

Examiners' Report
June 2016

GCSE Computer Science 1CP0 01

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Introduction

This is the second time that candidates have sat for examinations in this unit, which requires them to demonstrate an understanding of

- problem solving and programming;
- data, both representation and manipulation;
- computers as devices and conceptual models
- digital communications and the Internet; and
- the impact that computing technology has on society.

This untiered paper has been specifically designed so that easier questions are more prevalent earlier in the paper, with gradually more challenging questions later on. However, candidates across the ability range will find questions that are both challenging and interesting throughout.

Candidates are introduced to a context for each question. Unless instructed otherwise, candidates should apply this context when developing responses. Additionally, candidates will find that 'command words' are used consistently in the paper to indicate the type of response expected.

Examiners saw many detailed responses. However, candidates often provided little more than simple statements and did not include examples and reasons where expansions or explanations were required. It is imperative that in a technical subject, the correct terminology be used and that sufficient detail be given to demonstrate understanding.

The specification contains items that candidates were seen to confuse. These include:

- Global variables and local variables
- High-level programming languages and low-level programming languages
- Virtual machines and virtual reality
- Libraries for code and databases for data
- Stored program concept and secondary storage

Question 1 (a) (i)

Many candidates were able to express the required idea of communication. Some marks were lost due to vague responses or responses that indicated specific protocols, such as TCP/IP.

1 (a) Computer networks are valuable to many businesses and individuals.

(i) State the purpose of network protocols.

(1)

It protects your data and files.



ResultsPlus
Examiner Comments

This response lacks detail. It earns no marks.

1 (a) Computer networks are valuable to many businesses and individuals.

(i) State the purpose of network protocols.

(1)

They act as rules so that the devices on the network can communicate.



ResultsPlus
Examiner Comments

This response earns full marks.

Question 1 (a) (ii)

This question was not answered well. Many candidates gave the name of a specific type of network media, such as 'fibre'.

Question 1 (a) (iii)

This question was answered well.

Question 1 (b) (i)

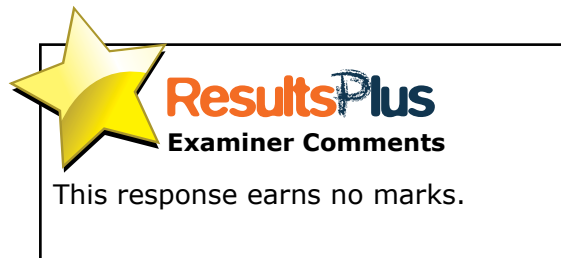
This question was well answered. Many responses incorporated the concept of hacking as an illustration. However, candidates are reminded that encryption cannot physically prevent hacking.

(b) Data transmitted over a network is sometimes encrypted.

(i) State **one** reason why data encryption is used on a network.

(1)

So nobody can hack the data stored in the network



(b) Data transmitted over a network is sometimes encrypted.

(i) State **one** reason why data encryption is used on a network.

(1)

If it were to be intercepted, one
could not be read without one key.



Question 1 (b) (ii)1

This question was answered well.

Question 1 (b) (ii)2

This question was not answered as well as the first part of the question.

uejwnw uejwnw	-2	zglypw
-----------------------------	----	--------

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	origin
x	y	Z	A	B	C	d	E	f	g	h	I	J	k	l	m	n	o	p	q	r	s	t	u	v	w	+3
C	d	E	f	g	h	I	J	K	L	M	N	O	P	q	r	s	t	u	v	w	x	y	Z	A	B	-2



ResultsPlus
Examiner Comments

This response uses the ciphertext as plaintext and applies a - 2 shift. It earns no marks.

Question 1 (c) (i)

This question was answered well.

(c) Binary numbers are used to represent data in programs.

(i) Complete the table by adding these two positive 8-bit binary integers.

(1)

0	1	1	1	0	0	1	0
0	0	1	0	0	0	1	1
0	1	0	1	0	1	0	1



ResultsPlus
Examiner Comments

This response does not carry the final 1 from the addition. It earns no marks.

Question 1 (c) (ii)

This question was answered well by many candidates.

(ii) Convert the 8-bit binary 01101110 to hexadecimal.

Handwritten student work for Question 1 (c) (ii). On the left, a table for binary-to-decimal conversion is shown with columns for powers of 2 (128, 64, 32, 16, 8, 4, 2, 1) and rows for bits (0, 1, 1, 0, 1, 1, 1, 0). The table is crossed out. In the middle, a calculation is shown: $2 + 4 + 8 + 32 + 64 = 109 = 6D$. On the right, a table for binary-to-hexadecimal conversion is shown with columns for powers of 16 (8, 4, 2, 1) and rows for bits (0, 1, 1, 0, 1, 1, 1, 0). The right side of the table is marked with (1) and the results 0=6 and 0=D.



ResultsPlus Examiner Comments

Although this response correctly interprets the four bits on the right, the incorrect letter representation has been used. It earns no marks.

Question 1 (c) (iii)

As might be expected, this question was answered as well as the previous subpart.

(iii) Convert the hexadecimal number C4 to 8-bit binary.

Handwritten student work for Question 1 (c) (iii). On the left, a table for hexadecimal-to-binary conversion is shown with columns for hexadecimal digits (1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C) and rows for binary bits. The table is crossed out. In the middle, a calculation is shown: $12 \times 16 + 4 = 208 = 11010000$. On the right, a table for hexadecimal-to-binary conversion is shown with columns for hexadecimal digits (12, 4) and rows for binary bits (1, 0, 1, 1, 0, 0, 1, 1, 0). The right side of the table is marked with (1) and the result = 10110010.



ResultsPlus Examiner Comments

This response shows that each set of 4-bits needs to be identified, but has numbered the scale the wrong way around. It earns no marks.

Question 1 (c) (iv)

This question was not answered well.

(iv) Write an arithmetic expression to show that 256 different numbers can be represented in 8 bits.

(1)

$$128 + 64 + 32 + 16 + 8 + 4 + 2 + 1 = 256$$

| | | | | | | |



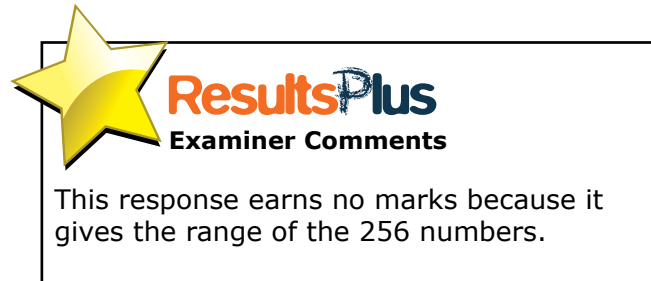
ResultsPlus
Examiner Comments

This response earns no marks.

(iv) Write an arithmetic expression to show that 256 different numbers can be represented in 8 bits.

(1)

$$0-255$$



ResultsPlus
Examiner Comments

This response earns no marks because it gives the range of the 256 numbers.

(iv) Write an arithmetic expression to show that 256 different numbers can be represented in 8 bits.

(1)

$$2^8 = 256$$



ResultsPlus
Examiner Comments

This response earns full marks.

Question 1 (d) (i)

This question was answered well by many candidates.

It is usually quite small



ResultsPlus
Examiner Comments

It is unclear what is small. It could be the algorithm or the file resulting from the application of the algorithm. This response earns no marks.

& it will always remember the data



ResultsPlus
Examiner Comments

This response may have confused 'lossy' with 'lossless'. It earns no marks.

It loses unnecessary data
to make the file smaller.



ResultsPlus
Examiner Comments

This response earns full marks.

Some of the detail / quality in the file can
be lost.



ResultsPlus
Examiner Comments

This response earns full marks.

Question 1 (e)

This question was answered well by many candidates. However, some lost marks due to reversing the coordinates or missing one of the values.

~~Ex~~ -2,3



ResultsPlus
Examiner Comments

This response earns 1 mark.

$\begin{matrix} x & y \\ (2, & 0) \end{matrix}$



ResultsPlus
Examiner Comments

This response earns 1 mark.

Question 2 (b) (ii)

Some responses did not use the appropriate terminology, but earned marks because they expressed the equivalent concept.

Many candidates remembered terminology from Computer Science, but not always the terminology that could be applied to the pseudocode in this question.

Subprograms.



ResultsPlus
Examiner Comments

This response earns no marks.

Algorithm



ResultsPlus
Examiner Comments

This response earns no marks.

Add notes



ResultsPlus
Examiner Comments

This response earns full marks.

Question 2 (b) (iii)

It is important for candidates to understand the different parts of a subprogram definition, including the name and the parameters. Many candidates could distinguish the parts of the subprogram header.

(iii) State the name of the subprogram shown in the pseudocode.

(1)

FUNCTION cubeNum.



ResultsPlus

Examiner Comments

This response has included part of the subprogram header, which does not answer the question. It earns no marks.

(iii) State the name of the subprogram shown in the pseudocode.

(1)

While



ResultsPlus

Examiner Comments

This response earns no marks.

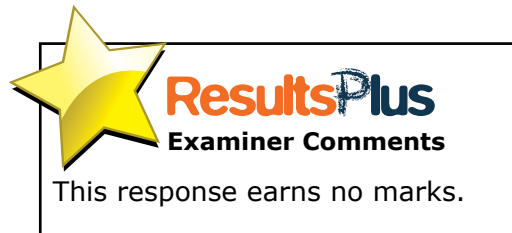
Question 2 (b) (iv)

It is important that candidates understand how the blocking of code is implemented. Many candidates included a range of lines in their response, but others only identified the first line of the selection statement.

(iv) State the range of line numbers that show a selection statement.

(1)

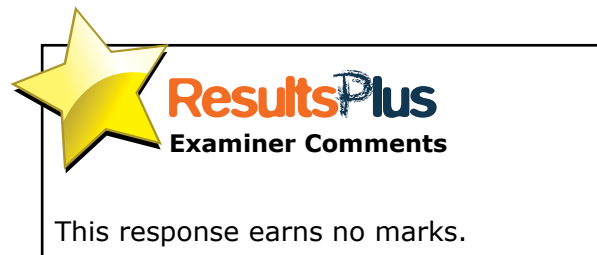
~~19, 27, 28~~ 10, 11



(iv) State the range of line numbers that show a selection statement.

(1)

18



Question 2 (b) (v)

This question was not answered well. Many candidates reversed the answers to (v) and (vi).

(v) State a line number on which the variable `aNum` is a local variable.

(1)

23



ResultsPlus
Examiner Comments

This response demonstrates the confusion between global and local variables. It earns no marks.

Question 2 (b) (vi)

This question was not answered well. Many candidates reversed the answers to (v) and (vi).

(vi) State a line number on which the variable `aNum` is a global variable.

(1)

25



ResultsPlus
Examiner Comments

This response demonstrates the confusion between global and local variables. It earns no marks.

Question 2 (c) (i)

Although this was a challenging question, many candidates answered it well. Computational thinking, specifically pattern recognition, could be applied to this question.

(c) Charles is preparing to write program code.

- (i) Complete the table to show the place value of the 1s to the right of the decimal in this binary real number.

(3)

Place value	4	2	1	.	16	8	4	2	1
	0	1	0	.	1	1	0	0	0

Convert this binary real number to denary.

25

24x1



ResultsPlus
Examiner Comments

This response earns no marks.

(c) Charles is preparing to write program code.


- (i) Complete the table to show the place value of the 1s to the right of the decimal in this binary real number.

(3)

Place value	4	2	1	.	1	2	4	8	16
	0	1	0	.	1	1	0	0	0

Convert this binary real number to denary.

2.3



ResultsPlus
Examiner Comments

This response earns no marks.

(c) Charles is preparing to write program code.

(i) Complete the table to show the place value of the 1s to the right of the decimal in this binary real number.

(3)

Place value	4	2	1	.	$1/2$	$1/4$			
	0	1	0	.	1	1	0	0	0

Convert this binary real number to denary.

2.53



ResultsPlus
Examiner Comments

This response earns 1 mark for '1/2'.

(c) Charles is preparing to write program code.

(i) Complete the table to show the place value of the 1s to the right of the decimal in this binary real number.


(3)

Place value	4	2	1	.	$1/2$	$1/4$			
	0	1	0	.	1	1	0	0	0

Convert this binary real number to denary. 10^3

10^3

1000.0011



ResultsPlus
Examiner Comments

This response earns 2 marks for '1/2' and '1/4'.

Question 2 (c) (ii)

This question was answered well.

Question 2 (c) (iii)

This calculation presented many challenges for the candidates. Many were able to construct expressions that attempted to calculate parts of the required total calculation. Few candidates were able to construct the required expression in its entirety.

~~transmission of file~~ transmission = $\frac{\text{file size}}{\text{time taken}}$

$$\frac{10 \times 1024}{10} = \frac{10240}{10} = 1024 \text{ kb}$$

~~10/1024~~ ~~10/1024~~



ResultsPlus

Examiner Comments

Part of top calculation and part of bottom calculation, are provided, but not enough to earn marks.

$$\text{transfer rate} = \frac{10 \times \text{byte} \times 1}{3}$$

$$\frac{10 \times 1024 \times 8 \times 1}{10}$$



ResultsPlus

Examiner Comments

The top part of the equation has been expressed correctly. This response earns 1 mark.

$$100 \times 10 = 1000$$

$$\textcircled{0.001}^{(2)}$$

$$\frac{10000}{10} = 1000$$

$$\frac{10000}{1000} = 10$$

$$\frac{1}{1000} = 0.001$$



ResultsPlus

Examiner Comments

This response attempts to show an expression, but the presentation is difficult to follow. As there are no identifiable combination of numbers, it earns no marks.

Question 3 (a)

There was some confusion between how an operating system organises files using a hierarchy, folders and directories with how a GUI or a directory listing shows the files.

3 Shaneela is designing and coding a website. The files she creates will be stored on a computer.

(a) File management is a function that an operating system performs.

Describe how an operating system organises files.

(3)

An operating system stores files in a folder hierarchy system, with parent and child folders. They can be ordered by name, date of creation, types of files etc. in both ascending and descending formats. It also organises files into their locations on the hard disk.



ResultsPlus
Examiner Comments

This response has earned 2 marks for 'hierarchy system' and 'folders'.

Operating systems are the most important piece of software in a computer, they manage files in folders to keep them organised and to make them easy to find.



ResultsPlus
Examiner Comments

This response earns 1 mark for 'manage files in folders'.

An operating system organises files via size, alphabetical order and/or date modified.



ResultsPlus
Examiner Comments

This response earns no marks.

3 Shaneela is designing and coding a website. The files she creates will be stored on a computer.



(a) File management is a function that an operating system performs.

Describe how an operating system organises files.

(3)

It organises the files using a hierarchical structure. It simply ~~starts~~ searches for a file by starting at the top most folder, called the ~~root~~ root node. Then it works its way down the ~~second~~ second row ~~and~~, which is called a subdirectional; and then the last row to ~~the~~ find a file.



ResultsPlus
Examiner Comments

This response provides sufficient detail and earns full marks.

Question 3 (b) (i)

Some responses incorporated details that did not address the question.

But they would be able to find it in the
www and would be able to use the
pages.



ResultsPlus
Examiner Comments

This response is very high level and is too vague to earn marks.

They will go onto a server that users
can access. They will have a personalised
login so only clients will be able
to access it.



ResultsPlus
Examiner Comments

This response is a very high level description of what the user does to access the web pages. Network login is not part of the question. It earns no marks.

Someone will use a computer to request send a request to the server
(this makes the computer the client) the server then finds the file for
the webpage and sends it back to the client




ResultsPlus
Examiner Comments

This response earns full marks.

Question 3 (b) (ii)

Some responses did not incorporate any recognisable HTML tags. It is important that candidates be familiar with basic HTML and CSS.


```
<Ti> Tootle Tools </Ti>  
<li> Socket </li> <li> Open Ended </li>  
  
<H> Sale Wrenches </H>  
<li> Socket </li>  
<li> Open Ended </li>  
  
<H> Sale Pliers </H>  
<li> Thin-Nose </li>  
<li> Needle-Nose </li>
```



ResultsPlus
Examiner Comments

This response earned 1 mark for the to lines.

```
<html>  
<body>  
<t> Socket </t>  
<t> - Open Ended </t>
```



ResultsPlus
Examiner Comments

This response earned 0 marks because of incorrect tags.

Question 3 (c) (i)

There were many responses that confused the concepts of 'code libraries' with 'databases'.

(c) Shaneela is planning to use libraries in the code for the website.

(i) State **two** reasons for using libraries in code.

(2)

1 Don't have to repeat pieces of frequently used long code.

2 The code is easier to understand.



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This response earned 1 mark for 'don't have to repeat pieces of code'.

1 Lots of information^{data} can be obtained from libraries. (2)

2 The use of libraries in code speeds up the ~~to~~ running speed of the program.



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Examiner Comments

This response earned 1 mark for 'speeds up the running speed of the program' as being equivalent to 'optimised library functions'.

- 1 Using libraries removes the need to program simple things that could be included in a ~~bin~~ library, saving time.
- 2 Libraries are usually without any errors and are compiled ~~already~~ ^{programs} that are ~~executed~~ executed by the interpreter, so it will be more ~~easy~~ efficient to use libraries than ~~writing them~~ ^{writing them} ~~yourself~~.



ResultsPlus
Examiner Comments

This response earns full marks.

Question 3 (c) (ii)

A few responses did not use logical operators at all.

- (ii) Complete the following pseudocode to show the logical operations required to produce the correct output.

(4)

```

IF day >= 1  day <= 5 THEN
    SEND "weekday" TO DISPLAY
ENDIF
IF day = 6  day = 7 THEN
    SEND "weekend" TO DISPLAY
ENDIF
IF  (day >= 1  day <= 7) THEN
    SEND "error" TO DISPLAY
ENDIF

```



ResultsPlus
Examiner Comments

This response does not use logical operators, so earns no marks.

```

IF day >= 1  day <= 5 THEN
    SEND "weekday" TO DISPLAY
ENDIF
IF day = 6  day = 7 THEN
    SEND "weekend" TO DISPLAY
ENDIF
IF  (day >= 1  day <= 7) THEN
    SEND "error" TO DISPLAY
ENDIF

```



ResultsPlus
Examiner Comments

This response earns 2 marks.

Question 3 (d)

Some responses did not include any recognisable SQL commands. It is important for candidates to be familiar with the SQL commands provided in the specification.

Write an SQL statement that will report the 'id' and 'description' fields for all records where the 'id' begins with the letter G. Sort the result by 'id' in ascending order.

(4)

SORT id by ascending order
 FIND id begins with letter G



ResultsPlus
Examiner Comments

This response does not use any identifiable form of SQL. It earns no marks.

```
SELECT id
FROM tblProduct
WHERE id = 'G'
```



ResultsPlus
Examiner Comments

This response earns 1 mark for 'FROM tblProduct'.

```
SELECT id , And description FROM tblProduct
WHERE id ('G')
ORDER BY time. asc
```



ResultsPlus
Examiner Comments

This response only misses the last mark because of the incomplete 'where' clause. It earns 3 marks.

Question 4 (a)

The stored program concept was most often confused with storing a program on secondary storage devices. It is important for candidates to understand how both data and instructions are stored in memory and how the fetch-decode-execute cycle works.

- 4 Manuel is interested in understanding the relationship between hardware and software.

(a) Describe what is meant by the term 'stored program concept'.

(2)

Stored program concept is a relationship between hardware and software. It is whereby a program (software) is stored in a device such as a hard drive (hardware).



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This response indicates that the stored program concept is associated with storing files on secondary storage devices such as hard drives. It earns no marks.

stored program concept is where data and information is stored in a place that is kept when its not being used and information from stores the output of the programme.



ResultsPlus Examiner Comments

This response is referring to storing data and information somewhere, most probably on a hard drive. It earns no marks.

Question 4 (b) (i)

In some responses, candidates confused a 'virtual machine' with 'virtual reality'. This is a question where an example could be used to clarify a response.

(b) Computing machines can take many forms and can be based on various models.

(i) Describe what is meant by the term 'virtual machine'.

(2)

Virtual machine is a machine based in the actual computer, it's a type of software that cannot be seen in real life as it's a program on the computers machine.



ResultsPlus
Examiner Comments

This response earns 1 mark due to 'type of software'.

(b) Computing machines can take many forms and can be based on various models.

(i) Describe what is meant by the term 'virtual machine'.

(2)

A 'virtual machine' is a simulation of another operating system and/or computing device within one computing device. It allows the 'virtual machine' to act as another independent device, although in reality it has no physical hardware of its own, and the host device can carry out simultaneous tasks in its own operating system and the 'virtual machines'.



ResultsPlus
Examiner Comments

This response earns 1 mark due to 'simulation of another operating system'.

(b) Computing machines can take many forms and can be based on various models.

(i) Describe what is meant by the term 'virtual machine'.

(2)

A piece of software on your computer which will act as a secondary computer which uses your hardware and a specified operating system. These can be given simple instructions or act as secondary computers. Some can store data between it and the original computer, some can't. It can allow computers with one operating system to run another (such as a Mac running windows). An example can be two separate accounts on a computer.



ResultsPlus
Examiner Comments

This response earns full marks.

Question 4 (b) (ii)

Some responses just provided definitions of sequential and parallel. This was not enough to earn marks. The best responses incorporated the ideas of instructions, splitting of processes, and rejoining.

(ii) Explain the difference between the sequential and parallel computational models.

(4)

A sequential computational model runs one instruction after another doing one operation per a ^{single} clock cycle. A parallel computational model can execute multiple instructions in one full clock cycle. The parallel is used in dual/quad core processors while sequential is run on a processor with a single core.



ResultsPlus
Examiner Comments

This response earns marks for 'one instruction after another', 'single core', 'multiple instructions', 'dual/quad core'.

(ii) Explain the difference between the sequential and parallel computational models.

(4)

Sequential models complete the process one step at a time, and so is much slower than parallel models as parallel models can do two or more processes at the same time, and so is faster as they can work side by side.



ResultsPlus
Examiner Comments

This response earns marks for 'one step at a time' and 'slower than parallel'. The rest of the response does not provide additional information.

(ii) Explain the difference between the sequential and parallel computational models.

(4)

Sequential will complete processes 1 after another whereas parallel will complete ~~two~~ more than 1 process at a time, this makes sequential slower than a parallel computational method.



ResultsPlus
Examiner Comments

This response earns 1 mark for 'sequential is slower'. The rest of the response is only attempting to define the words 'sequential' and 'parallel'.

Question 4 (c) (i)

Some candidates were able to fully generalise this subprogram by adding parameters to the subprogram header, using the parameters inside the subprogram, and amending the call to pass a value to the subprogram. This is an important concept that candidates should understand.

```
SET radius TO VALUE  
PRO  
calcCircleArea()  
  
PROCEDURE calcCircleArea (radius)  
BEGIN PROCEDURE  
    SET area TO Pi * radius * radius  
    SEND area TO DISPLAY  
END PROCEDURE
```



ResultsPlus
Examiner Comments

This response earned marks for the 'radius' on the subprogram header and for using 'radius' inside the subprogram.

calCircleArea ()

```
PROCEDURE calCircleArea ()
```

```
Beo BEGIN PROCEDURE
```

```
radius = int (input ("what is the radius"))
```

```
SET area TO Pi * radius * radius
```

```
SEND area TO DISPLAY
```

```
END PROCEDURE
```



ResultsPlus
Examiner Comments

This response earned 1 mark for using the 'radius' variable in the area calculation.

```
calCircleArea ()  
user number = input ("enter a number")  
PROCEDURE calCircleArea ()
```

```
BEGIN PROCEDURE
```

```
SET area to pi * user number * user number
```

```
SEND area TO DISPLAY
```

```
END PROCEDURE.
```



ResultsPlus
Examiner Comments

This response earned no marks because the value for 'user number' is actually set after the call to calcCircleArea. It would not function correctly.

Question 4 (c) (ii) 1

Many candidates were able to complete the binary search and identify the nodes visited in the search.

Manuel is writing a binary search routine to search for an individual pupil in a list of all pupil numbers.

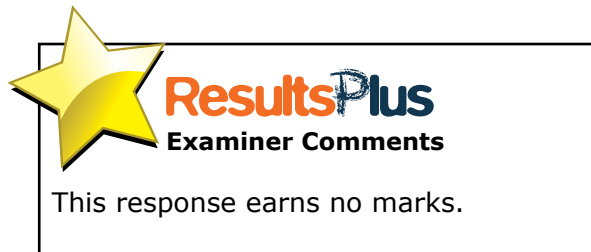
Here is the list of pupil numbers.

837, 1529, 1683, 2245, 3901, 3921, 4524

- (ii) Complete the table showing the pupil numbers visited and the associated sublists when using a binary search to locate the pupil number 1683.

(5)

Pupil number visited	Sublist
837	1529, 1683, 2245, 3901, 3921, 4524



Manuel is writing a binary search routine to search for an individual pupil in a list of all pupil numbers.

Here is the list of pupil numbers.

837, 1529, 1683, 2245, 3901, 3921, 4524

- (ii) Complete the table showing the pupil numbers visited and the associated sublists when using a binary search to locate the pupil number 1683.

(5)

Pupil number visited	Sublist
2245	2245 > 1683



Question 4 (c) (ii) 2

This question is a continuation of Q04(c)(ii).

1529	false
------	-------



ResultsPlus
Examiner Comments

This response earns 1 mark for the node visited.

20278 3901, 3921	16873 837
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ResultsPlus
Examiner Comments

This response earns no marks.

Question 4 (c) (ii) 3

This is a continuation of Q04(c)(ii).

3921	
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ResultsPlus
Examiner Comments

This response earns no marks.

Question 4 (c) (iii)

Many candidates were familiar with the layout of these truth tables and were able to earn marks in this question.

Manuel is working on logic for an exclusive OR operator, often known as XOR. This logical operator can be implemented using AND, OR, and NOT.

(iii) Complete this truth table to show Q.

(3)

A	B	R = A OR B	S = NOT (A AND B)	Q = R AND S
0	0	0	1	1
0	1	1	0	1
1	0	1	0	1
1	1	0	1	1



ResultsPlus
Examiner Comments

This response earns no marks.

A	B	R = A OR B	S = NOT (A AND B)	Q = R AND S
0	0	0	1	1
0	1	1	1	1
1	0	1	1	1
1	1	1	0	0



ResultsPlus
Examiner Comments

This response earns 2 marks for columns R and S.

A	B	R = A OR B	S = NOT (A AND B)	Q = R AND S
0	0	0	1	1
0	1	1	0	1
1	0	1	0	1
1	1	1	0	1



ResultsPlus
Examiner Comments

This response earns 1 mark for column R.

Question 5 (a)

Most candidates were able to earn marks in this question by expressing their understanding of artificial intelligence. In responding, candidates are reminded to address each of the topics set out in the question.

5 Artificial intelligence is an emerging trend in computer science.

*(a) Discuss the use of artificial intelligence by describing some of its characteristics, the ways in which it may be used and the ethical issues associated with its use.

Artificial ^{intelligence} ~~intelligence~~ is the study of computers ^{(6) replicating} ~~imitating~~ human thoughts or actions ~~(aware)~~ (Self aware). Artificial intelligence is normally found in games the AI controllers in games ^{talk bots & can even} ~~to~~ be found on ~~or even Siri or Cortana on operating systems~~ operating systems helping the user via voice talking, & having a conversation. Examples include Siri or Cortana. Artificial intelligence has progressed ^{within the last decade} a lot with ~~an~~ ^{an} AI ~~computer~~ ^{capable} that was able to beat chess ^{world} champions at chess. This technology could ~~be~~ potentially be dangerous ~~in the~~ hands of the military if computers are allowed to kill humans or fight wars instead of humans. Or if the Artificial intelligence ~~became~~ became very self aware & turned against humanity. There are ^{also} ethical issues ~~connected~~ with AI ^{development & application} such as in the ^{military} army allowing ^{AI} programs to kill humans ^(Now drones have human operators for ethical reasons) instead of humans ~~or~~ and creating ~~artificial~~ 'life'. Despite these points, there are ^{for many} ~~many~~ advantages to Artificial Intelligence such as helping progress technology further, complex problem solving & if implemented into robots, the robots could go into dangerous zones such as ~~an~~ a fallout zone or post ~~earthquake~~ earthquake to help survivors / discover new places. Also

if use robots are used in wars instead of humans, no humans have to die. There is also the ^{ethical issue} raised ^{that if the} if AI is 'aware' enough, would it be considered ^{a slave} ~~slavery~~ to humans and should they have equal rights.



ResultsPlus Examiner Comments

This response earns 5 marks because it has described some characteristics of AI, including ways in which it is currently being used and some indication of how it might be used in the future, and has discussed ethical issues in a factual way.

(6)
Artificial intelligence is the manufacturing of machines able to replicate human behaviour. Artificial intelligence can be as simple as a robot walking of its own accord, or a machine which can have an actual conversation with a human. It is mainly used in computer games, with artificial intelligence (AI) being able to complete objectives in a game or target the player character. AI can also be developed to be able to work better than factory machines, complete jobs such as pizza delivery and medical diagnosis, and to even operate phone calls. Issues arise due to AI being

a machine, so there is always a chance of malfunction or error, and this could cause jobs to be done wrong. People may also say it's wrong to create artificial humans and that replacing humans with machines can cause unemployment. People also worry if machines could become smarter than us.



ResultsPlus

Examiner Comments

This response earns 4 marks because it attempts to address what AI is, gives some examples of how it is used, and some ethical issues. However, there may be some misconception that robots are all based on artificial intelligence.

Artificial intelligence is used in phones as personal assistants like Siri or Cortana. They can be useful as they can tell you about ~~me~~ any meetings you have that day or anything that's on your phone as well as searching the web for suggestions.

Characteristics of artificial intelligence include the ability for the AI (artificial intelligence) to look things up without being directly asked and the ability to give you useful information ~~if~~ ^{even if} you didn't ask for it directly.

At the moment it is mainly used ~~to~~ to keep track of daily events and what you have planned but it could be used to help people who suffer from medical problems as a "friend".

There are ethical issues like if we create consciousness will it get human rights? When ~~will~~ ^{should} it human stop and draw a line and is it OK to cross it?

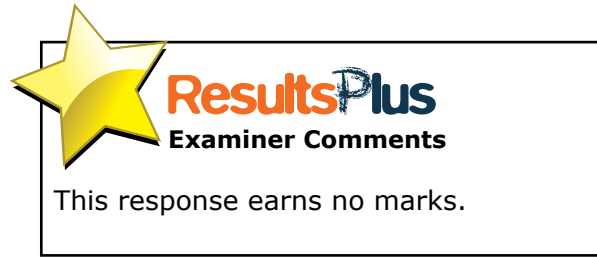


ResultsPlus
Examiner Comments

This response earns 2 marks for its description of using natural language processing and the suggestion of some ethical issues. Overall, it is descriptive of only one situation.

Artificial intelligence is used in advanced computerised systems. Most predominantly it is used by professionals as it was not very common or known and therefore ~~mainly~~ is mainly used by the developers. Artificial intelligence has unauthentic characteristics such as being used from animals and other parts in order to develop outstanding processes. This has raised many ethical demands because many people argue that it is incorrect and should hence be stopped completely however this creates major problems. Primarily due to the artificial intelligence

being tested on living organisms and many argue that this is unacceptable.



ResultsPlus
Examiner Comments

This response earns no marks.

Question 5 (b) (i)

Many responses earned marks for the trace table.

- (i) Complete the trace table showing the changes in the values of R3, R4 and R5 during execution of the program.

(5)

R3	R4	R5
1	2	4
3	2	4
3	2	3



ResultsPlus
Examiner Comments

This response earns 1 mark.

R3	R4	R5
245		
	246	
		247
		247
250		
250		
	250	
		251
		251



ResultsPlus
Examiner Comments

This response earns no marks. The line numbers in the assembly code have been used to fill the table rather than the value of the variables.

R3	R4	R5
1		
	2	
		4
2		
		3



ResultsPlus
Examiner Comments

This response earns 2 marks.

Question 5 (b) (ii)

This question was not answered well. Many candidates just presented an interpretation of a line in the algorithm, rather than attempting to determine the higher-level purpose of the assembly code.

(ii) State the purpose of this algorithm.

(1)

To implement intelligence algorithms.



ResultsPlus
Examiner Comments

This response earns no marks, because it has not addressed the question.

The purpose of the algorithm is to make R5 become equal to 0.



ResultsPlus
Examiner Comments

This response earns no marks, because it has only identified a step in the algorithm, not its higher-level purpose.

An algorithm is a set of instructions for a computer to carry out.



ResultsPlus
Examiner Comments

This response has given the definition of 'algorithm' rather than a response to the question.

An algorithm is a set of instructions for a computer to carry out.




ResultsPlus
Examiner Comments

This response has earned the mark. This is a case where an example has added clarity.

Question 5 (b) (iii)

Some candidates recalled the correct terminology for an assembly code instruction.


MOV Move
R4,#2 Register 4 by 2



ResultsPlus
Examiner Comments

This response earned no marks.


MOV Function operation
R4,#2 Variable



ResultsPlus
Examiner Comments

This response earned 1 mark for 'operation'.

MOV The OPCODE shows what will be done.
R4,#2 The OPERAND shows what it will be done to.



ResultsPlus
Examiner Comments

This response has earned full marks.

Question 5 (b) (iv)

Many candidates presented Python code in their response. There were a variety of solutions, all of which earned marks.

~~registerThree~~

registerThree = 1

registerFour = 2

registerFive = 4

Compare (registerFive), (0)

~~registerThree~~ * registerThree * registerFour

registerFive - registerFive - 1



ResultsPlus
Examiner Comments

This response earned 1 mark for initialisation.

R3 = 1

R4 = 2

R5 = 4

R3 = R3 * R4

R5 = R5 - 1



ResultsPlus
Examiner Comments

This response earned 1 mark for initialisation and 1 mark for calculation.

R3 = 1

R4 = 2

R5 = 4

while R5 != 0:

R3 = R3 * R4

R5 = R5 - 1



ResultsPlus
Examiner Comments

This response earned all 3 marks.

R3 = 1

R4 = 2

R5 = 4

~~while~~ ~~while~~ ~~while~~ ^{while} R5 != 0:
R3 = R3 * R4
R5 = R5 - 1
Else:
Break



ResultsPlus
Examiner Comments

This response earned full marks.

Paper Summary

Based on their performance on this paper, candidates are offered the following advice:

- Attempt every question.
- Be sure to read the entire question, including any contextual information that may come before the actual question number.
- Respond with the context of the question in mind; try not to give general responses.
- Use appropriate subject specific terminology and key words.
- Identify key words and command words in the question to ensure responses reflect what the question asks.
- Continue to develop the good practice of expanding and explaining answers using examples and reasons, where more than a simple statement or list is required.
- Do not repeat responses when more than one example/reason is required.
- Be able to distinguish between the same term used in different contexts (server, client, programming language, program translator, virtual)

Grade Boundaries

Grade boundaries for this, and all other papers, can be found on the website on this link:

<http://www.edexcel.com/iwantto/Pages/grade-boundaries.aspx>

Ofqual



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