relating to the Raspberry Pi, plus additional items on our website.
www.ocr.org.uk/raspberrypi

Hodder Dynamic Learning:
Hodder are the official publishing partners for OCR and have developed a dynamic learning website to support the GCSE Computing specification. It contains a range of resources covering all aspects of the specification.
http://www.dynamic-learning.co.uk

Susan Robson has produced a text book covering the theory elements of this course and it is available as a pdf site licence, a monochrome printed text book or a full colour printed text book from:
http://www.lulu.com/spotlight/susanjrobson

theteacher.info has a range of resources dedicated to GCSE computing including a text book, a website, tests and self-marking tests.
http://www.theteacher.info/index.php/gcse-computing

GCSEComputing.org.uk is a website containing a wide range of resources dedicated to this specification including coverage of the theory and controlled assessment units.
http://www.gcsecomputing.org.uk/

CS4Fn:
Free magazine and website from Queen Mary College, London.
http://www.cs4fn.org

Industry publications:
There are many industry magazines which put computing into a work related context. As well as many articles and features on contemporary issues, it is useful to look at the jobs sections to see what skills are actually in demand at the moment.
http://www.computerweekly.com/Home/

http://s0.2mdn.net/1651284/ctg_HDS_welcome.

http://www.computing.co.uk/

Computing at schools group:
Lots of support including teaching units for programming skills and other resources.
http://www.computingatschool.org.uk

Little Man Computer:
Just one of several online working demonstrations of how memory and the processor interact.
http://www.atkinson.yorku.ca/~sychen/research/LMC/LittleMan.html

Background reading for the more able students:
http://www.eecs.qmul.ac.uk/~pc/research/education/puzzles/reading/

http://courses.cs.vt.edu/~csonline/index.html

A visit to the **Bletchley Park Museum** always provides a stimulating background to the history and importance of computing.
http://www.bletchleypark.org.uk/

BBC BASIC for windows:
Easy to use programming language.
http://bbcbasic.co.uk

Computer Science Unplugged:
Set of exercises from Canterbury University in New Zealand.
http://csunplugged.com/

D F Stermole website:
Resources to support programming in various languages including Pascal, Java C etc plus an excellent introduction to key programming techniques in the Turing pages.
http://www.dfstermole.net/

Dick Baldwin:
Programming tutorials for various languages including some excellent SCRATCH tutorials.
http://www.dickbaldwin.com/

FreePascal:
Programming language
http://www.freepascal.org/

GameMaker:
http://www.yoyogames.com/gamemaker

Greenfoot:
Environment for introducing object oriented programming
http://www.greenfoot.org/index.html

Proganimate:
An interactive flowchart based visual problem solving tool and code generator. It is aimed at the basics of programming, problem solving and code reading skills.
http://www.comp.glam.ac.uk/pages/staff/asscott/progranimate/

Raptor:
Visual algorithm based application that allows students to create flowcharts that they can run and test.
http://www.usafa.af.mil/df/dfcs/bios/mcc_html/raptor.cfm

RoboMind:
Programmable robot environment
http://www.robomind.net/en/index.html

Scratch:
Great resource from MIT for introducing programming that uses colour coded snap together blocks to create sequences of instructions. A good starting point for developing the logical programming processes not hindered by the syntax barrier
http://scratch.mit.edu/

Python:
Python is a programming language that lets you work more quickly and integrate your systems more effectively. Python is an easy to learn programming environment.
www.python.com

For f**urther resources** to support teaching:
http://info.scratch.mit.edu/Educators

Small Basic:
A simple 3rd generation BASIC
http://msdn.microsoft.com/en-us/devlabs/cc950524.aspx

Visual Basic.net:
Standard free visual .net environment programming language and support.
http://www.microsoft.com/express/Windows/

Visual Basic Express books:
McGrath, M. Visual Basic Express in Easy Steps (2006) ISBN: 9781840783292

This is an excellent easy to follow introduction to the language.

Ford, J. Microsoft Visual Basic 2008 Express Programming for the Absolute Beginner (2009) ISBN: 978-1598639001

This is a more detailed book for those who want to go beyond the absolute basics of the language.

OTHER FORMS OF SUPPORT

In order to help you implement the new Entry Level Computing specification effectively, OCR offers a comprehensive package of support. This includes:

PUBLISHED RESOURCES

OCR offers centres a wealth of quality published support with a fantastic choice of 'Official Publisher Partner' and 'Approved Publication' resources, all endorsed by OCR for use with OCR specifications.

PUBLISHER PARTNERS

OCR works in close collaboration with three Publisher Partners; Hodder Education, Heinemann and Oxford University Press (OUP) to ensure centres have access to:

- Better published support, available when you need it, tailored to OCR specifications

- Quality resources produced in consultation with OCR Subject teams, which are linked to OCR's teacher support materials

- More resources for specifications with lower candidate entries

- Materials that are subject to a thorough quality assurance process to achieve endorsement

There is not an endorsed published textbook for the Entry Level Computing specification, however Hodder Education is the publisher partner for OCR GCSE Computing and the textbook for this specification can be used to aid the delivery of this qualification:

O'Byrne, S and Rouse, G. OCR Computing for GCSE (2012), ISBN: 978-1444177794

APPROVED PUBLICATIONS

OCR still endorses other publisher materials, which undergo a thorough quality assurance process to achieve endorsement. By offering a choice of endorsed materials, centres can be assured of quality support for all OCR qualifications.

ENDORSEMENT

OCR endorses a range of publisher materials to provide quality support for centres delivering its qualifications. You can be confident that materials branded with OCR's "Official Publishing Partner" or "Approved publication" logos have undergone a thorough quality assurance process to achieve endorsement. All responsibility for the content of the publisher's materials rests with the publisher.

These endorsements do not mean that the materials are the only suitable resources available or necessary to achieve an OCR qualification. Any resource lists which are produced by OCR shall include a range of appropriate texts.

OCR PROFESSIONAL DEVELOPMENT

The OCR Professional Development Programme offers more accessible and more cost effective training, with the same valued content that you expect from us.

At OCR, we are constantly looking for ways in which we can improve the support we offer to teachers. Most recently we have been considering the increasing challenges that schools face in releasing teachers for INSET, and how OCR can make its professional development programme more accessible and convenient for all.

From September 2012, our new improved programme will include:

- FREE online professional development units available when and where you want them

- FREE live web broadcasts of professional development events
- FREE face to face training for GCSE controlled Assessment and GCE coursework
- a series of 'not to be missed' premier professional development events

For more information, please email training@ocr.org.uk or visit www.ocr.org.uk/training

OCR SOCIAL

Visit our social media site http://www.social.ocr.org.uk. By registering you will have free access to a dedicated platform where teachers can engage with each other - and OCR - to share best practice, offer guidance and access a range of support materials produced by other teachers; such as lesson plans, presentations, videos and links to other helpful sites.

INTERCHANGE

OCR Interchange has been developed to help you carry out day to day administration functions online, quickly and easily. The site allows you to register and enter candidates online. In addition, you can gain immediate and free access to candidate information at your convenience. Sign up at https://interchange.ocr.org.uk

FREQUENTLY ASKED QUESTIONS

PROGRAMMING

Do I have to use the specimen task?
No, you may amend the specimen task or write your own. It is the teacher's responsibility to ensure that candidates have the opportunity to meet all assessment criteria.

Can candidates work in groups for this task?
No, candidates are expected to tackle this task individually.

What language should I for use the Programming task?
The choice of language is entirely up to the teacher. Providing it is capable of solving the task in a way that meets the assessment criteria, it may be used.

Can candidates solve the specimen text based programming task in Scratch?
Yes.

Do candidates have to complete the text and Scratch programming tasks?
No, students only need to complete either the text based task or the Scratch one.

CURRENT TRENDS

Can candidate work in groups for this task?
No, candidates are expected to tackle this task individually.

Is this controlled assessment?
No.

Contact us

Keep up to date with the latest news by registering to receive e-alerts at **www.ocr.org.uk/updates**

Telephone 01223 553998

Facsimile 01223 552627

Email general.qualifications@ocr.org.uk