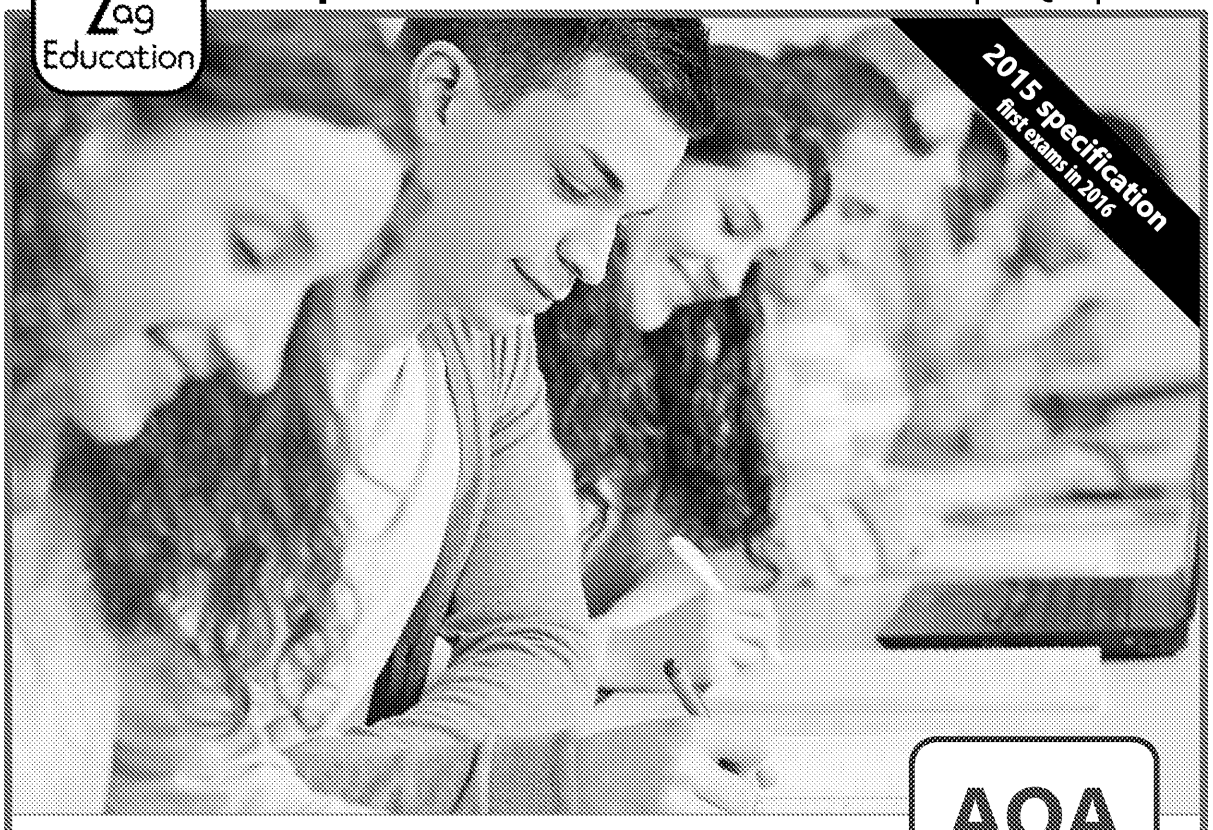
Zig Zag Education

Computer Science AS | AQA | 7516



AQA

Practice Exams

for AS AQA Computer Science Paper 2

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POD 6075

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Teacher's Introduction

This resource has been produced to help your students prepare for the examination of AS AQA Computer Science, Paper 2 (for examination May/June 2016 onwards). There are three practice question papers with supporting mark schemes.

The practice papers have been designed to cover a wide range of content across topics 5-9 of the subject content listed in the AQA specification (for first teaching September 2015).

The question papers and mark schemes are designed to be in a similar style to the AQA specimen assessment materials, to provide realistic exam practice. Photocopy-friendly versions of the question papers (without answer lines) are also provided for your convenience.

The papers can be used as a 'mock' examination; alternatively, individual questions can be set for recap/revision purposes. A specification grid has been included below, to help you see which topics have been covered where.

AQA Specification	Paper 1	Paper 2	Paper 3
3.5 – Fundamentals of Data Representation			
Number Systems	Q1	Q1	–
Number Bases	Q2	Q1	Q6
Units of Information	Q3	–	Q1
Binary Number System	Q2	Q1	Q6
Information Coding Systems	Q4	Q2	Q7
Representing Images, Sound & Other Data	Q6	Q5	Q1
3.6 – Fundamentals of Computer Systems			
Hardware & Software	Q9	Q8	–
Classification of Programming Languages	Q5	Q4	Q2
Types of Program Translator	Q5	–	Q2
Logic Gates	Q10	Q7	Q5
Boolean Algebra	Q10	Q7	Q5
3.7 – Fundamentals of Computer Organisation and Architecture			
Internal Hardware Components of a Computer	–	Q4	Q4
The Stored Program Concept	–	Q4	–
Structure & Role of the Processor & its Components	Q8	Q4	Q4
External Hardware Devices	Q6	Q6	–
3.8 – Consequences of Uses of Computers			
Individual, Social, Legal and Cultural Issues and Opportunities	Q11	–	Q1
3.9 – Fundamentals of Communication and Networking			
Communication	Q7	–	Q3
Networking	Q7	Q3	Q8

Name	

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AQA AS Computer Science
Paper 2 (7516/2)

Practice Exam 1

Instructions
- Write your name at the top of this page.
- Answer all questions in the spaces provided.
- You may use a calculator.

Information
- The marks for questions are shown in brackets.
- The maximum mark for this paper is 75.

1 Explain the difference between rational numbers and irrational n

Illustrate your answer with one example of each type of number

Explanation:

.....

.....

.....

.....

Example of a rational numbe

.....

le of an irrational number

.....

2 . 1 What is the decimal equivalent of the hexadecimal number F3?

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.....

2 . 2 10110101_2 is an eight bit two's complement binary integer. Wh

Show your working.

.....

.....

.....

.....

2 . 3 

01_2 is a fixed point binary number with three bits after th

State its decimal equivalent. Show your working.

.....

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.....

3 . 1 An audio format stores digitised sound by sampling at a rate of 4 comprising 32 bits.

How many **bytes** would be required to store a piece of music ex this format? Show your working.

.....

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.....

4 . 1 The ASCII code for the lower case character 'a' is 1100001_2.

Complete the table below.

Character	ASCII code
a (lower case)	1100001_2
g (lower case)	
T (upper case)	
Z (upper case)	1011010_2

4 . 2 An alternative to the ASCII character set is Unicode.

State **two** advantages that Unicode has over ASCII, and **one** di

Advantage 1:

.....

.....

Advantage 2:

.....

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ai tage:

.....

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Turn over for the next question

5 The following is a single instruction from an assembly program:

```
ADD rA, rB
```

5.1 Assembly is a low-level language. Explain what is meant by lov

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5.2 Using examples take[illegible] above assembly instruction, exp
terms **opcod[illegible]** **rand**.

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5.3 High-level languages can be translated using either interpreters
Explain the difference between an **interpreter** and a **compiler**.

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6 . 1 For each of the following data storage technologies, describe ho
the storage medium.

Optical:

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.....

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Magnetic:

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.....

.....

State:

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6 . 2 Define the term **compression**.

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6 . 3 Define the term **lossy** compression and state **one** file format tha

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Question 6 continues on the next page

6 . 4 Define the term **lossless** compression and state **one** file format compression.

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7 A networked office has a physical star topology but a logical bus

7 . 1 Explain the difference between logical topology and physical top

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7 . 2 Explain how a network with a physical star topology can also en

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7 . 3 Describe how checksum checks for errors in packets that travel

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7 . 4 An employee wishes to connect to the network wirelessly from v

State two pieces of hardware required for this connection.

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7 . 5 Two measures of data transfer across a netwo k are bit rate and

Define the term **baud rate.**

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7 . 6 Explain how it is possible that bit rate can be higher than baud r
at the same time.

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8 . 1 State the name and describe the purpose of each of **two** specia
used in the **fetch** phase of the fetch-execute cycle.

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8 . 2 During the fetch-execute cycle, an interrupt might occur.

Explain what happens when an interrupt occurs.

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9 . 1 Describe two roles of an operating system.

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9 . 2 State two advantages and one disadvantage of buying bespoke shelf software.

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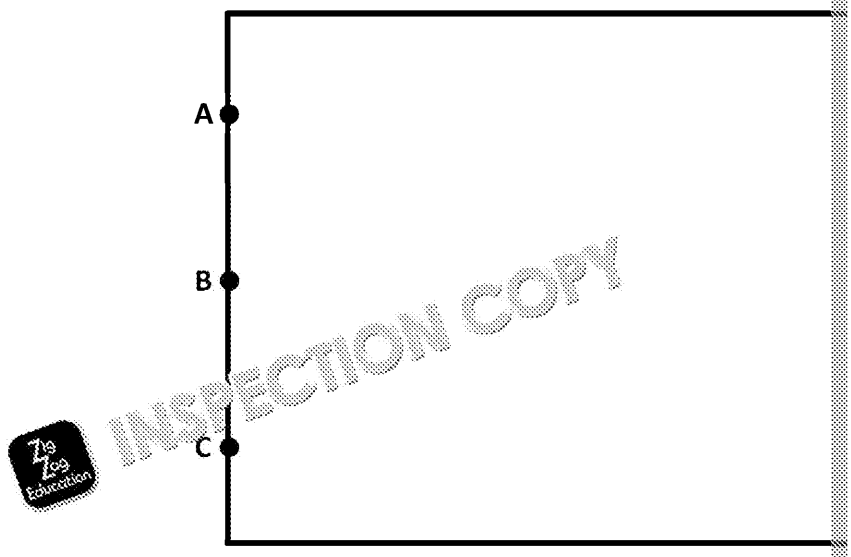
Turn over for the next question

10 . 1 Draw a logic circuit for the following Boolean expression:

$D = A.(B + C)$



10 . 2 Complete the truth table for the following logic gates.

OR Gate		
Input A	**Input B**	**Output**
0	0	
0	1	
1	0	
1	1	

XOR Gate		
Input A	**Input B**	**Output**
0	0	
0	1	
1	0	
1	1	

Turn over for the next question

11 . 1 Employers are increasingly making use of high-speed Internet c
to work from home, or telecommute. A company is considering
so that the norm for each employee who uses a computer will b
in the company's office.

In order to facilitate this, a large number of changes will need to
sure that all data required by such employees will be available,

Discuss the practical, legal and ethical issues that the company
working practices in this way.

Preview of Questions Ends Here

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Mark Scheme for Practice Exam 2

The following annotation is used in this mark scheme:

;	single mark
//	alternative response
/	alternative wording
A	acceptable answer
R	reject answer
NE	not enough
DPT	in some questions a specific error made by a candidate, if repeat gain more than one mark. The DPT label indicates that this mista candidate losing one mark on the first occasion that the error is m remains understandable, subsequent marks should be awarded a repeated.

1	1	**All marks for AO2 (apply)** **1 mark:** for division of 185 by 16 to reach 11 or B for first digit **1 mark:** for correct answer: B9
1	2	**All marks for AO2 (apply)** **1 mark:** subtracting values in turn from 107: -128, 16, 4, 1 **A:** any suitable alternative means of deriving the answer, as long as **1 mark:** for correct answer: 10010101_2 (also accept 10010101, with
1	3	**All Marks for AO2 (apply)** **1 mark:** for correct answer: 11110101_2 (also accept 11110101, with
1	4	**All Marks for AO1 (understanding)** **1 mark:** whole numbers / integers of zero or above **A:** Above zero instead of zero and above **1 mark:** Valid example – 0, 1, 2, 3, etc. Must be non-negative.
1	5	**Marks for AO1 (understanding)** **1 mark:** A rational number is one that can be written as a ratio / fra **1 mark:** *rational: any number written as a fraction or* a ratio, e.g. ½

2	1	**All marks for AO1 (understanding)** **2 marks:** ASCII requires less storage space per character than Uni ASCII uses seven bits /a/ one byte /a/ 8 bits per character, Unicode represent more / characters / alphabets than ASCII
2	2	**All marks for AO2 (apply)** **1 mark:** 1100001_2 (also accept 1100001, with or without spaces) **1 mark:** 1100101_2 (also accept 1100101, with or without spaces)
2	3	**All marks for AO2 (apply)** **1 mark:** for attempting a binary subtraction of 32, or a conversion o decimal and subtraction of 32, even if result is incorrect **1 mark:** for correct answer: 1000111_2 (also accept 1000111, with o

3	1	**All marks for AO2 (analyse)** A collision would be detected by both A and B // Each machine wou period of time // data would be re-sent // the process would repeat u received by both the server and the printer **Maximum 3 marks**
3	2	**All marks for AO1 (recall)** **1 mark:** Peer-to-peer **1 mark:** advantage: no network operating system required // less sp required // easier to set up // no need for an expensive ser could not disrupt the network significantly **1 mark:** disadvantage: no central backing up of data // reliance on a logical file structure / naming convention // security is decen weaker // a user's machine may have widely varying network acces users downloading from their machines
3	3	**Mark for AO1 (understanding)** **1 mark:** the same bandwidth is divided up among more users // ea bandwidth is reduced

4	1	**All marks for AO2 (analyse)** Marks can only be awarded if descriptions relate to the greenhouse descriptions of components are worth no marks. **1 mark:** Processor: to compare the current temperature with thresh 25 degrees // to determine when to open or close the windows **1 mark:** Main memory: to store threshold values / 22 / 25 // to main / window open and close times // to store the instructions for the pr **1 mark:** Control bus: to carry a write instruction to main memory w a read instruction to memory when accessing threshold values **1 mark:** Data bus: to carry threshold values / 22 / 25 from main me carry temperature data / window open and close logs from the proc **1 mark:** address bus: to carry address location where temperature close logs will be saved to // to carry ad lo ation where thresh retrieved from **2 marks:** one for input, on for output to read input data from the s instructions to oper s the motor
4	2	**Mark for ( ) (knowledge)** **1 mark:** A language based on the instruction set of the computer / p guage in which one instruction translates directly to one instruct instruction set / … is already one instruction in the machine's instru
4	3	**All marks for AO1 (understanding)** **2 marks:** advantages: low-level language programs generally exec ports and registers can be written to / read from **2 marks:** disadvantages: different machines have different architec assembly // more difficult to learn // more difficult to find a program level // less support exists for low-level languages // you need to be computer architecture

4	4	**All marks for AO3 (programming)**
		
		`CMP RT, #25`
		`BLT endif1`
		`STR RO, #1`
		`endif1:`
		`CMP RT #22`
		`BGT endif2:`
		`STR RO, #0`
		`endif2:`
		`HALT`
		
		1 mark: for first comparison
		1 mark: for branching statement and point ich can be named
		1 mark: for storing value in RO
		1 mark: for second comparis
		1 mark: for branchin n t and pointer
		R: if second po ha ame name as first pointer
		DPT: if f ng mark was not awarded because BGT was u
		T awarded a mark here
		1 mark: for storing value in RO

4	5	**All marks for AO1 (recall)** **1 mark:** instructions/programs stored in main memory/RAM with d memory can be interpreted as instructions or data **1 mark:** Instructions/program can be replaced by loading another p into memory **1 mark:** programs/instructions are run by fetching, decoding and e sequence

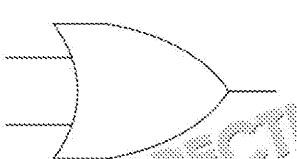
5	1	**All marks for AO2 (apply)** **1 mark:** (1200 * 1600 * 24) / 1000 = 46080 **1 mark (DPT):** 46080 / 8 = 5760 kilobytes 2 marks can be awarded if the correct answer is reached via a suit calculation, provided that working is shown
5	2	**All marks for AO1 (recall)** **1 mark:** definition: data that describes the file // data that describes of the file that is not part of the image itself **1 mark:** example: height // width // resolution // number of pixels // compression type // file type // user who created/last edited the file

6	1	**All marks for AO1 (knowledge)** **2 marks:** description of RFI nsceiver contained within the read signal // the signal a to RFID tag // which transmits a unique s **Maximum** **1 mark:** advantage: do not require line of sight // can be scanned w nes or wallet // less susceptible to damage than other technique **1 mark:** disadvantage: more expensive to implement than barcode might be subject to collision / multiple RFID tags could be within ra // there is not necessarily a secondary means of registration if tag is **2 marks:** description of barcode scanning: barcode printer (along with (such as an ID card) // barcode readers fire a laser at the barcode // in measured // to determine whether each section is a bar or a space be **Maximum 2 marks** **1 mark:** advantage: cheap/easy to implement // barcodes do not re damaged barcode can have its number manually entered // replaci / easy **1 mark:** disadvantage: requires line of sight to scan // easily replica

7	1	**All marks for AO1 (knowledge)** **1 mark:** no mistakes

OR Gate		
Input A	Input B	Output
0	0	**0**
0	1	**1**
1	0	**1**
1	1	**1**

1 mark:



7	2	**m for AO2 (apply)** $A.B.(A + \overline{B})$ $A.B.A + A.B.\overline{B}$ Expansion of brackets $A.B + A.B.\overline{B}$ Use of A.A = A $A.B + FALSE/0$ Use of B.NOT(B) = false/0 **1 mark:** Final answer: A.B **Maximum 2 marks for working**

7	3	**All marks for AO2 (apply)** $\overline{X}.(X+Y).(X+Y)$ $\overline{X}.(X.X+X.Y+Y.X+Y.Y)$ Expansion of brackets $\overline{X}.X.X+\overline{X}.X.Y+\overline{X}.Y.X+\overline{X}.Y.Y$ Continued expansion $0+0.Y+Y.0+\overline{X}.Y$ Use of X.NOT(X) = false/0 $0+0+0+\overline{X}.Y$ Use of 0.Y = 0 **1 mark:** Final answer $\overline{X}.Y$ **Maximum 2 marks for working**

8	1	**All marks for AO1 (knowledge)** **1 mark:** Antivirus / malware // backup software / clean up // compr debuggers // defragmentation // file mar / network utilities // s **A:** any valid utility program **1 mark:** Purpose of utility – describe what the utility does, e.g. anti removes harm ff e.g. defragmentation: speeds up disk ac monitors s e user to check RAM / CPU usage / network con if i not match stated utility software ark: Operation of utility – describe how the utility works, e.g. an with profiles of known malware // updates virus dictionary regularly behaviour of files; e.g. defragmentation: moves parts / fragments o another // identifies when a single file is stored in multiple physical monitors: RAM percentage is updated when data is loaded into / u usage is calculated by dividing utilised time slices by available time connectivity is monitored by dividing actual network traffic by availa **A:** any valid explanation of how the utility program performs its prin **R:** if it does not match stated utility software
8	2	**All marks for AO1 (3 x understanding; 6 x knowledge)** ***Resource management*** **1 mark:** definition of resources as any two or more of: processor / memory / backing store / IO devices / network access **2 marks:** explanation of resource management: processor time allo process priority // processes that need to be run being loaded into removed from main memory when they no longer need to be there extracted from backing store and loaded into main memory // data allocated a physical location on backing store // indexing of backing capacity for creating / editing files / folders / directories on backing devices (such as printers) to establish readiness state // providing a queuing/buffering incoming/outgoing data // checking network avail access according to priority / queue / multiplexing **Maximum 2 marks; Maximum 1 mark per resource** ***Virtual Machine*** **1 mark:** definition of virtual machine: operating system isolates / bu complexities of) the hardware **2 marks:** descriptions of services a virtu ine would provide: backing store displayed for the use as system of directories/folde hardware activities (such a ing a drive to spin up to speed) clicking on the drive / be partitioned and different partitio operating sys different drives // files and programs can be re moving f ograms is simplified to the point of dragging from on mm to be entered into the system more closely resemble na hine code // **any** machine function that has been translated to a human user (this list is not exhaustive) **Maximum 2 marks** ***Device Drivers*** **1 mark:** definition of device driver: a piece of software that allows c the computer and a peripheral **2 marks:** description of how an OS would manage device drivers: piece of hardware under installation // searching for existing drivers plugged in / attached to the computer // removing drivers for hardw opening/accessing/using the driver when the device is needed **Maximum 2 marks**

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Computer Science
(7516)

Mark Scheme for Practice Exam 3

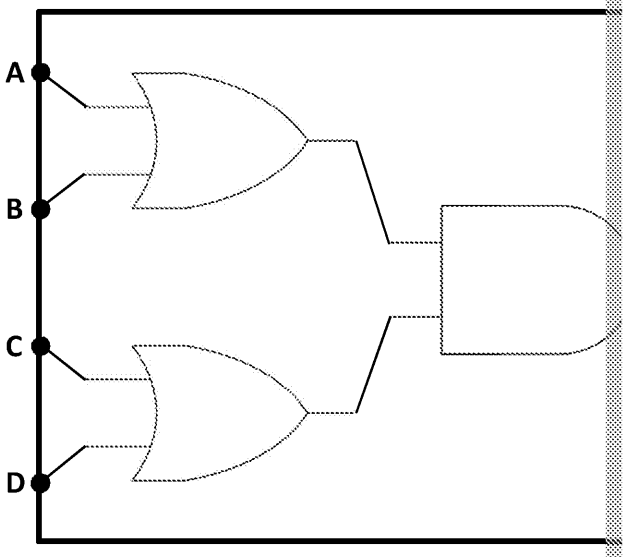
The following annotation is used in this mark scheme:

;	single mark
//	alternative response
/	alternative wording
A	acceptable answer
R	reject answer

01	1	**All marks for AO2 (apply)** **1 mark:** Any calculation, even if incorrect, in which the candidate m 1,024 or 1.024 **1 mark:** for correct answer: 1953
01	2	**All marks for AO2 (apply)** **1 mark:** 1920 * 1000 (for bytes) * 8 (for bits) / 24: any three of these used for the first mark **1 mark:** for correct answer: 640,000
01	3	**All marks for AO1 (recall)** **3 marks:** one for each correctly listed or de ed: height // width // resolution // numbe ix // data taken // file siz file type // user who created/la di ne file // colour depth // pale
01	4	**Mark for AO1 (re)** ng data to make it unintelligible to anyone other than encryption key to make data unreadable to anyone within ncoding
01	5	**All marks for AO1 (knowledge)** **2 marks**: advantages: illegal activities / terrorist threats can be dete be monitored / have intelligence gathered on them // national intere **Maximum 2 marks** **2 marks**: disadvantages: government can misuse data / go beyond privacy is invaded // commercial secrecy can be breached // diplom harmed **Maximum 2 marks**
01	6	**2 marks for AO1 (knowledge); 1 mark for AO1 (understanding)** **2 marks (knowledge):** sequences of a single colour are identified; once, along with how many times (in a row) it occurs **1 mark (understanding):** effective for images with large sequence as icons/logos

02	1	**Mark for AO1 (knowledge)** **1 mark:** different machines have different architectures / versions c to learn // more difficult to find a programmer who can write low leve low-level languages // you need to be familiar with a particular com
02	2	**All marks for AO3 (programming)** STR R1, R3 STR R2, R1 STR R3, R2 use of opcode str (even if only used once) use of RX register as a temporary store area **rk:** for completely correct answer, which would be either as ab of RA switched with all instances of RB

02	3	**All marks for AO1 (understanding)** **3 marks:** Compilers generate object code, while interpreters do not compilers produce object code while interpreters translate line-by-li compiled code executes more quickly than interpreted code; once a compiler has produced object code, it can be run repeatedly must re-translate each time it is run; a compiler will not compile source code that contains syntax errors syntactically valid parts of a program that contains some errors **Maximum 3 marks** **1 mark:** advantage of interpreter: does not require program to be c allows testing of code that is incomplete or contains errors // errors encountered are easier to resolve // progra[illegible]cution can be inter **R:** Any point for which a mark was a[illegible] the three-mark sectio **1 mark**: advantages [illegible] compiled code runs more quickly t compilers can [illegible] object code that is more efficient // compilati happen [illegible] compiled code does not require the end machine to [illegible] compiler **A.** compiled code is more straightforward to [illegible]y point for which a mark was awarded in the three-mark sectio
03	1	**Mark for AO1 (recall)** **1 mark:** a connection that transmits one bit at a time
03	2	**All marks for AO2 (knowledge)** **2 marks:** parallel connections are only effective over short distance likely over a serial connection (or more likely over a parallel connec connection is cheaper to manufacture (or more expensive for parall
03	3	**Mark for AO1 (recall)** **1 mark:** (synchronous transmission) transmits data according to the clock
03	4	**All marks for AO1 (knowledge)** **1 mark:** a stop bit is a bit (or a sequence of bits) that marks the enc **A:** ... marks the end of a character **1 mark:** because transmission is regulated externally, the time at w is known to the receiving device // transmission is set to stop at a ce
04	1	**All marks for AO1 – 3 marks for knowledge; 3 marks for unders** **Descriptions: knowledge; examples; understanding** **1 mark:** The data bus carries data f[illegible] the CPU to be written into m data/instructions read from me[illegible]y to the CPU **1 mark:** For the exam[illegible] of having a [named specific] value // rea any specific p[illegible]l **1 mark:** The address bus carries the memory location of the data to [illegible]emory **1 mark:** For the example: e.g. a value that has been read and modi stored in a particular location – the address bus communicates that amplification or clarification of the first mark can gain the second ma **1 mark:** The control bus carries signals to tell other components wh **1 mark:** For the example: e.g. read // write // delete // etc.

04	2	**All marks for AO1 (understanding)** **2 marks:** cache memory capacity: stores data/instructions that are accessing cache memory is faster than accessing any other memor the more data/instructions can be accessed more quickly **Maximum 2 marks** **1 mark:** defining word length: the number of bits a processor can op // number of bits/size of each register in the CPU // number of bits th within the computer at one time **1 mark**: explanation: a higher word length allows faster internal tran calculations on larger data items to take place faster // requires fewe process larger data items **2 marks:** number of cores: a core is a component of the processor and performs calculations // multiple cores (dual core/quad core) allo the same time // the more cores a computer has, the more processes simultaneously **Maximum 2 marks** **1 mark:** clock speed: the speed at which a computer operates me per second // execution of an instruction can only begin on a pulse/at higher clock speed allows more instructions to be executed (per sec **Maximum 2 marks**
05	1	**All marks for AO2 (apply)**  **1 mark:** A and B connected to **or** gate **1 mark:** C and D connected to **or** gate **1 mark:** Each of the first two gates, wh[illegible] onnected correctly or incorrectly **and** gate
05	2	**All marks for AO2 (apply)** $(A + B).(A + B)$ $A.A + A.B + \overline{A}.A + \overline{A}.B$ Expansion of brackets $A.B + \overline{A}.B$ Use of NOT(A).A = 0/false $A + B$ Removal of redundant clause **1 mark:** Correct answer: A + B **Maximum 2 marks for working**

05	3	**All marks for AO2 (apply)** $\overline{X}.(X+Y).(X+\overline{Y})$ $\overline{X}.(X.X+X.Y+X.\overline{Y}+Y.\overline{Y})$ Expansion of brackets $\overline{X}.X.X+\overline{X}.X.Y+\overline{X}.X.\overline{Y}+\overline{X}.Y.\overline{Y}$ Continued expansion $0+0+0+0$ NOT(X).X = 0/false NOT(Y).Y = 0/false **1 mark:** Correct answer: 0/false **Maximum 2 marks for working**

06	1	**All marks for AO2 (apply)** **1 mark:** answer comprising (any) positive number **1 mark:** correct answer: 117
06	2	**All marks for AO2 (apply)** **1 mark:** answer comprising (any) negative number **1 mark:** correct answer: -75

06	3	**All marks for AO2 (apply)** 10001001_2 (also accept 10001001, with or without spaces) **1 mark:** sign bit **1 mark:** following seven bits (spacing unimportant) **R:** if not 8 bits
06	4	**All marks for AO2 (apply)** 00111100_2 (also accept 00111100, with or without spaces) **2 marks:** one mark per nibble (spacing unimportant)
06	5	**Mark for AO2 (apply)** 127
06	6	**Mark for AO1 (understanding)** **1 mark:** overflow // not enough bits to store response // result would

07	1	**All marks for AO1 (knowledge)** **1 mark:** it is set to either 1 or 0 to ensure that the total number of 1s parity bit, there will be an odd number of 1s **1 mark:** receiving device checks that incoming data contains the co
07	2	**All marks for AO2 (apply)** **1 mark:** 1[0] **1 mark:** 100001**[0]**
07	3	**First mark for AO1 (knowledge); second for AO2 (apply)** **1 mark:** If two bits (or any even number) are transmitted incorrectly maintained / there will still be an odd number of 1s / there will still be the data is correct. **1 mark:** Any bit pattern where an even number of bits are changed. e.g. 10101011 (sent) 1111011 (received)

08	1	**All marks for AO1 (understanding)**

Level	Description
3	A detail description has been written, which indicates a comprehensive understanding of both SSI and WPA. F each technology, the candidate has covered the majori the points laid out below. The answer is sufficiently wel structured to demonstrate how the two technologies are related. QWC: The quality of written communication is good; wr legible, ideas are communicated clearly and fluently, sentences follow one another coherently and appropria specialist vocabulary has been There are few, if errors in spelling, punct grammar.
2	An adequate d or overing a range of points fro lists bel a.didate has demonstrated some g of each of the technologies, although the have a comprehensive understanding, or they may demonstrate an awareness of how the technologies interrelate. QWC: Text is legible and meaning is clear; ideas are communicated clearly with occasional lapses; sentence paragraphs are linked; specialist vocabulary has been u correctly; there may be occasional errors in spelling, punctuation and grammar.
1	A small number of points have been made that demons recall rather than understanding. There are significant fundamental gaps. **Or** The candidate has demonstrated knowledge of a Level standard, but only in any significant way for one of the t technologies. QWC (in either case): most text is legible; forms of expr are deficient but can still be understood; paragraphs ma always be well connected; specialist vocabulary has no successfully employed; there are significant errors in sp punctuation and grammar.

Service set identifier (SSID)

- A service set identifier is a locally unique identifier for the wi
- In order to access the network, a wireless client machine m
- The SSID is a 32-character alphanum code which acts a

Wi-Fi protected access

- Allows encrypti ent across the wireless network
- Client m nes the network must have an encryption ke
- the s
- encryption key can change over time for added security
- Users must enter a passphrase as well as having a **corresp**
- More secure than its predecessor, WEP (wired equivalent p

Preview of Answers Ends Here