Qualification Accredited

OCR
Oxford Cambridge and RSA

GCSE (9-1)

Exemplar Candidate Work

COMPUTER SCIENCE

J276
For first teaching in 2016

J276/02 Summer 2018 examination series

Version 1

Contents

Introduction

These exemplar answers have been chosen from the summer 2018 examination series.

OCR is open to a wide variety of approaches and all answers are considered on their merits. These exemplars, therefore, should not be seen as the only way to answer questions but do illustrate how the mark scheme has been applied.

Please always refer to the specification https://www.ocr.org.uk/qualifications/gcse/computer-science-j276-from-2016/ for full details of the assessment for this qualification. These exemplar answers should also be read in conjunction with the sample assessment materials and the June 2018 Examiners' report or Report to Centres available from Interchange https://interchange.ocr.org.uk/Home.mvc/Index

The question paper, mark scheme and any resource booklet(s) will be available on the OCR website from summer 2019. Until then, they are available on OCR Interchange (school exams officers will have a login for this and are able to set up teachers with specific logins – see the following link for further information http://www.ocr.org.uk/administration/support-and-tools/interchange/managing-user-accounts/).

It is important to note that approaches to question setting and marking will remain consistent. At the same time OCR reviews all its qualifications annually and may make small adjustments to improve the performance of its assessments. We will let you know of any substantive changes.

Question 1(a)

1 OCR High School uses a computer system to store data about students' conduct. The system records good conduct as a positive number and poor conduct as a negative number. A TRUE or FALSE value is also used to record whether or not a letter has been sent home about each incident.

An example of the data held in this system is shown below in Fig. 1:

StudentName	Detail	Points	LetterSent
Kirstie	Homework forgotten	−2	FALSE
Byron	Good effort in class	1	TRUE
Grahame	100% in a test	2	FALSE
Marian	Bullying	−3	TRUE

Fig. 1

(a) State the most appropriate data type used to store each of the following items of data.

- StudentName .....
- Points .....
- LetterSent .....

[3]

Exemplar 1 3 marks

(a) State the most appropriate data type used to store each of the following items of data.

- StudentName ..String.....
- Points ..Integer.....
- LetterSent ..Boolean.....

[3]

Examiner commentary

The candidate here has hit all three definitions from the mark scheme.

Exemplar 2 2 marks

(a) State the most appropriate data type used to store each of the following items of data.

- StudentName ..String.....
- Points ..real.....
- LetterSent ..Char boolean.....

[3]

Examiner commentary

String and Boolean given, but "real" is not correct for the Points data type.

Exemplar 3 — 0 marks

(a) State the most appropriate data type used to store each of the following items of data.

- StudentName Byron
- Points 1
- LetterSent True

[3]

Examiner commentary

The candidate has identified a value of each variable, rather than the appropriate data type.

Exemplar 4 — 0 marks

(a) State the most appropriate data type used to store each of the following items of data.

- StudentName Qualitive
- Points Quantitive
- LetterSent Qualitive

[3]

Examiner commentary

An incorrect response that gains 0 marks.

Question 1(b)(i)

(b) The data shown above in Fig. 1 is stored in a database table called **Conduct**.

(i) Write an SQL statement to select the StudentName field for all records that have negative Points.

.....

.....

..... **[3]**

Exemplar 1 3 marks

(b) The data shown above in Fig. 1 is stored in a database table called **Conduct**.

(i) Write an SQL statement to select the StudentName field for all records that have negative Points.

Select StudentName from Conduct

where Points < 0

..... **[3]**

Examiner commentary

The SQL statement is logically correct and includes the SELECT, FROM and WHERE clauses in the correct order.

Exemplar 2 2 marks

(b) The data shown above in Fig. 1 is stored in a database table called **Conduct**.

(i) Write an SQL statement to select the StudentName field for all records that have negative Points.

Select StudentName From Conduct

IF Points <= -1

..... **[3]**

Examiner commentary

SELECT and FROM clauses correctly identified, but the WHERE clause is incorrect with the candidate instead mistakenly trying to use a high level language (IF) to filter results.

Exemplar 3

0 marks

(b) The data shown above in Fig. 1 is stored in a database table called **Conduct**.

(i) Write an SQL statement to select the StudentName field for all records that have negative Points.

Record(Student Name ~~variable~~ String, ~~LetterSent~~,
Boolean) ~~FAL~~ Points, variable)
Students =E <0 **[3]**

Examiner commentary

A response that shows little to no understanding of SQL. Incorrect.

Question 1(b)(ii)

(ii) State the wildcard that can be used in SQL to show all fields from a table.

.....

..... [1]

Exemplar 1 — 1 mark

(ii) State the wildcard that can be used in SQL to show all fields from a table.

*

SELECT * FROM Conduct ..... [1]

Examiner commentary

An asterisk is clearly identified here.

Exemplar 2 — 0 marks

(ii) State the wildcard that can be used in SQL to show all fields from a table.

Select * ..... [1]

Examiner commentary

Although this gets 0 marks, this does perhaps show some understanding. However, the wildcard is simply the asterisk and so any other code given apart from this (in this case the SELECT clause) cannot be credited.

Exemplar 3 — 0 marks

(ii) State the wildcard that can be used in SQL to show all fields from a table.

Record

..... [1]

Examiner commentary

A response that shows little to no understanding of wildcards and their use.

Exemplar 4 — 0 marks

(ii) State the wildcard that can be used in SQL to show all fields from a table.

Points

..... [1]

Examiner commentary

An incorrect response that gains 0 marks.

Question 1(c)

(c) A single record from this database table is read into a program that uses an array with the identifier `studentdata`. An example of this array is shown below:

```
studentdata = ["Kirstie", "Homework forgotten", "-2", "FALSE"]
```

The array is zero based, so `studentdata[0]` holds the value "Kirstie".

Write an algorithm that will identify whether the data in the `studentdata` array shows that a letter has been sent home or not for the student. The algorithm should then output either "sent" (if a letter has been sent) or "not sent" (if a letter has not been sent).

.....

.....

.....

..... **[4]**

Exemplar 1

4 marks

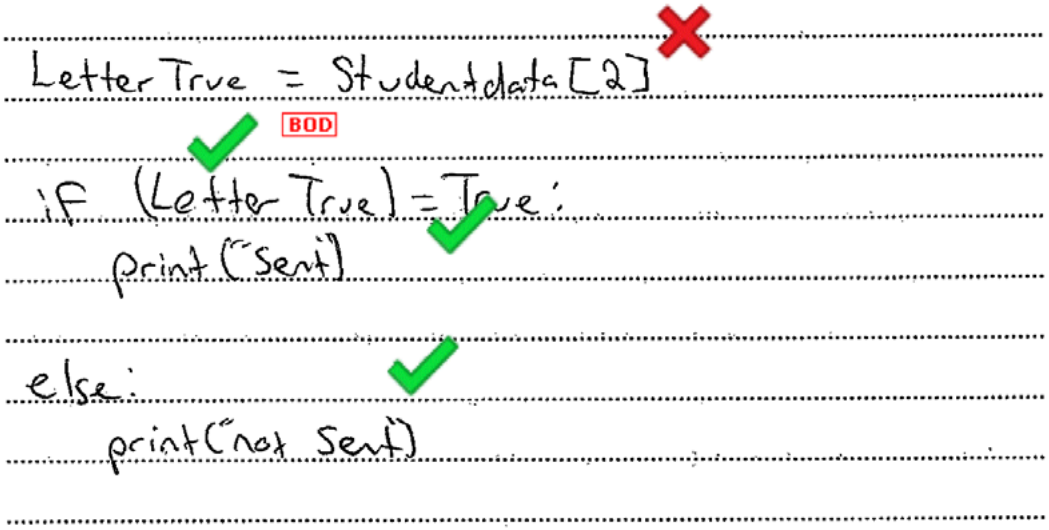
```
If studentdata(3) = "False" then
    output "not sent"
Else
    output "sent"
Endif
```

Examiner commentary

All four points from the mark scheme have clearly been met here. The student data array has been accessed and the candidate has used to appropriate index number for this, outputting the right message for each of True/False.

Exemplar 2

3 marks

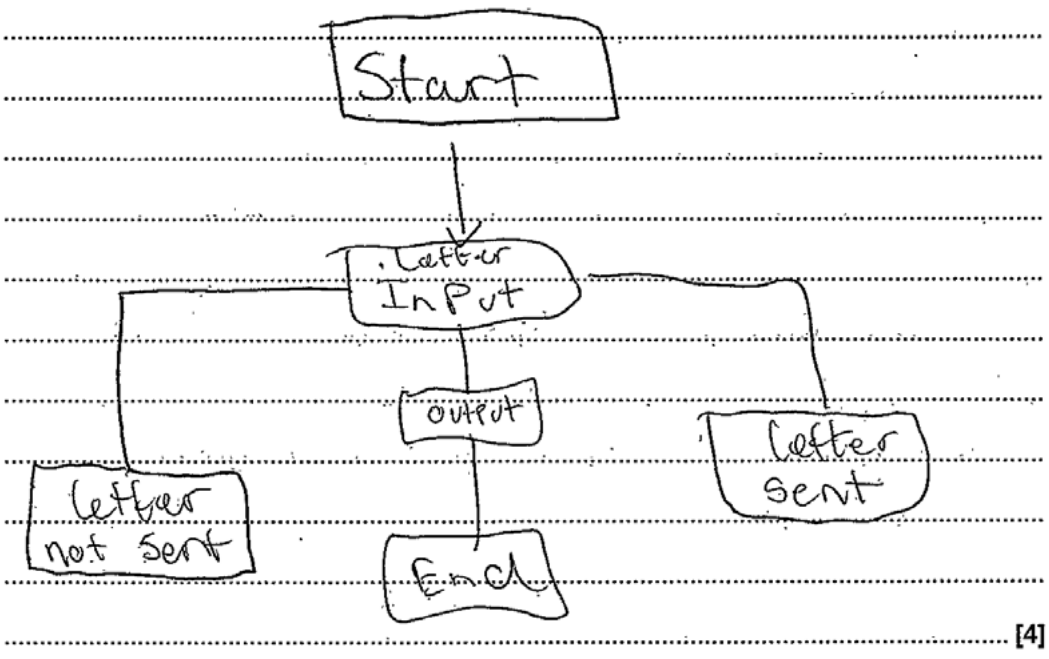


Examiner commentary

A good response. Using an intermediate variable to store this before deciding if it is TRUE or FALSE is absolutely fine. This response would have gained full marks if the correct index number (studentdata[3]) had been used in line 1.

Exemplar 3

0 marks



[4]

Examiner commentary

A response that gains 0 marks. It was possible for candidates to gain marks by using a flowchart here but this is simply a high level overview that repeats the question rather than an attempt to break down how this could be solved.

Exemplar 4

0 marks

student data = ["Kirstie", "Homework forgotten", "-2", "FALSE"
Kirstie;
Negative point
reason: Homework forgotten
LetterSent: FALSE
Kirstie has not had a letter home

Examiner commentary

An incorrect response that gains 0 marks.

Question 2(a)(i)

2 A programmer has written an algorithm to output a series of numbers. The algorithm is shown below:

```
01 for k = 1 to 3
02     for p = 1 to 5
03         print (k + p)
04     next p
05 next k
06 m = 7
07 print m * m
```

(a) (i) Give the first **three** numbers that will be printed by this algorithm.

..... **[1]**

Exemplar 1 — 1 mark

(a) (i) Give the first **three** numbers that will be printed by this algorithm.

~~2,3,4~~ 2, 3, 4 ✓ **[1]**

Examiner commentary

The correct numbers printed (2, 3 and 4) have clearly been identified.

Exemplar 2 — 0 marks

(a) (i) Give the first **three** numbers that will be printed by this algorithm.

1, 2, 3 **[1]**

Examiner commentary

An incorrect response that gains 0 marks.

Exemplar 3 — 0 marks

(a) (i) Give the first **three** numbers that will be printed by this algorithm.

123 **[1]**

Examiner commentary

An incorrect response that gains 0 marks.

Question 2(a)(ii)

(ii) State how many times line **03** will be executed if the algorithm runs through once.

..... [1]

Exemplar 1 — 1 mark

(ii) State how many times line **03** will be executed if the algorithm runs through once.

15 [1]

Examiner commentary

The correct answer (15) has clearly been identified here.

Exemplar 2 — 0 marks

(ii) State how many times line **03** will be executed if the algorithm runs through once.

1 [1]

Examiner commentary

An incorrect response that gains 0 marks.

Exemplar 3 — 0 marks

(ii) State how many times line **03** will be executed if the algorithm runs through once.

[1]

Examiner commentary

An incorrect response that gains 0 marks.

Question 2(b)

(b) Identify **two** basic programming constructs that have been used in this algorithm.

1 .....

.....

2 .....

.....

[2]

Exemplar 1 2 marks

(b) Identify two basic programming constructs that have been used in this algorithm.

1 Sequence - executing code line by line

eg (05 → 06)

2 iteration - looping (eg 02 → 04)

.....

[2]

Examiner commentary

Sequence and iteration have been identified as two basic programming constructs used in the example given. The candidate here has also gone as far as to demonstrate their understanding of these constructs, but centres should be aware that this is not needed as the question simply asks candidates to identify two constructs.

Exemplar 2 1 mark

(b) Identify **two** basic programming constructs that have been used in this algorithm.

1 Sequence Control Flow

.....

2 [illegible] arrays

.....

[2]

Examiner commentary

One mark given for sequence.

Exemplar 3

0 marks

(b) Identify **two** basic programming constructs that have been used in this algorithm.

1 list

2 String

[2]

Examiner commentary

An incorrect response that gains 0 marks.

Exemplar 4

0 marks

(b) Identify **two** basic programming constructs that have been used in this algorithm.

1 = equal to sign

2 * multiply

[2]

Examiner commentary

An incorrect response that gains 0 marks.

Question 2(c)(i)

(c) (i) Describe what is meant by a variable.

.....

.....

.....

..... [2]

Exemplar 1 2 marks

(c) (i) Describe what is meant by a variable.

a value stored in RAM that can be assigned data, can change during the running of the program, can be used in calculations etc during the program. [2]

Examiner commentary

Two clear marks here, for being assigned a value and the fact that this value can change. It is arguable that the first bullet point on the mark scheme (a memory location) has also been met, but the candidate has already achieved the maximum 2 marks on this response and so the point is moot.

Exemplar 2 1 mark

(c) (i) Describe what is meant by a variable.

A piece of data that can be changed throughout a program running. The value inside can be changed. REP

..... [2]

Examiner commentary

The candidate has identified that the data can be changed and has indeed repeated this again, but has not given any further description that might have gained the second mark.

Exemplar 3 — 1 mark

(c) (i) Describe what is meant by a variable.

A variable ~~is~~ is Something that you ~~Cant~~ can change or add to, ~~that~~ find that you e.g. Tree Hight = [155] define Something ~~You add variables~~ to. **[2]**

Examiner commentary

The fact that the variable's contents can change has been given for 1 mark.

Exemplar 4 — 0 marks

(c) (i) Describe what is meant by a variable.

A Variable holds a piece of information temperarial, ~~athy~~ while the program is run, which can be used ~~[illegible]~~ in instructions, such as ADD **[2]**

Examiner commentary

Although this is close to a correct answer, the response is not tightly enough defined to gain the mark. The use of "information" is specifically stated to not be allowed in the mark scheme. This is an example of a response from a candidate who perhaps has experience of the use of variables without being able to define what they are.

Exemplar 5 — 0 marks

(c) (i) Describe what is meant by a variable.

A variable is an key word thats always used eg print **[2]**

Examiner commentary

An incorrect response that gains 0 marks.

Question 2(c)(ii)

(ii) Identify **two** variables that have been used in the algorithm above.

1 .....

2 .....

[2]

Exemplar 1 — 2 marks

(ii) Identify **two** variables that have been used in the algorithm above.

1 k ✓

2 p ✓

[2]

Examiner commentary

The variable names here have clearly been identified.

Exemplar 2 — 0 marks

(ii) Identify **two** variables that have been used in the algorithm above.

1 m=7

2 (k+p)

[2]

Examiner commentary

An incorrect response that gains 0 marks. Although the variable names are given as part of the answer, it is not clear that the candidate knows which part of this is the variable. Examiners are specifically told not to read into a candidate's answer.

Exemplar 3 — 0 marks

(ii) Identify **two** variables that have been used in the algorithm above.

1 letters

2 .....

[2]

Examiner commentary

An incorrect response that gains 0 marks.

Question 3(a)(i)

3 The logic diagram below (Fig. 2) shows a system made up of two connected logic gates.

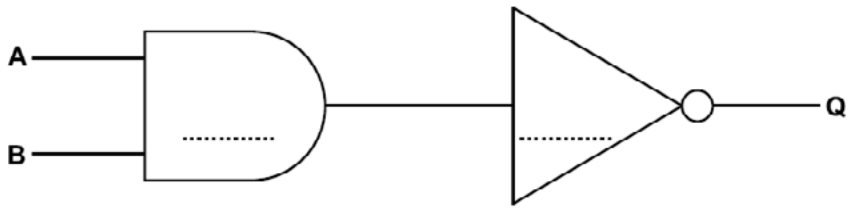


Fig. 2

(a) (i) Label the names of the two gates on the diagram above. [2]

Exemplar 1 2 marks

3 The logic diagram below (Fig. 2) shows a system made up of two connected logic gates.

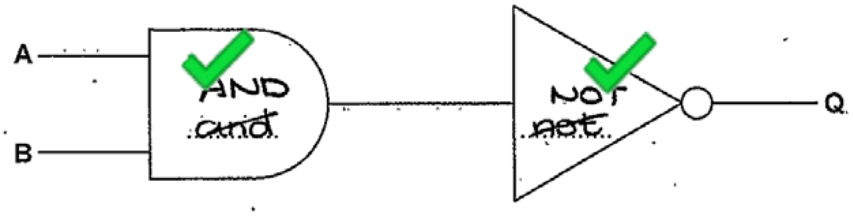


Fig. 2

(a) (i) Label the names of the two gates on the diagram above. [2]

Examiner commentary

The candidate clearly identifies AND and NOT as the two names of the logic gates in the diagram. The candidate has originally written them in lower case, which would have been fine, but has chosen to cross this out and write in upper case. This has no impact on the mark.

Exemplar 2 2 marks

3 The logic diagram below (Fig. 2) shows a system made up of two connected logic gates.

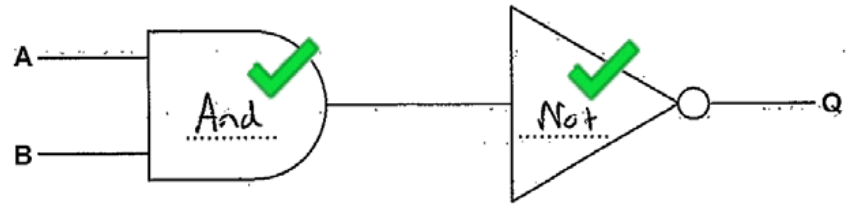


Fig. 2

(a) (i) Label the names of the two gates on the diagram above. [2]

Examiner commentary

A correct response that gains 2 marks.

Exemplar 3

1 mark

3 The logic diagram below (Fig. 2) shows a system made up of two connected logic gates.

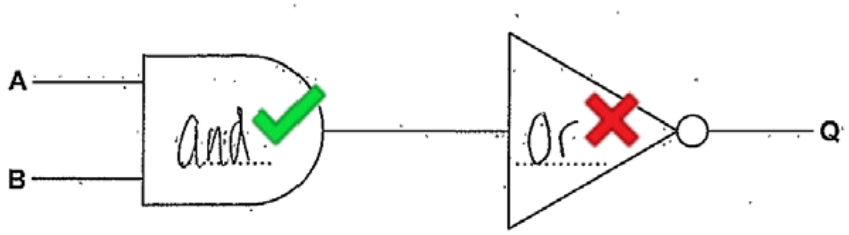


Fig. 2

(a) (i) Label the names of the two gates on the diagram above. [2]

Examiner commentary

AND given as a correct answer but OR is incorrect. 1 mark overall.

Exemplar 4

0 marks

3 The logic diagram below (Fig. 2) shows a system made up of two connected logic gates.

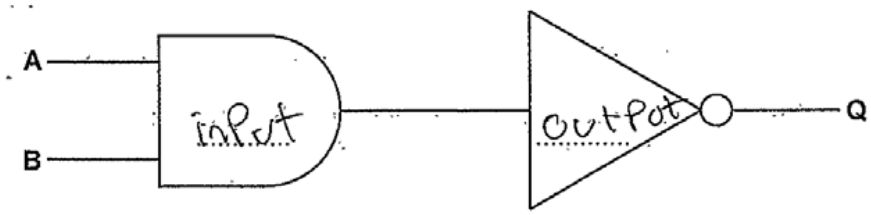


Fig. 2

(a) (i) Label the names of the two gates on the diagram above. [2]

Examiner commentary

An incorrect response that gains 0 marks.

Question 3(a)(ii)

(ii) Complete the truth table below to show the output from this logic system.

A	B	Q
0	0	
0	1	
1	0	
1	1	

[4]

Exemplar 1

4 marks

(ii) Complete the truth table below to show the output from this logic system.

A	B	Q
0	0	1
0	1	1
1	0	1
1	1	0

C (A AND B).
0
0
0
1

[4]

Examiner commentary

The candidate has identified the correct outputs for all four rows of the truth table. One mark has been given per row.

Exemplar 2

3 marks

(ii) Complete the truth table below to show the output from this logic system.

A	B	Q
0	0	0
0	1	1
1	0	1
1	1	0

[4]

Examiner commentary

A partially correct response that gains 3 out of 4 marks.

Exemplar 3

2 marks

(ii) Complete the truth table below to show the output from this logic system.

A	B	Q
0	0	0
0	1	1
1	0	1
1	1	2

[4]

Examiner commentary

Although the candidate gains 2 marks here, is certainly an answer that demonstrated a lack of understanding. Outputs from a logic system are always either True/False or 1/0.

Exemplar 4

1 mark

(ii) Complete the truth table below to show the output from this logic system.

A	B	Q
0	0	0
0	1	0
1	0	0
1	1	0

[4]

Examiner commentary

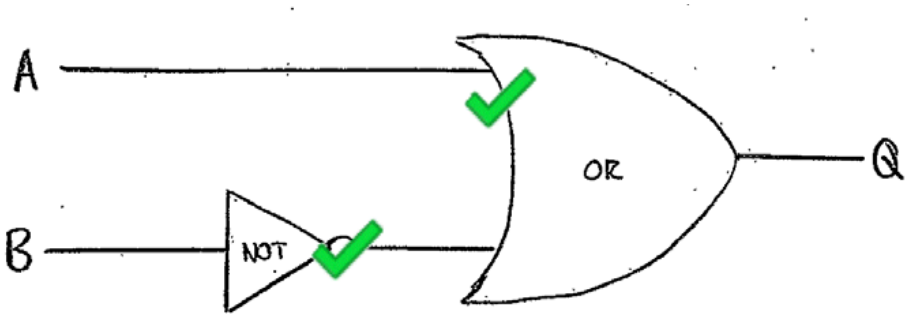
The candidate gains a mark for the bottom row even though it is unclear whether they understand the use of truth tables when applied to the given logic system.

Question 3(b)

(b) Draw the logic diagram represented by **Q = A ∨ ¬B**

[2]

Exemplar 1 2 marks

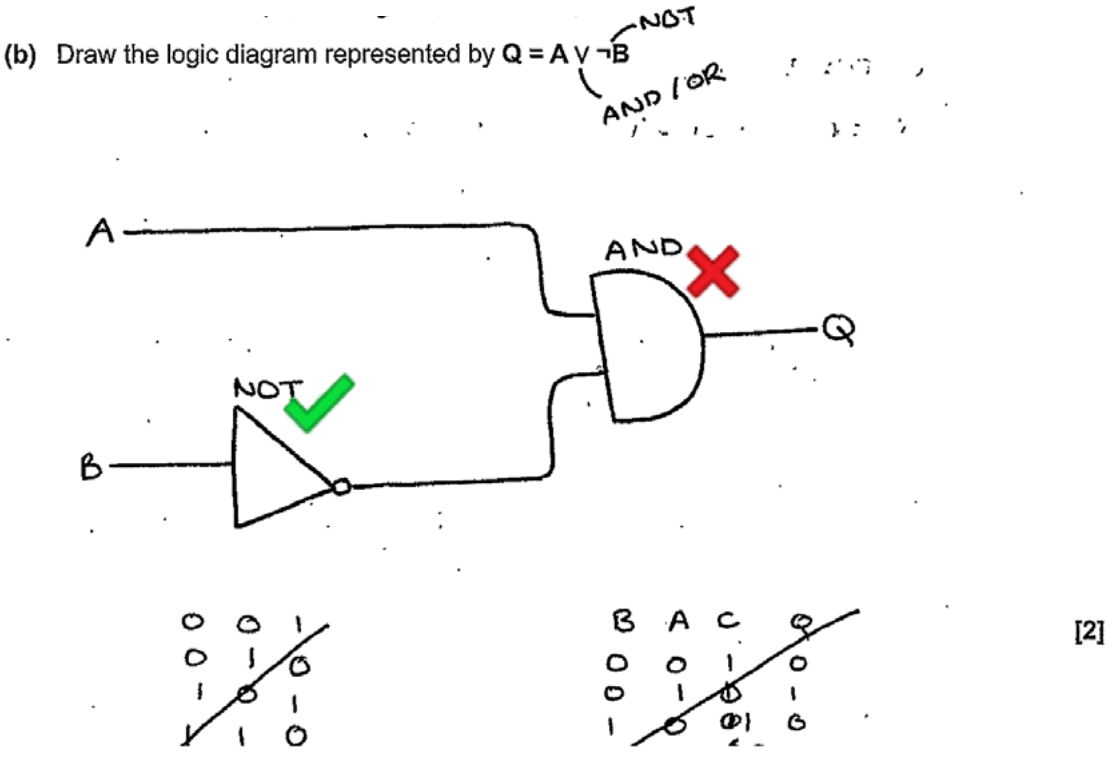


[2]

Examiner commentary

The candidate has correctly identified both the NOT gate and the OR gate and has shown the correct connections between these.

Exemplar 2 1 mark



[2]

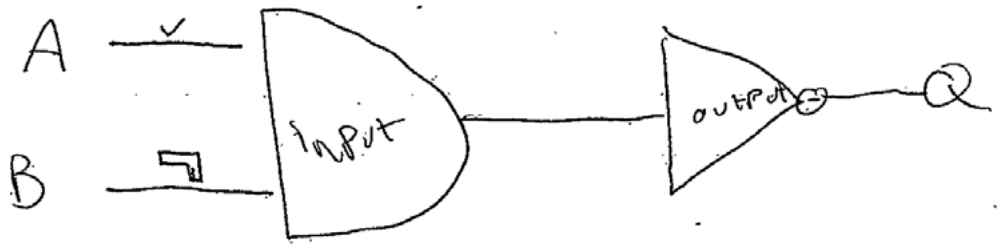
Examiner commentary

The candidate here has correctly identified the NOT gate but has incorrectly shown an AND gate when the logic diagram requires an OR gate.

Exemplar 3

0 marks

(b) Draw the logic diagram represented by **Q = A ∨ ¬B**



Examiner commentary

An incorrect response that gains 0 marks.

Question 4(a)(i)

4 A library gives each book a code made from the first three letters of the book title in upper case, followed by the last two digits of the year the book was published.

For example, "Poetry from the War", published in 2012 would be given the code `POE12`.

(a) (i) Complete the following pseudocode for a function definition that will take in the book title and year as parameters and return the book code.

```
01 function librarycode(title, ..........)
02     parta = title.subString(0, ..........)
03     partb = year.subString(2, 2)
04     ..... parta.upper + partb
05 endfunction
```

[3]

Exemplar 1

3 marks

```
01 function librarycode(title, ...year published...)
02     parta = title.subString(0, ...3...)
03     partb = year.subString(2, 2)
04     ...return... parta.upper + partb
05 endfunction
```

[3]

Examiner commentary

All three missing items of pseudocode have been correctly filled in.

Exemplar 2

2 marks

```
01 function librarycode(title, ...year...)
02     parta = title.subString(0, ...3...)
03     partb = year.subString(2, 2)
04     ...bookcode = parta.upper + partb
05 endfunction
```

[3]

Examiner commentary

The candidate has clearly met the first two marks available. The candidate has not appeared to have understood the need for a function to return a value. The final line assigns the variable bookcode to a value but does not return this or do anything with this that would logically meet the requirement of the question.

Exemplar 3

2 marks

```
01 function librarycode(title, year)
02     parta = title.subString(0, 1,2)
03     partb = year.subString(2, 2)
04     librarycode = parta.upper + partb
05 endfunction
```

[3]

Examiner commentary

The response here hits the first and third point on the mark scheme but the second point is incorrect. Note that the third part of this response is actually an alternative answer – the mark scheme guidance said to give credit for responses such as this as some languages (notably Visual Basic) allow programmers to return values by assigning the a value to the literal name of the function. This has therefore been given a mark here.

Exemplar 4

1 mark

```
01 function librarycode(title, published)
02     parta = title.subString(0, 3)
03     partb = year.subString(2, 2)
04     Book code = parta.upper + partb
05 endfunction
```

[3]

Examiner commentary

One mark given for the second part of the answer (line 02, correct answer of 3).

Exemplar 5

0 marks

```
01 function librarycode(title, variable)
02     parta = title.subString(0, 2)
03     partb = year.subString(2, 2)
04     part C = parta.upper + partb
05 endfunction
```

[3]

Examiner commentary

An incorrect response that gains 0 marks.

Question 4(a)(ii)

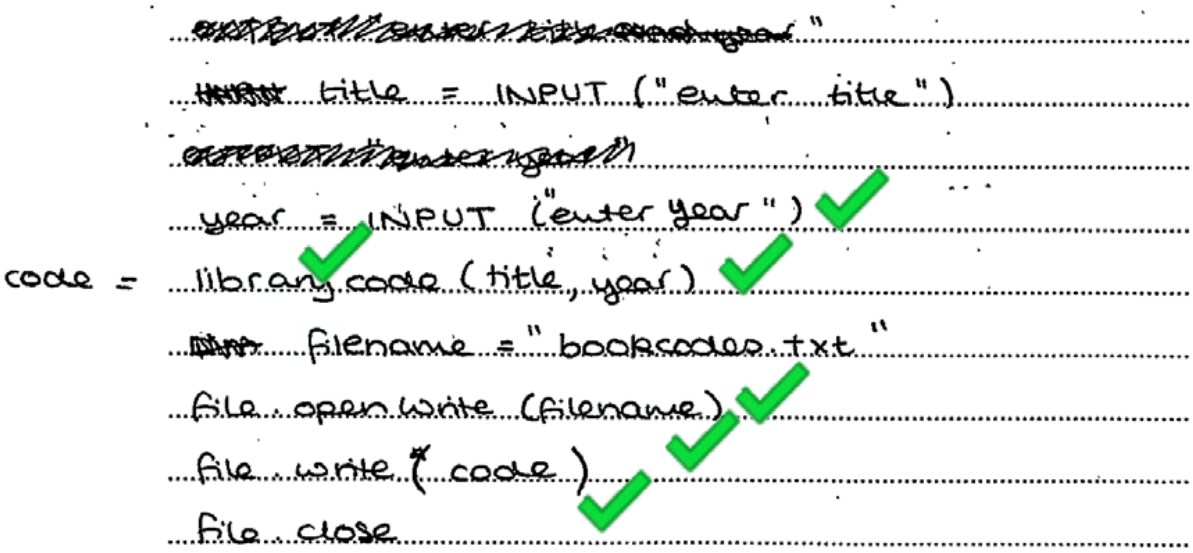
(ii) Use pseudocode to write an algorithm that does the following :

- Inputs the title and year of a book from the user.
- Uses the librarycode function above to work out the book code.
- Permanently stores the new book code to the text file `bookcodes.txt`

[6]

Exemplar 1

6 marks

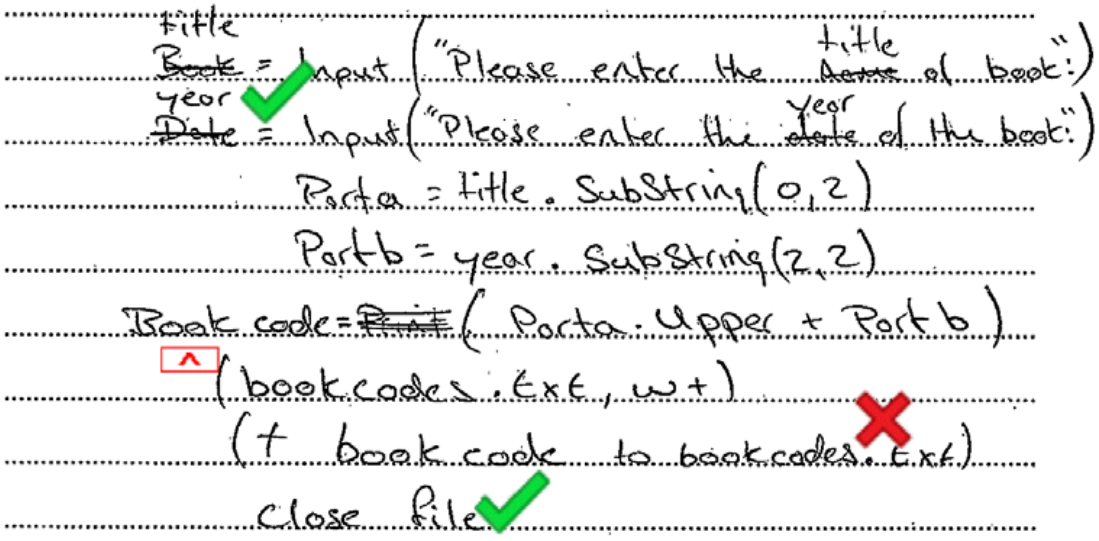


Examiner commentary

This is a very good example of a question that generally did not receive high marks for many candidates. Here, the title and year have both been input and then passed to the library code function as parameters. The text file has been opened, the code written and this has then been closed. Note that the candidate has understood the premise of the question well and has used the pre-written librarycode() function without attempting to unnecessarily re-write it out again.

Exemplar 2

2 marks

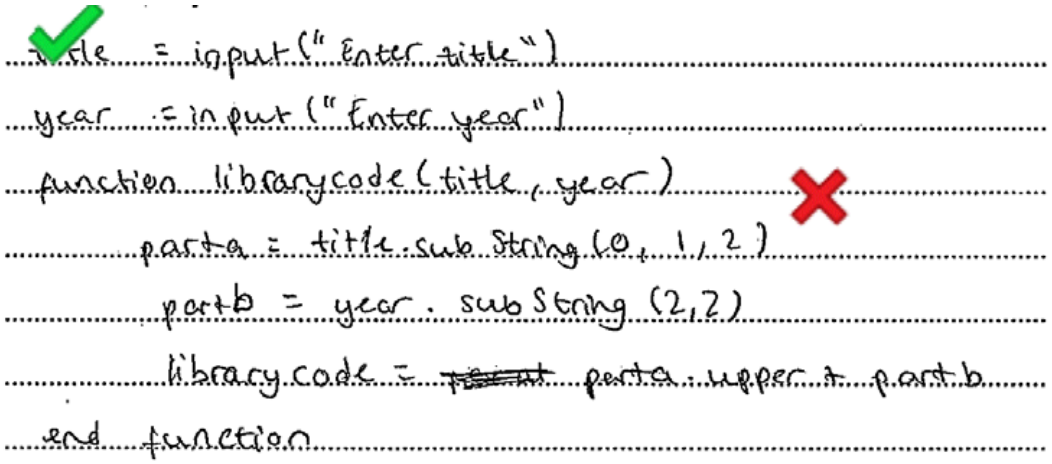


Examiner commentary

The candidate has achieved the mark for inputs but not for the use of the function. They have not correctly called the pre-existing function but rather just written out the code from the preceding question. However, another mark is gained for closing the file (perhaps generously, seeing as they haven't even explicitly opened it!)

Exemplar 3

1 mark



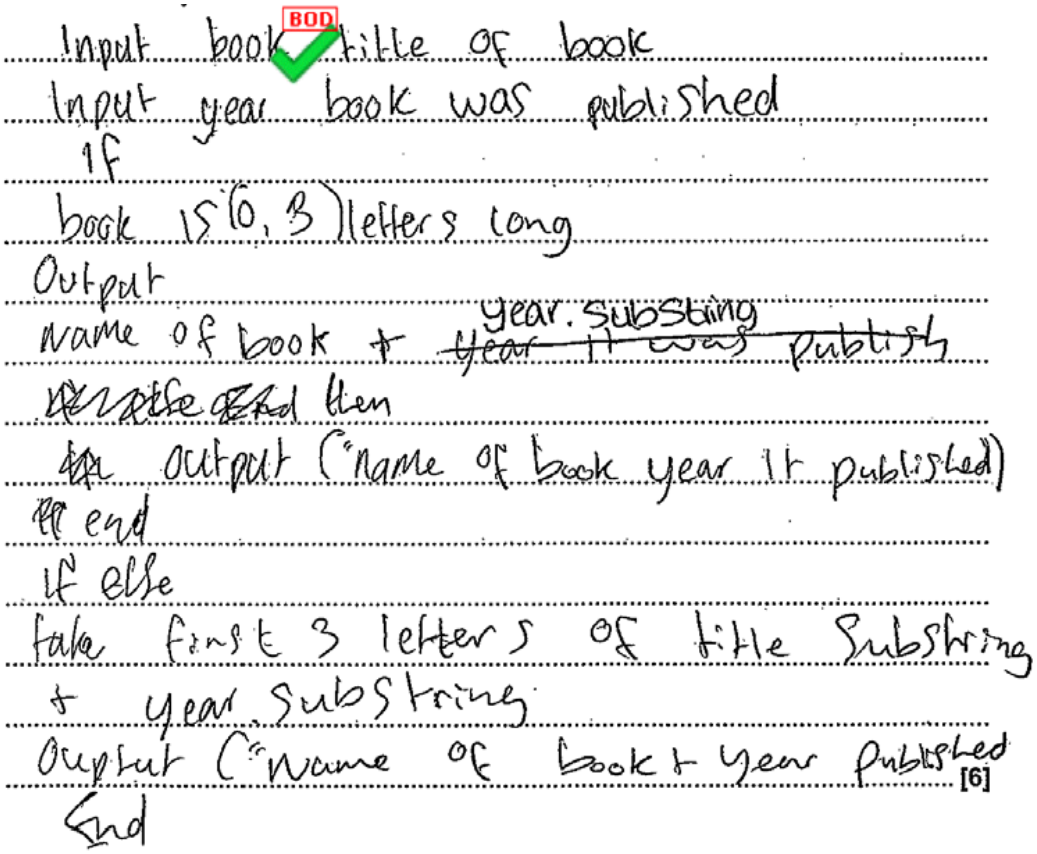
```
title = input("Enter title")
year = input("Enter year")
function librarycode(title, year)
    part a = title.subString(0, 1, 2)
    part b = year.subString(2,2)
    library code = part a.upper + part b
end function
```

Examiner commentary

This is a typical low ability answer that was seen regularly. The candidate has achieved the first mark for input from the user, but has then misunderstood the idea of functions and has simply copied out the function definition again and has not even then made a call to this function. No attempt is made to do any manipulation of text files even though the question specifically asks for this.

Exemplar 4

1 mark



```
Input book title of book
Input year book was published
If
book is (0, 3) letters long
Output
name of book + year.subString
Then
output ("name of book year it published)
end
if else
take first 3 letters of title subString
+ year.subString
Output ("name of book + year published
End
```

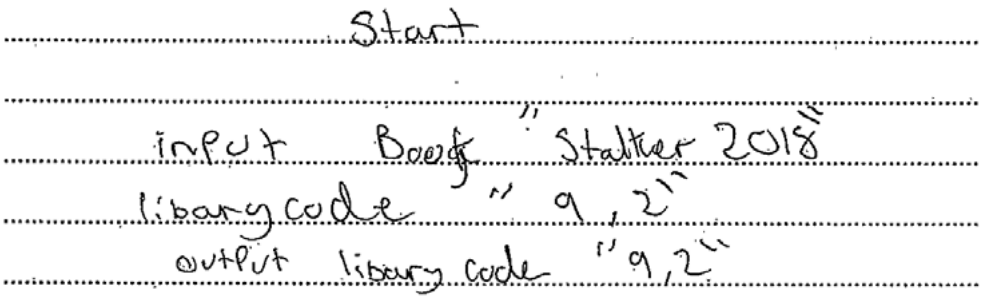
[6]

Examiner commentary

A mostly incorrect response that gains 1 mark. The examiner has given the candidate a benefit of the doubt over the input of the required data.

Exemplar 5

0 marks



Examiner commentary

An incorrect response that gains 0 marks.

Question 4(b)(i)

(b) Functions and procedures are both examples of sub programs.

(i) Describe **one** difference between a function and a procedure.

.....

.....

..... **[2]**

Exemplar 1 2 marks

A function is a small section of code that takes variables and returns values, whereas a procedure only takes variables, doesn't return a value.

Examiner commentary

A function returns a value whereas a procedure does not. Both key points of this response are clearly met by the candidate.

Exemplar 2 0 marks

A function is used when a certain input is made.
One The difference is that ones is used in an array and the other isn't

Examiner commentary

An incorrect response that gains 0 marks.

Exemplar 3

0 marks

a ~~procedure~~ procedure output something to the screen whereas a function doesn't

Examiner commentary

An incorrect response that gains 0 marks.

Question 4(b)(ii)

(ii) Describe **two** benefits to a programmer of using sub programs.

.....

.....

.....

..... **[4]**

Exemplar 1 4 marks

(ii) Describe **two** benefits to a programmer of using sub programs.

It produces structured code that is easy to be read by the programmer and by other people.

Procedures and functions can be shared between different programs and reused in the same program, to make code more efficient.

Examiner commentary

The candidate here has discussed the fact that code is structured because of the use of sub programs, with the expansion that this is now easy to read (maintain) by other programmers. Two different examples of reuse are then given, both reuse within the same program and reuse between programs, again with a suitable expansion.

Exemplar 2

2 marks

(ii) Describe **two** benefits to a programmer of using sub programs.

- Sub programs can break down the problem, Making it easier to Solve and Complete with out lots of problem at once.
- Sub program can also help the programmer, ~~giving them more options~~, to complete the problem, ~~Making it easier~~, as it gives them More Variable and options on ways to Complete the problem [4]

Examiner commentary

Two marks gained for the candidate discussing the benefits of breaking down the problem to make it easier to maintain/solve. However, the second part of the response is of little value and does not hit any point on the mark scheme.

Exemplar 3

1 mark

(ii) Describe **two** benefits to a programmer of using sub programs.

It is easier to understand So if Someone was to follow on your work (TV) it'll be as Easier for them to understand (REP) and again your Code will flow easier So you are less likely to make errors

Examiner commentary

Easy to understand is listed under maintenance and then repeated. A brief discussion around errors was felt to not be enough to be credited. This response is poorly written and communicated for a 4 mark question.

Question 4(c)(i)

(c) The library sorts their books based on the book code.

(i) Show the steps that a merge sort would take to put the following list of book codes into ascending alphabetical order (from A to Z).

POE12 , BAC97 , FLY77 , JAV16 , TAL86 , AND18 , ZAR09 , HOP86

.....

.....

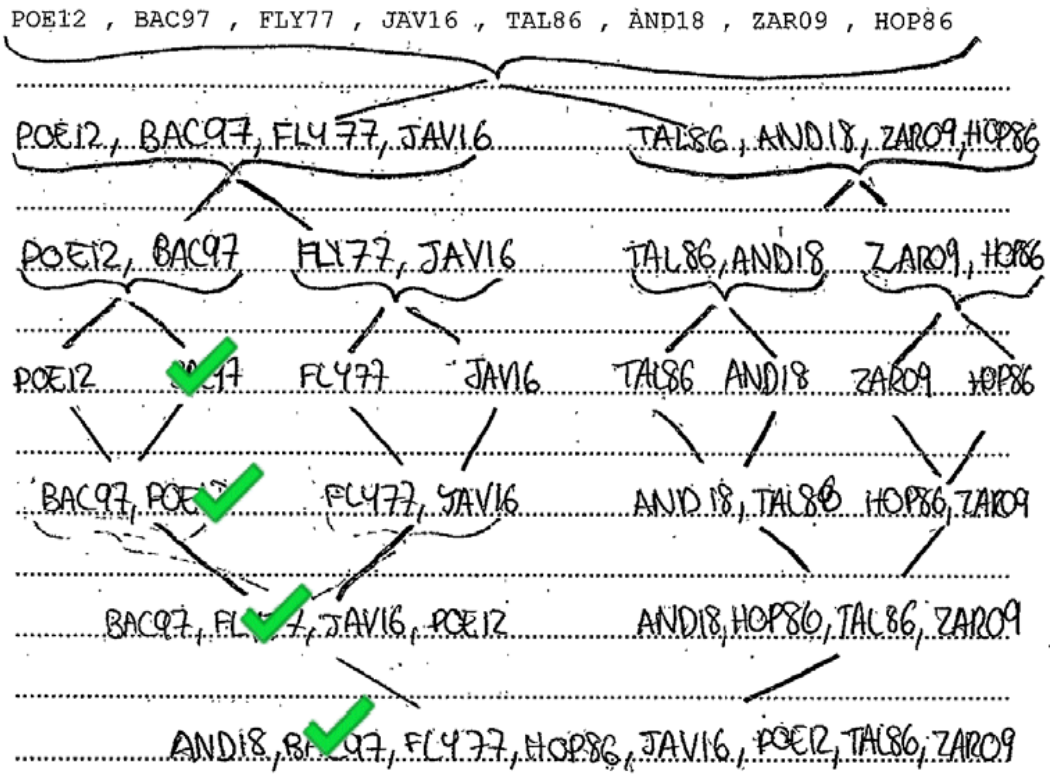
.....

.....

[4]

Exemplar 1

4 marks



Examiner commentary

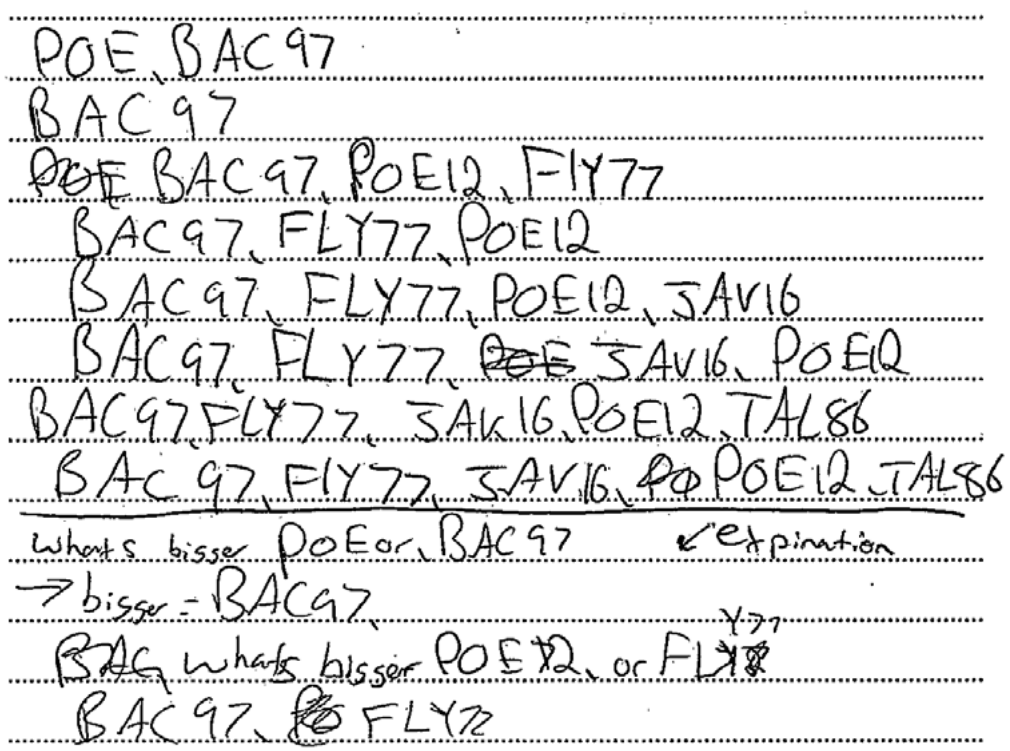
The candidate here has shown the idea of the list being split down into multiple lists of a single item (1 mark) before then showing these being merged back together correctly into lists of 2 items, 4 items and then finally one list of 8 items (3 marks) .

Note that the act of merging the lists together orders the items; a number of candidates incorrectly showed the lists being merged and THEN sorted, which is incorrect.

Exemplar 2

0 marks

POE12 , BAC97 , FLY77 , JAV16 , TAL86 , AND18 , ZAR09 , HOP86



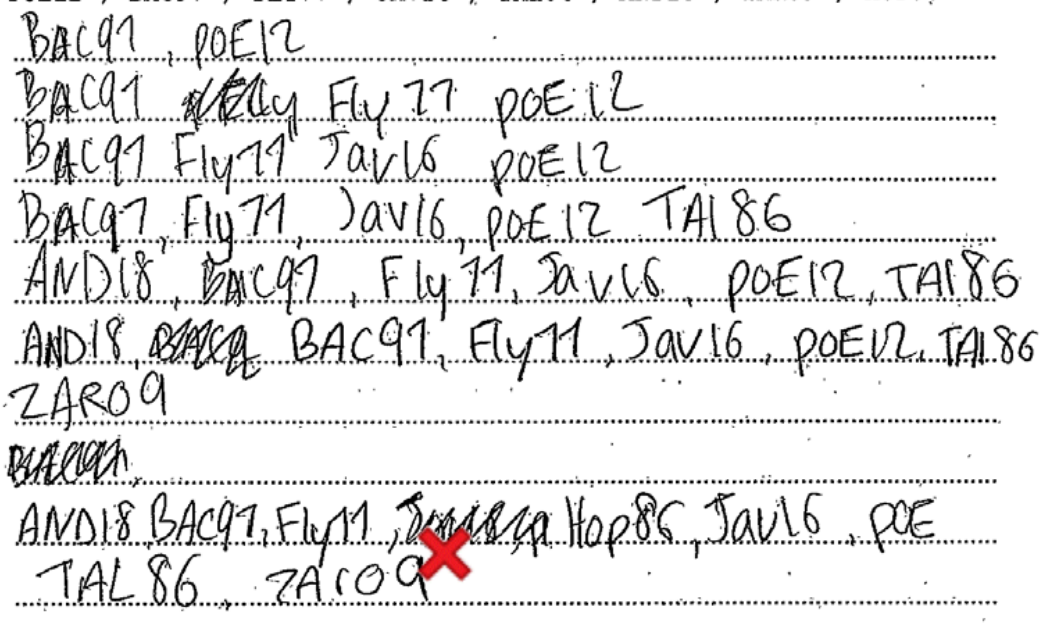
Examiner commentary

An incorrect response that gains 0 marks. The candidate does not make any attempt to split up or merge together lists in any fashion and so no marks can be credited.

Exemplar 3

0 marks

POE12 , BAC97 , FLY77 , JAV16 , TAL86 , AND18 , ZAR09 , HOP86



Examiner commentary

An incorrect response that gains 0 marks. The candidate does not make any attempt to split up or merge together lists in any fashion and so no marks can be credited.

Question 4(c)(ii)

(ii) Explain **one** advantage of a merge sort compared to a bubble sort.

.....

.....

.....

.....

..... **[2]**

Exemplar 1 2 marks

a merge sort requires fewer swaps of data than a bubble sort, so it's ~~easier to~~ quicker to be executed and runs faster (especially using large data sets) (sorts large numbers of items faster.) than a bubble sort. **[2]**

Examiner commentary

The candidate has clearly stated that the merge sort is quicker (1 mark) for large data sets (1 mark).

Exemplar 2 1 mark

Explain **one** advantage of a merge sort compared to a bubble sort.

BOD

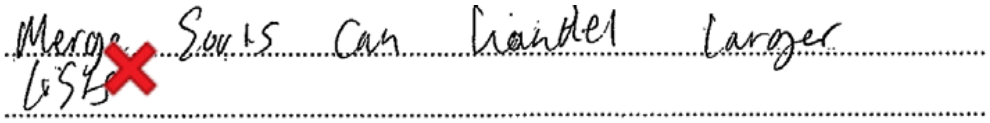
Merge is more efficient, it can be done quickly and correctly for any amount of values whereas a bubble sort can't.

Examiner commentary

More efficient was given in the mark scheme as an alternative to quicker (1 mark) but there is no mention of this being applied to larger data sets for a second mark. In fact, the candidate attempts to suggest that a merge sort can sort "any amount" of values whereas a bubble sort cannot do this; this is obviously incorrect.

Exemplar 3

0 marks

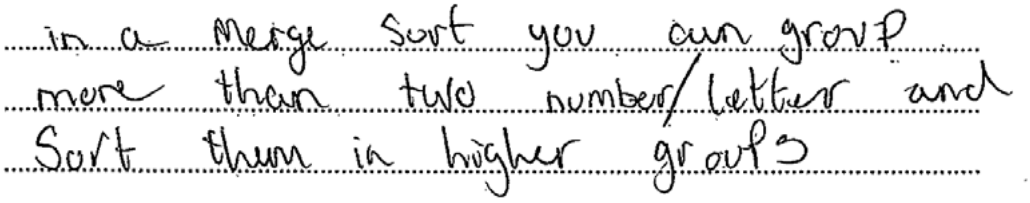


Examiner commentary

An incorrect response that gains 0 marks.

Exemplar 4

0 marks



Examiner commentary

An incorrect response that gains 0 marks.

Question 5(a)(i)

5 (a) (i) Convert the denary number **132** into an 8 bit binary number.

.....

.....

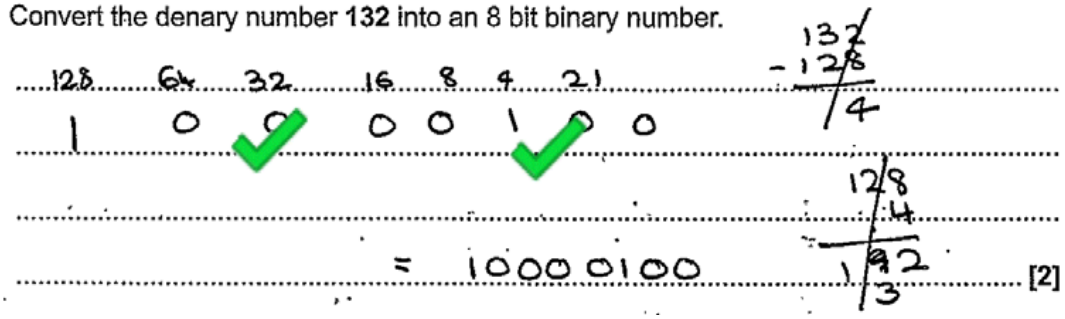
.....

..... **[2]**

Exemplar 1

2 marks

Convert the denary number **132** into an 8 bit binary number.



[2]

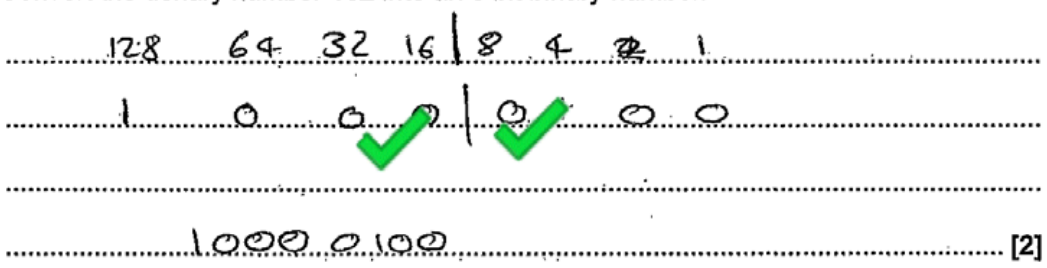
Examiner commentary

The candidate has completed the conversation correctly and given the correct answer. Note there is no requirement here show any working, although the candidate has shown this as well.

Exemplar 2

2 marks

Convert the denary number **132** into an 8 bit binary number.



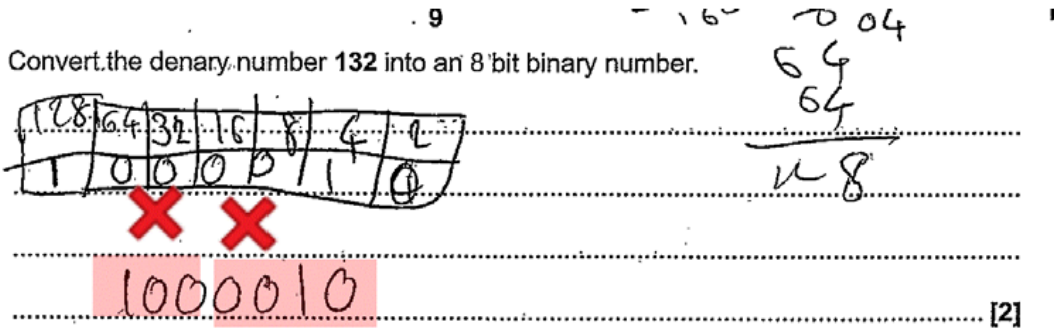
[2]

Examiner commentary

The candidate has completed the conversation correctly and given the correct answer.

Exemplar 3

0 marks



Examiner commentary

An incorrect response that gains 0 marks.

Question 5(a)(ii)

(ii) Convert the binary number **10110101** to its hexadecimal equivalent.

.....

.....

.....

..... [2]

Exemplar 1

2 marks

(ii) Convert the binary number **10110101** to its hexadecimal equivalent.

1011 = 11 = B ✓✓

0101 = 5 = 5

128 32 16 4 1

181

= B5 [2]

Examiner commentary

The candidate has completed the conversation correctly and given the correct answer. Note there is no requirement here show any working, although the candidate has shown this as well.

Exemplar 2

2 marks

(ii) Convert the binary number **10110101** to its hexadecimal equivalent.

8 4 2 1 8 4 2 1

1 0 1 1 0 1 0 1

(11) (5)

B5 ✓✓

[2]

Examiner commentary

The candidate has completed the conversation correctly and given the correct answer.

Exemplar 3

0 marks

(ii) Convert the binary number **10110101** to its hexadecimal equivalent.

9D ✗

[2]

Examiner commentary

An incorrect response that gains 0 marks.

Exemplar 4

0 marks

(ii) Convert the binary number **10110101** to its hexadecimal equivalent..

1 2 4 8 16 32 64 128

1 0 1 1 0 1 0 1

173

[2]

Examiner commentary

An incorrect response that gains 0 marks.

Question 5(a)(iii)

(iii) Show the effect of a binary shift right of two places on the binary number **00110100**.

.....

.....

.....

..... [1]

Exemplar 1

1 mark

00|00110100

= 0000 1101

(divides by 2^2, divides by 4) [1]

Examiner commentary

The candidate has correctly shown the effect of the binary shift, showing the binary number after this shift.

Exemplar 2

1 mark

128 64 32 16 8 4 2 1

0 0 1 1 0 1 0 0 = 52

0 0 0 0 1 1 0 1 = 13

0000 1101 = 13 lost 39 [1]

Examiner commentary

The candidate has completed the shift correctly and given the correct response.

Exemplar 3

0 marks

00|11|0100

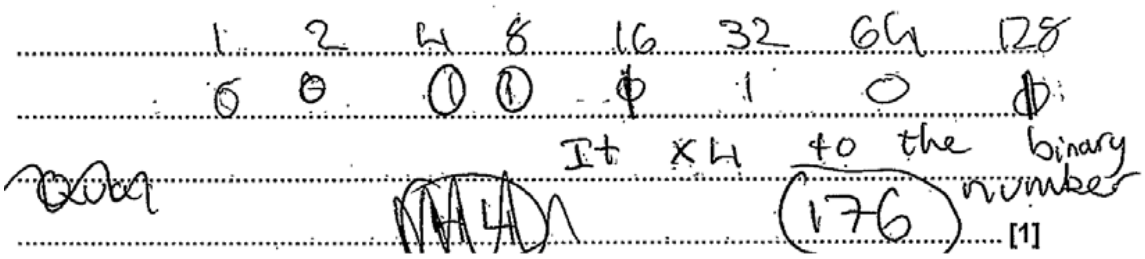
[1]

Examiner commentary

An incorrect response that gains 0 marks.

Exemplar 4

0 marks



Examiner commentary

An incorrect response that gains 0 marks.

The candidate's answer cannot be marked as correct, as it is not clear what the intended answer is. Examiners will not read into candidates answers in this way.

If a mistake is made, the candidate should cross out their answer and replace it.

Question 5(a)(iv)

(iv) Describe a shift that can be used to double the value of the binary number **00100100**.

.....

.....

.....

..... **[2]**

Exemplar 1 — 2 marks

left shift by 1 place

(multiplying by $2^1 = \times 2$)

..... **[2]**

Examiner commentary

The candidate has correctly identified the left shift (1 mark) of one place (1 mark) for both marks.

Exemplar 2 — 2 marks

Shifting left of one place will double the value of the binary number 00100100

0 0 1 0 0 1 0 0 = 36 x 2 = 72

0 1 0 0 1 0 0 0 = 64 + 8 = 72 **[2]**

From 36 to 72.

Examiner commentary

The candidate has correctly identified the left shift (1 mark) of one place (1 mark) for both marks.

Exemplar 3 — 1 mark

Describe a shift that can be used to double the value of the binary number **00100100**.

IF yes Shift the binary 8 the to the left the 1 increases in denary value

..... **[2]**

Examiner commentary

Left shift identified for 1 mark, but no indication of how many places to shift.

Exemplar 4

1 mark

(iv) Describe a shift that can be used to double the value of the binary number **00100100**.

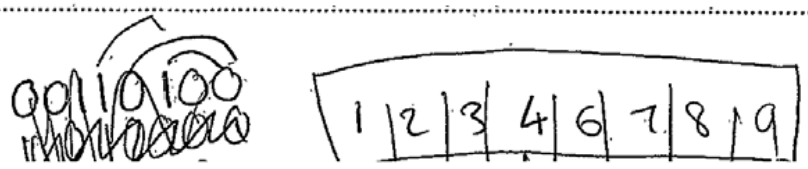
the left shift BOD

.....

.....

.....

..... [2]



Examiner commentary

Left shift identified for 1 mark, but no indication of how many places to shift.

Exemplar 5

1 mark

Describe a shift that can be used to double the value of the binary number **00100100**.

1 2 4 8 16 32 64 128

0 0 0 1 0 0 1 0

IF you shift your 1 one place to the right it double the binary number [2]

Examiner commentary

The candidate correctly states that a 'one place shift' is needed, but gives the wrong direction.

Question 5(b)(i)

(b) The table below (Fig. 3) shows the ASCII codes for a number of characters.

The lower case ASCII code for a character can be found by adding **0100000** to the upper case version.

Character	ASCII code
R	1 0 1 0 0 1 0
r	1 1 1 0 0 1 0
A	1 0 0 0 0 0 1
a	
E	1 0 0 0 1 0 1
e	

Fig. 3

(i) Complete the table above by filling in the missing ASCII codes. **[2]**

Exemplar 1 — 2 marks

(b) The table below (Fig. 3) shows the ASCII codes for a number of characters.

The lower case ASCII code for a character can be found by adding **0100000** to the upper case version.

Character	ASCII code
R	1 0 1 0 0 1 0
r	1 1 1 0 0 1 0
A	1 0 0 0 0 0 1
a	1 1 0 0 0 0 0 1
E	1 0 0 0 1 0 1
e	1 1 0 0 1 0 1

Fig. 3

(i) Complete the table above by filling in the missing ASCII codes. **[2]**

Examiner commentary

The candidate has correctly identified the result of the addition for both parts of this question.

Exemplar 2

2 marks

(b) The table below (Fig. 3) shows the ASCII codes for a number of characters.

The lower case ASCII code for a character can be found by adding **0100000** to the upper case version.

Character	ASCII code
R	1010010
r	1110010
A	1000001
a	1100001 ✓
E	1000101
e	1100101 ✓

Fig. 3

(i) Complete the table above by filling in the missing ASCII codes. **[2]**

Examiner commentary

The candidate has correctly identified the result of the addition for both parts of this question.

Exemplar 3

0 marks

(b) The table below (Fig. 3) shows the ASCII codes for a number of characters.

The lower case ASCII code for a character can be found by adding **0100000** to the upper case version.

Character	ASCII code
R	1010010
r	1110010
A	1000001
a	101001 ✗
E	1000101
e	1100100 ✗

Fig. 3

(i) Complete the table above by filling in the missing ASCII codes. **[2]**

Examiner commentary

An incorrect response that gains 0 marks.

Question 5(b)(ii)

(ii) Compare the use of ASCII and Extended ASCII to represent characters.

.....

.....

.....

.....

.....

..... **[2]**

Exemplar 1 2 marks

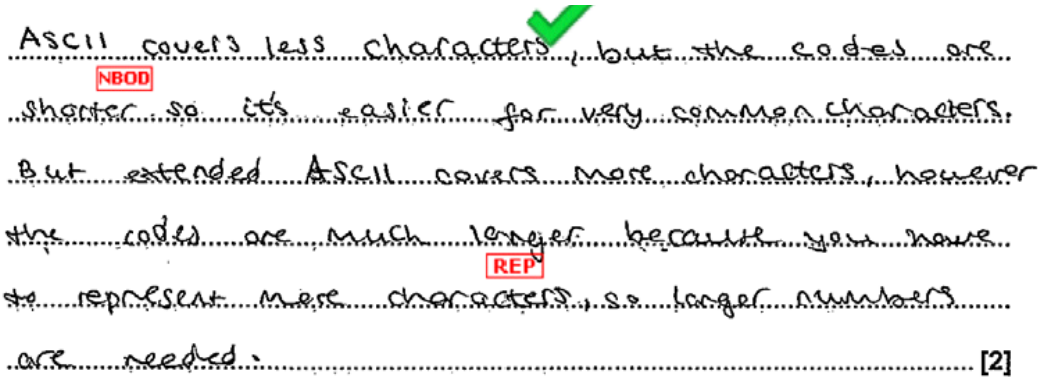
Extended ASCII uses 8 bit to represent 2^8 (256) characters whereas ASCII uses 7 bits to represent 2^7 (128) characters ✓ ✓ Extended ASCII can represent more symbols than ASCII but it takes up more bits / more memory to store. Extended ASCII is more useful as it allows more characters and symbols to be represented and expressed. [2]

Examiner commentary

The candidate has given correct comparisons here; firstly, the number of bits used to store each character in ASCII and Extended ASCII is given with the clear idea that Extended ASCII will use more bits than ASCII, which is 7-bit. The important idea here is not specific numbers, but rather the comparison that one is larger than the other. The second mark is given for the other comparison, that this means Extended ASCII can represent more symbols or characters. Again, it is the comparison that gains the mark here as per the question stem.

Exemplar 2

1 mark

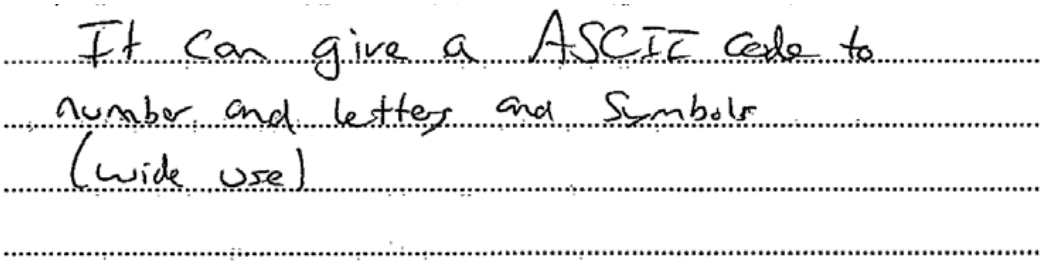


Examiner commentary

A response that gains 1 mark for identifying that ASCII has a smaller character set. The candidate repeats the same point – identifying that Extended ASCII has a large character set, without meeting any other marking point.

Exemplar 3

0 marks



Examiner commentary

An incorrect response that gains 0 marks.

Question 6(a)

6 An infinite loop is where a section of a program repeats indefinitely.

(a) For each of the pseudocode algorithms shown below, tick the appropriate box to show whether they will loop infinitely or not.

Pseudocode	Will loop infinitely	Will not loop infinitely
01 x = 0 02 while True 03 print x 04 endwhile		
01 x = 0 02 while x < 10 03 print x 04 endwhile		
01 x = 0 02 while x < 10 03 print x 04 x = x + 1 05 endwhile		
01 y = 5 02 for x = 1 to y 03 print x 04 next		

[4]

Exemplar 1

4 marks

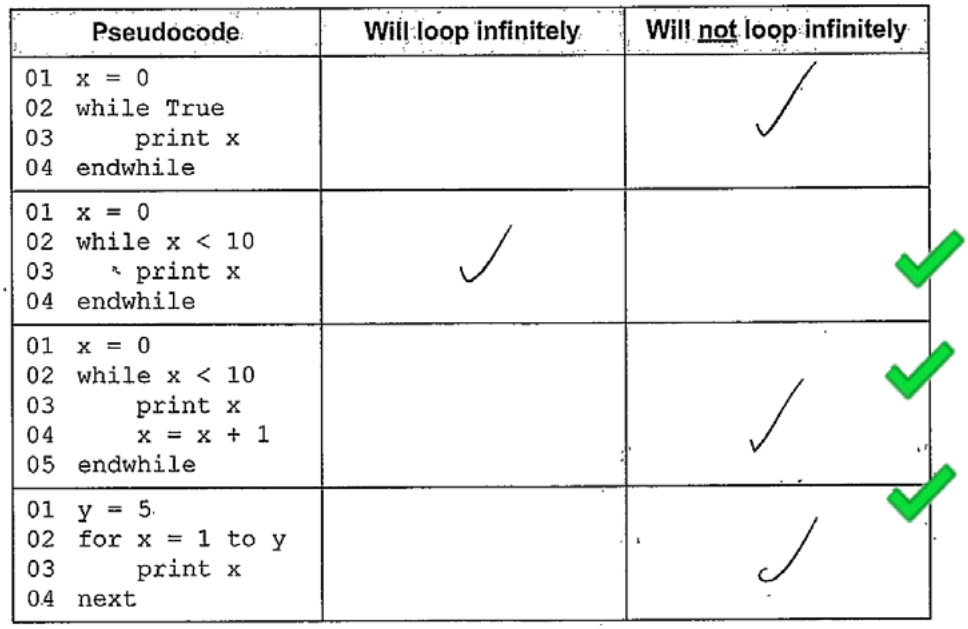
Pseudocode	Will loop infinitely	Will not loop infinitely
01 x = 0 02 while True 03 print x 04 endwhile	✓	✓
01 x = 0 02 while x < 10 03 print x 04 endwhile	✓	
01 x = 0 02 while x < 10 03 print x 04 x = x + 1 05 endwhile		✓
01 y = 5 02 for x = 1 to y 03 print x 04 next		✓

Examiner commentary

The candidate has correctly identified whether all four of the examples given will loop infinitely or not. 1 mark was credited per row, 4 rows correctly given.

Exemplar 2

3 marks



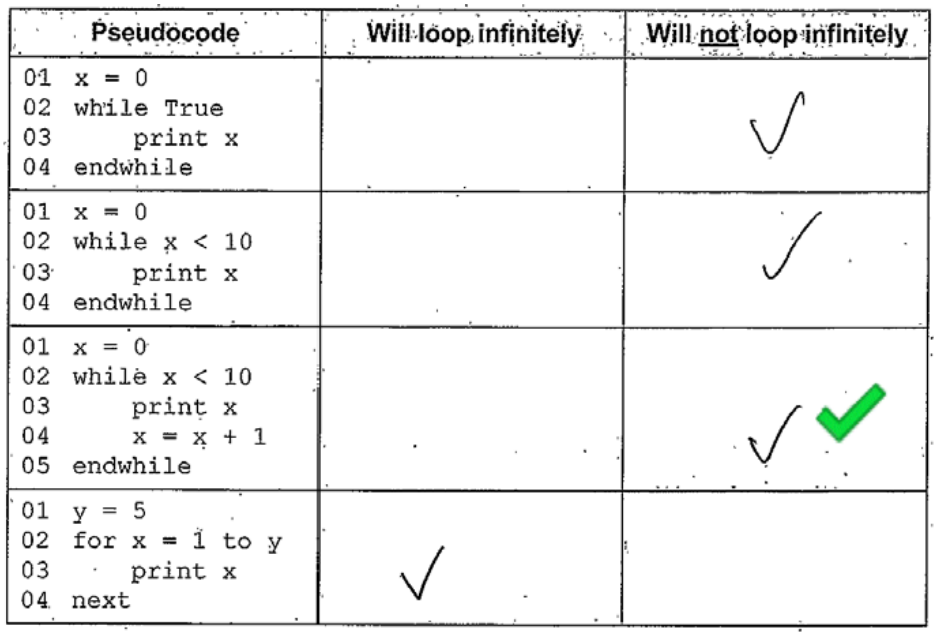
Pseudocode	Will loop infinitely	Will not loop infinitely
01 x = 0 02 while True 03 print x 04 endwhile		✓
01 x = 0 02 while x < 10 03 print x 04 endwhile	✓	✓
01 x = 0 02 while x < 10 03 print x 04 x = x + 1 05 endwhile		✓ ✓
01 y = 5 02 for x = 1 to y 03 print x 04 next		✓ ✓

Examiner commentary

3 out of 4 marks achieved, but the candidate has mistakenly identified the first example as not looping infinitely.

Exemplar 3

1 mark



Pseudocode	Will loop infinitely	Will not loop infinitely
01 x = 0 02 while True 03 print x 04 endwhile		✓
01 x = 0 02 while x < 10 03 print x 04 endwhile		✓
01 x = 0 02 while x < 10 03 print x 04 x = x + 1 05 endwhile		✓ ✓
01 y = 5 02 for x = 1 to y 03 print x 04 next	✓	

Examiner commentary

Only one of the four items of pseudocode correctly classified.

Question 6(b)

(b) Using pseudocode, write an algorithm that will use a count-controlled loop to print out the numbers 1 to 10 in ascending order.

.....

.....

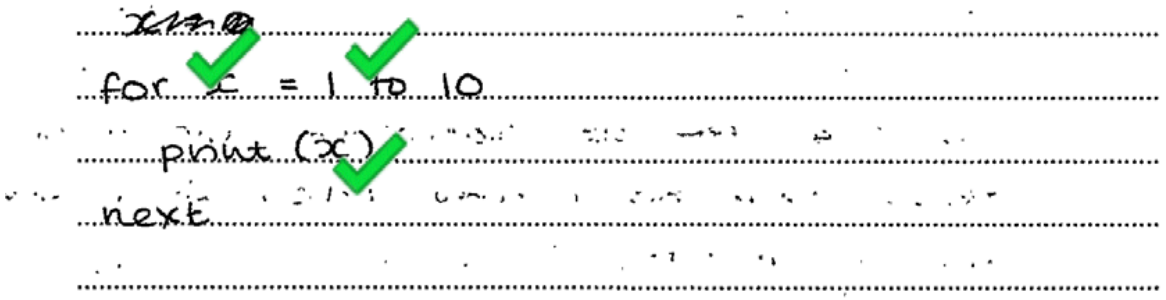
.....

.....

.....

..... **[3]**

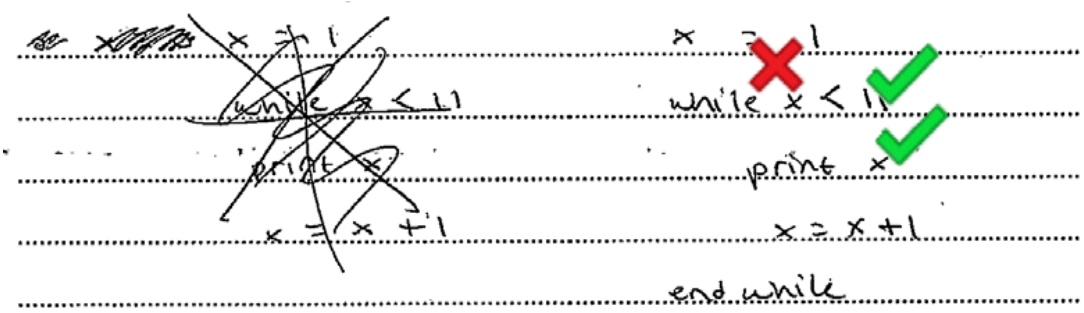
Exemplar 1 3 marks



Examiner commentary

Here the candidate has correctly and sensibly identified a FOR loop as being the count controlled loop asked for in the question. This is then set to loop 10 times (for x = 1 to 10), with the counter variable printed out inside each iteration. A common mistake here, which this candidate avoids, is to try and manually increment the counter variable; this is not needed with a FOR loop.

Exemplar 2 2 marks

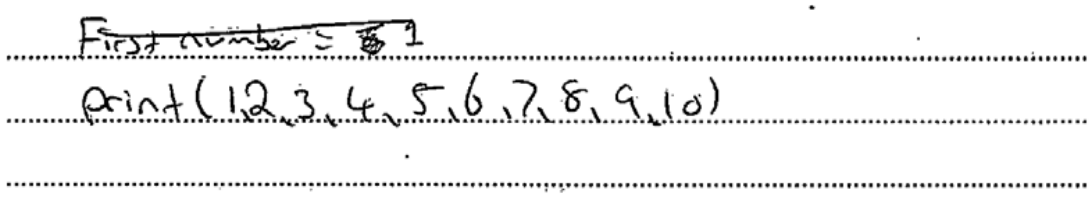


Examiner commentary

The candidate has incorrectly stated that a WHILE loop is count controlled when in fact it is condition controlled (even if that condition may be a comparison against a counter variable). Despite this, the candidate is able to gain the other 2 marks for the response that correctly loops between 1 and 10 and prints out the counter variable. Here the increment is needed to be done manually for a WHILE loop.

Exemplar 3

0 marks

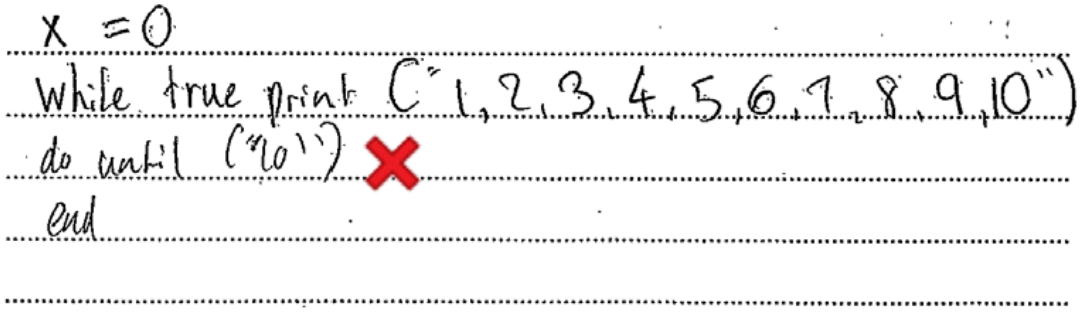


Examiner commentary

An incorrect response that gains 0 marks. No mention of any sort of loop and so no marks can be credited, despite the shortcut taken by the candidate to attempt to hard-code the output of the numbers 1 to 10. Candidates must read the question and respond with a suitable matching answer to gain marks.

Exemplar 4

0 marks



Examiner commentary

An incorrect response that gains 0 marks.

Question 7(a)(i)

7 Victoria is writing a program using a high level language to display the meaning of computer science acronyms that are entered. The code for her first attempt at this program is shown below.

```
01 a = input("Enter an acronym")
02 if a == "LAN" then
03       print("Local Area Network")
04 elseif a == "WAN" then
05       print("Wide Area Network")
06 .....
07 .....
08 endif
```

(a) (i) Complete the code above to print out an "unknown" message if any other acronym is entered by the user. **[2]**

Exemplar 1

2 marks

```
01 a = input("Enter an acronym")
02 if a == "LAN" then
03       print("Local Area Network")
04 elseif a == "WAN" then
05       print("Wide Area Network")
06 else
07       print("unknown")
08 endif
```

Examiner commentary

The candidate has correctly identified the ELSE (1 mark) and then the suitable print statement (1 mark).

Exemplar 2

1 mark

```
01 a = input("Enter an acronym")
02 if a == "LAN" then
03       print("Local Area Network")
04 elseif a == "WAN" then
05       print("Wide Area Network")
06 elseif a != "LAN" or "WAN"
07 print("please try again")
08 endif
```

Examiner commentary

The IF statement is logically incorrect – if two comparisons are to be made then a shortcut like this will not work – IF a !="LAN" and/or a!="WAN" would be logically acceptable but not in the form the candidate presents this. The print statement on line 07 is given 1 mark.

Exemplar 3

0 marks

```
01 a = input("Enter an acronym")
02 if a == "LAN" then
03       print("Local Area Network")
04 elseif a == "WAN" then
05       print("Wide Area Network")
06 IF (acronym) != (LAN) or (WAN):
07     print(unknown)
08 endif
```

Examiner commentary

This is a typical incorrect answer and highlights two key points. Firstly, the IF statement is logically incorrect – if two comparisons are to be made then a shortcut like this will not work – `IF a !="LAN" and/or a!="WAN"` would be logically acceptable but not in the form the candidate presents this.

Secondly, both the "unknown" message and the "LAN" and "WAN" values are strings and need to be surrounded by string delimiters (single or double quotation marks to indicate this). As the candidate presents this, these will be treated as variables instead which is not what is required.

Question 7(a)(ii)

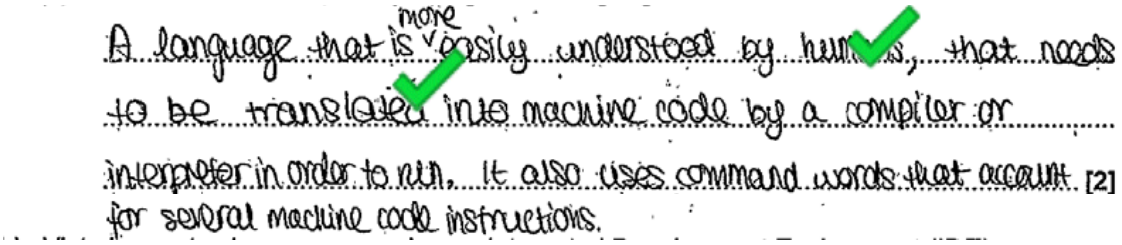
(ii) Describe what is meant by a "high level language".

.....

.....

..... [2]

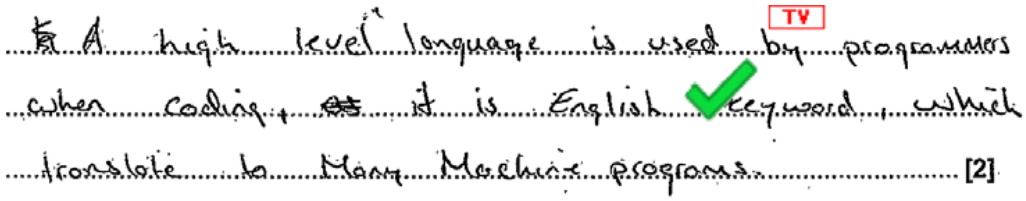
Exemplar 1 2 marks



Examiner commentary

The candidate here correctly identifies that a high level language is aimed at / understandable by humans (1 mark) and also has to be translated into machine code before it can be run (1 mark).

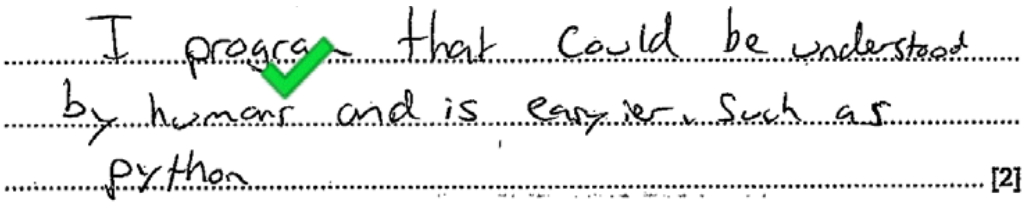
Exemplar 2 1 mark



Examiner commentary

Used by programmers is not enough to suggest that it is specifically understood or aimed at humans (after all, low level code can also be used by programmers). However, a mark is credited for stating that it uses English keyword. Translation is mentioned, but in the incorrect context of translating into "many machine programs" (sic).

Exemplar 3 1 mark



Examiner commentary

"Understood by humans" is marked as correct for 1 mark.

Exemplar 4 0 marks

A high level language is the top language level and is coding languages such as python and java. [2]

Examiner commentary

The candidate perhaps understands the meaning of a high level language but simply gives examples of Python and Java. Whilst these are correct examples, the question asks for a description and so these are not credited with any marks.

Exemplar 5 0 marks

A langurge that is capable of meny, many things and is usually hard to learn because of its complexity. [2]

Examiner commentary

A common mistake on this question was to state that high level means complex, as in "hard to learn by programmers". This is not correct and therefore not given marks.

Exemplar 6 0 marks

High level language is when ~~pmmo~~ Comed words are used in program [2]

Examiner commentary

An incorrect response that gains 0 marks.

Question 7(b)

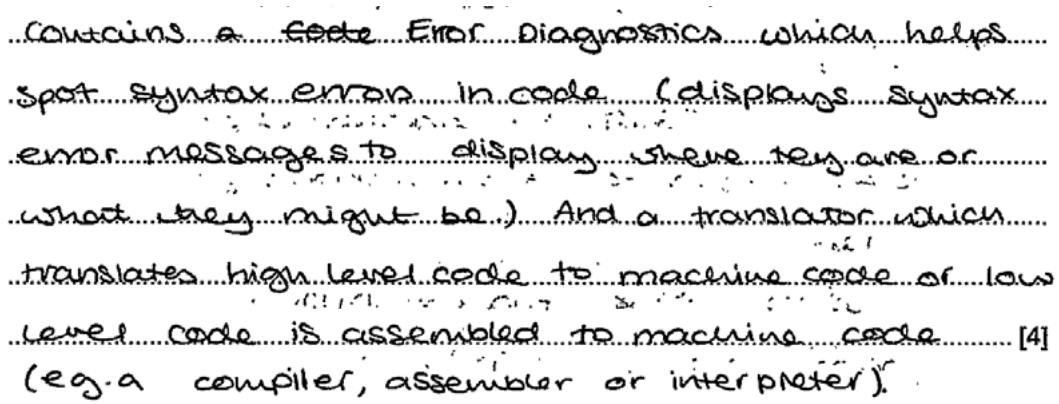
(b) Victoria creates her program using an Integrated Development Environment (IDE).

Describe two tools or facilities that an IDE commonly provides.

[4]

Exemplar 1

4 marks

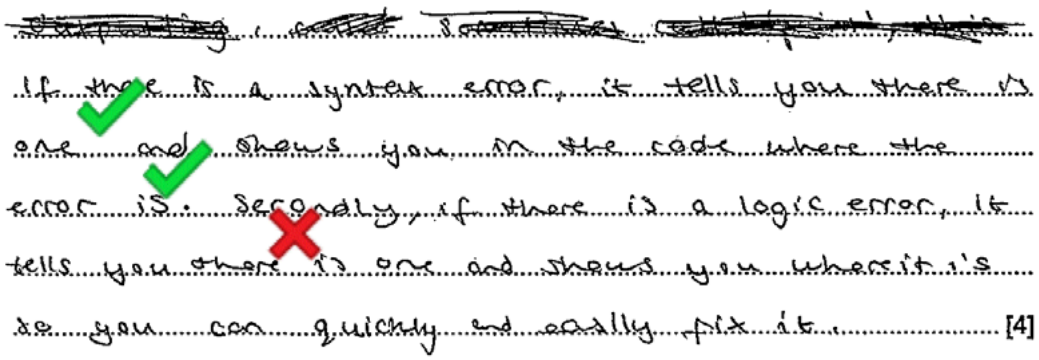


Examiner commentary

The candidate identifies and describes error diagnostics (2 marks) before then also identifying and describing a translator (2 marks), both of which are tools or facilities commonly found in an IDE.

Exemplar 2

2 marks



Examiner commentary

Marks credited for identifying syntax errors in the code and telling the programmer where these occur. However, the second half of this response is at best a repeat (again mentioning errors) and at worst incorrect – logic errors by their definition are not able to be trapped by an IDE. It is worth centres being aware that whatever the mark scheme says for various questions, incorrect answers will not be credited with marks.

Exemplar 3 — 2 marks

A IDE provides Syntax checking, so when A program is run, it can error due to a Syntax error, helping the programmer correct their code. You can also comment ~~You~~ the code, to help remind your self or anyone else what your code does and how it works. Also able to comment out code stopping [4]

NBOD

Examiner commentary

Syntax checking given for 2 marks. The second half of the response discusses commenting on code, which is not by itself a feature of an IDE.

Exemplar 4 — 1 mark

Describe two tools or facilities that an IDE commonly provides.

disk fragmenter, translater, converter, disk Frasher

Examiner commentary

Translator identified but not described (1 mark). The other responses are not part of an IDE and so are incorrect.

Exemplar 5 — 0 marks

safety - Protects against any unwanted data

Examiner commentary

An incorrect response that gains 0 marks.

Question 8

8 OCR town are holding an election with three candidates (A, B and C). An electronic voting booth will be used to allow people to vote.

Write an algorithm that:

- Allows voters to enter either A, B or C.
- Keeps track of how many times each candidate has been voted for.
- As soon as one person has finished voting, allows the next person to vote.
- At any point allows the official to type in "END", which will print out the number of votes for each candidate and the total number of votes overall.

.....

.....

.....

..... [6]

Exemplar 1

6 marks

```
8 : OCR TOWN
8 candidateA = 0
  candidateB = 0
  candidateC = 0
  doagain = TRUE
  DO
      OUTPUT "enter vote : A, B, or C"
      answer = INPUT
      If answer == "A" then
          candidateA = candidateA + 1
      else if answer == "B" then
          candidateB = candidateB + 1
      elseif answer == "C" then
          candidateC = candidateC + 1
      elseif answer == "END"
      doagain = "False
      endif
  loop while doagain == TRUE
  OUTPUT "candidateA got " & candidateA & "votes"
  OUTPUT "candidateB got " & candidateB & "votes"
  OUTPUT "candidateC got " & candidateC & "votes"
```

```
totalvotes = candidateA + candidateB + candidateC
OUTPUT "total was " & totalvotes & "votes"
```

Examiner commentary

This is a high ability answer that hits all 6 of the mark scheme points and consequently scores 6 marks.

The variables used to complete the vote counts are initialised to zero at the start. A loop is used in the form of DO/WHILE which clearly shows what is to be repeated and the criteria for iteration. A value is inputted from the user before this is then compared to "A", "B" and "C", incrementing the counter variables as appropriate. When the loop ends, the totals for each count and an overall total vote count are outputted to the user.

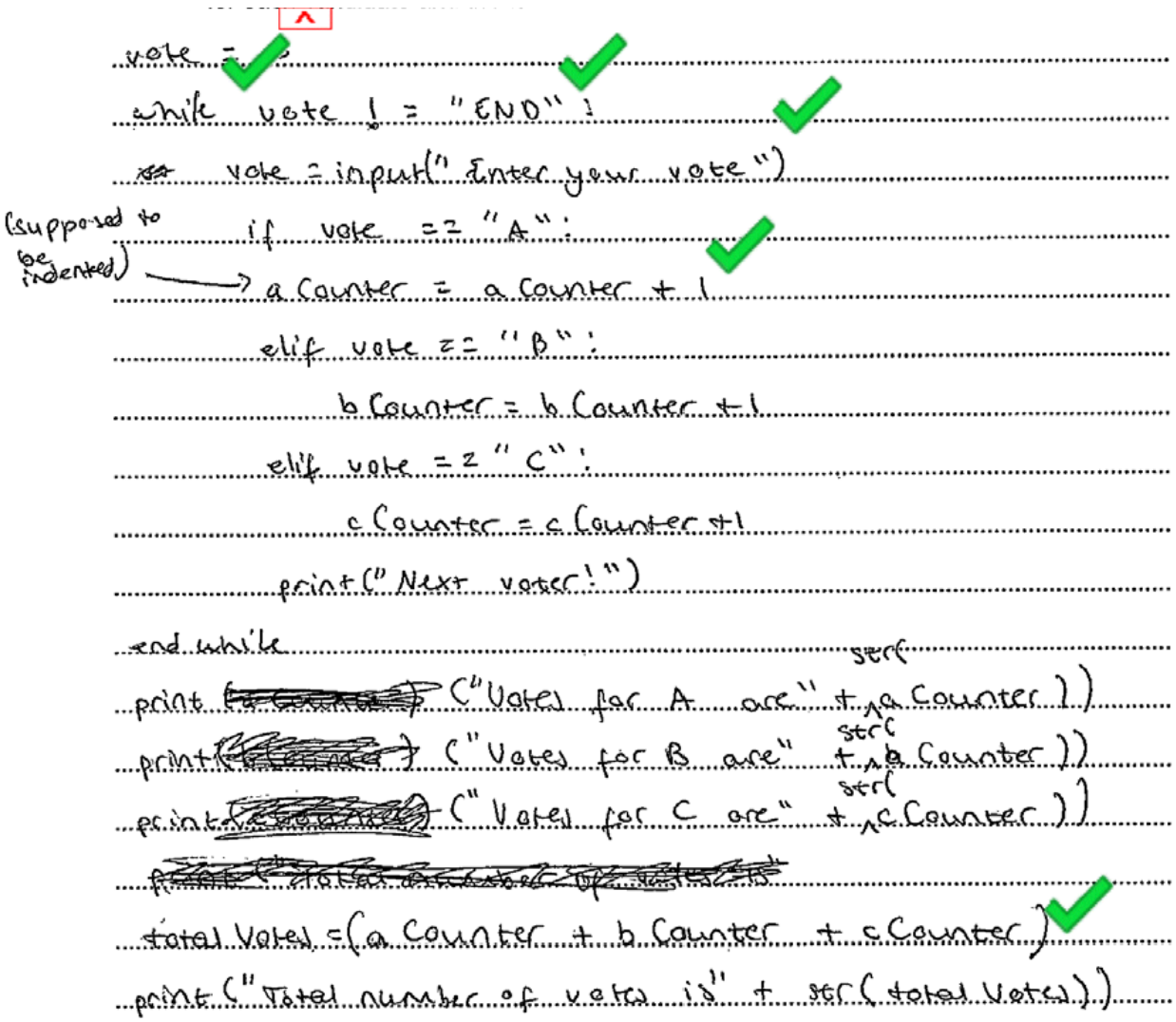
Exemplar 2 6 marks

```
8  A = 0
   B = 0
   C = 0

   vote = input ("Who are you voting for: candidate A, B, or C?")

   while vote != "END"
         if vote == "A" then
               A = A + 1
         elif vote == "B" then
               B = B + 1
         elif vote == "C" then
               C = C + 1
         else
               print ("Invalid input. Only A, B or C is allowed")
         print ("Next person")
         vote = input ("Who are you voting for: A, B or C ?")
   endwhile
   print ("Candidate A received: " + str(A) + "votes")
   print ("Candidate B received: " + str(B) + "votes")
   print ("Candidate C received: " + str(C) + "votes")
   Total = A + B + C
   print ("The total number of votes was: " + str(Total))
```

Examiner commentary

Another good example of a full mark response that hits all of the points on the mark scheme.

Exemplar 3 5 marks

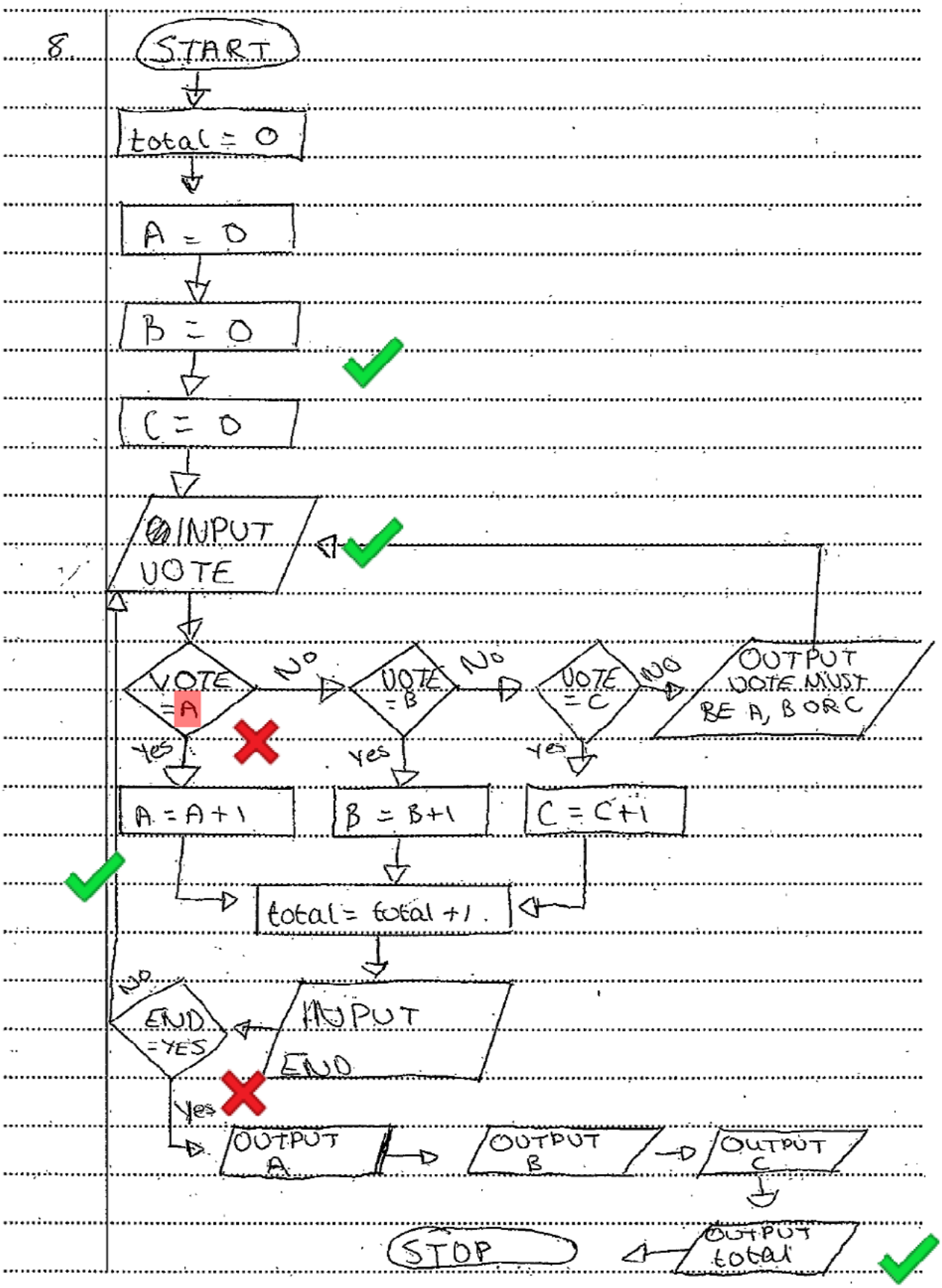


Examiner commentary

A good example that is just missing the initialisation of the variables used at the start; one is initialised, but not the various counters. Apart from this, this response is a logically sound and well expressed response. One point of note here is that although the candidate has cast the integer counter variables into strings so that they can be concatenated, this is not necessary in pseudocode for this question.

Exemplar 4

4 marks

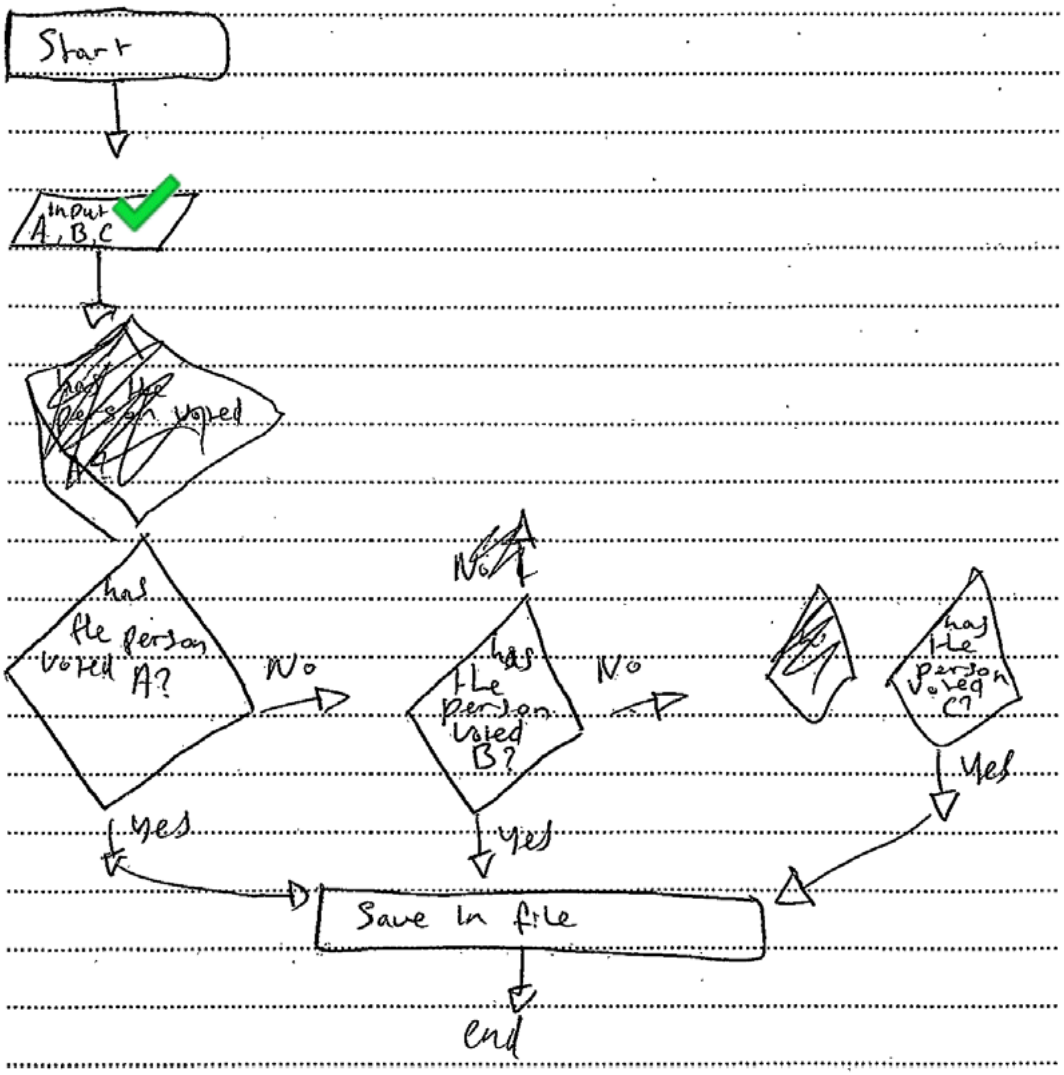


Examiner commentary

This is a relatively good example of how this type of question can be tackled as a flow chart. However, here the candidate loses marks because they do not realise that strings such as "A" are only strings if they are surrounded by string delimiters such as quotation marks (either single or double). The code VOTE = A must clearly distinguish which of the two are variables and which are strings in order to be marked as logically correct.

Exemplar 5

1 mark



[6]

Examiner commentary

A response that shows why flow charts perhaps tend to gain lower marks than pseudocode on algorithms questions such as this one. This flowchart gives a high level overview of what has to be done without the detail of how this can be achieved. One mark is perhaps generously given for the input.

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