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Examiners' Report
June 2019

GCSE Computer Science 1CP1 02

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Introduction

This component requires candidates to demonstrate application of computational thinking.

The untiered paper has been designed so that easier questions are presented earlier in the paper, with gradually more challenging questions later on. The paper is based within a single context. This context is expanded specifically for each question. Unless instructed otherwise, candidates should apply this context when developing responses.

Command words are used consistently in the paper to indicate the type of response expected. When the command word 'explain' is used the question is intended to allow candidates to demonstrate the depth of their understanding of a single topic. This requires candidates to give responses in two joined parts. The first part should be a fact that addresses the question. The second part of the link should be an expansion. It is helpful to consider using words such as because of/result of/associated with/reason for/connected to, which explicitly show an expansion.

There were 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 important that, in a technical subject, the correct terminology is used, and that sufficient detail is given to demonstrate understanding.

Additional blank pages were included to allow for re-working of the flowchart and algorithm questions. When a candidate does not want a response to be marked because it has been replaced, the original should be crossed out. When there are two different responses to a question, and it is unclear which the candidate intends to be marked, the first response will be marked.

Where additional sheets are provided it is important that candidates check that they have addressed all of the questions of the paper.

Question 1 (a)

A first question requiring the identification of variables required in a recipe. Candidates responded well to this question, which was intended to be accessible.

She stores all her recipes on a computer. One variable is needed to hold the amount of fruit and another is needed to hold the number of eggs.

(a) State **two** additional variables that need to be created to store the recipes for ice cream.

(2)

1 amount of vanilla

2 amount of cream

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Examiner Comments

This is a typical response that gains both of the available marks, as achieved by the majority of candidates.

2 marks

She stores all her recipes on a computer. One variable is needed to hold the amount of fruit and another is needed to hold the number of eggs.

(a) State **two** additional variables that need to be created to store the recipes for ice cream.

(2)

1 12 eggs

2 store fruit

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Examiner Comments

This is a typical response where marks are lost because the examples in the question had not been noted but had been repeated as an answer.

0 marks

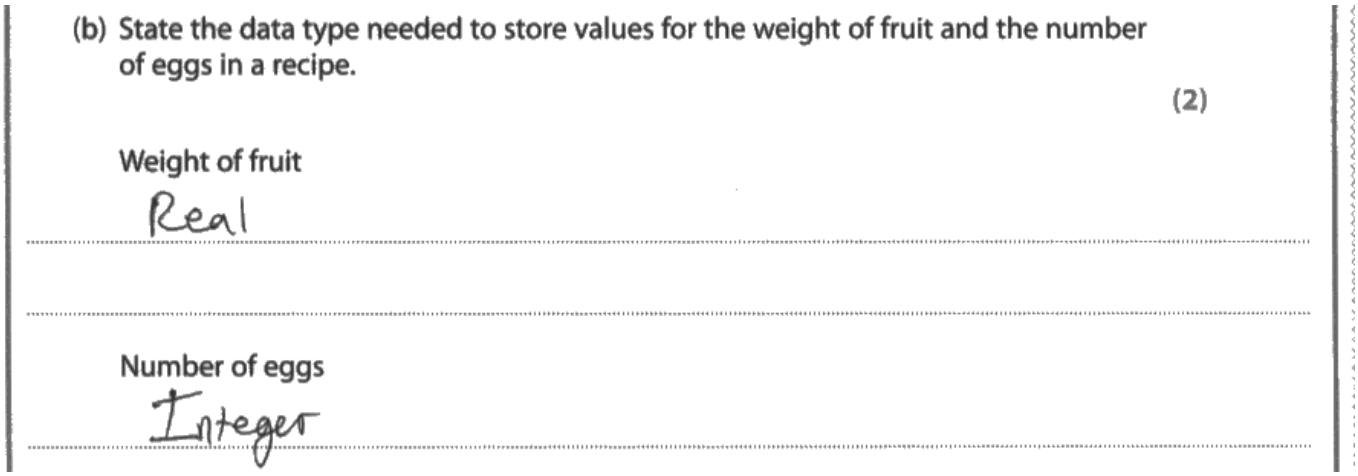
ResultsPlus
Examiner Tip

Meaningful variable names such as amVanilla were accepted, but sell-by date was not, because this does not need to be stored.

Question 1 (b)

This was a question that related to the same recipe as Q01(a), requiring the identification of suitable data types for quantities of different ingredients. Many candidates achieved both marks, with 'Float', 'Double' and 'Decimal' being accepted as alternatives for 'Real'.

A minority of candidates did not recognise the term 'data types' and therefore provided a response that achieved no marks.



(b) State the data type needed to store values for the weight of fruit and the number of eggs in a recipe.

(2)

Weight of fruit

Real

Number of eggs

Integer

ResultsPlus
Examiner Comments

An example of a response that receives both marks.

2 marks

(b) State the data type needed to store values for the weight of fruit and the number of eggs in a recipe.

(2)

Weight of fruit

Register

Number of eggs

RAM

ResultsPlus
Examiner Comments

An example of the type of response that did not receive any marks.

0 marks

Question 1 (c)

'Construct a general expression' enables mathematical content to be included without the need for complex calculations.

In this case, the expression was to identify the number of batches that could be made in a working day. Some candidates included a correct expression for the length of a working day and/or for the time required to make one batch and thereby gained 1 mark.

Only a very small number of candidates recognised that a whole number of batches was required and rounded their answer using 'INT', 'ROUNDDOWN' or 'DIV'.

The ice cream maker must be sterilised at the end of each day. This takes 20 minutes.

Construct a general expression to show how many batches of ice cream can be made in any number of hours.

(2)

$$\frac{\text{Num Hours} \times 60 - 20}{65}$$

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Examiner Comments

A response with correct numerator and denominator that receives the mark available.

1 mark

Construct a general expression to show how many batches of ice cream can be made in any number of hours.

(2)

10 + 30

1 batch = 65 minutes

$$\text{Batches of ice cream (Rounded down)} = \frac{(\text{number of hours} \times 60)}{65}$$

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Examiner Comments

This response receives both marks. Second mark for (Rounded down).

2 marks

ResultsPlus
Examiner Tip

Round() without direction will not be accepted for the second mark

Construct a general expression to show how many batches of ice cream can be made in any number of hours.

(2)

((number of hours * 60) - 20) DIV 65

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Examiner Comments

This response receives both marks. Second mark for use of 'DIV'.

2 marks

Question 2 (a)

This format for 'input', 'process' and 'output' was used in the 2018 paper and many candidates appeared to be familiar with the type of responses required.

The majority of candidates achieved 2 or more marks, with a large number achieving all 3 marks, as per the first clip shown.

'Process' proved to be the most difficult mark to gain, with many candidates using 'determine' to match the other processes given, but not including the required calculation.

A minority of candidates did not receive the input mark, where they concentrated on the method of input but did not describe the input data required.

- each pack of cookies has a sell-by date
- there must always be at least 10 packs of each type of cookie in stock
- quantity ordered must bring the number of packs of each type up to 10.

(3)

Input	Process	Output
Sell-by date	Determine if the sell-by date is passed	Yes, dispose of pack of cookies No, keep pack of cookies
Number of packs of this type of cookie	Determine if number of packs < 10	Yes, order 10 more packets No, take no further action
Number of packs of this type of cookie to reorder	Do 10 - how many are left.	Reorder this number of packs of this type of cookie

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Examiner Comments

This response receives all marks.

3 marks

Input	Process	Output
sell-by date of pack of ~~cookies~~ cookies	Determine if the sell-by date is passed	Yes, dispose of pack of cookies No, keep pack of cookies
Number of packs of this type of cookie	Determine if number of packs < 10	Yes, reorder cookies No, do not reorder cookies
Number of packs of this type of cookie to reorder	Determine if cookies need to be reordered	Reorder this number of packs of this type of cookie

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Examiner Comments

In this response, the mark for 'process' is not awarded.

2 marks

Question 2 (b)

A minority of candidates was familiar with referencing an item in a string by the index, with many candidates not receiving any marks for this question.

The convention of the index starting at '0' was not demonstrated, although several candidates did include a value as [..] to gain 1 mark. A mark was awarded if the response correctly indicated a date of 10 characters and spaces.

State the indexing expression for the first character and the last character of the sell-by date.

(3)

First character

INDEX [11]

Last character

INDEX [21]

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Examiner Comments

This is one of the very small number of responses to gain full marks.

3 marks

First character

[9]

Last character

[17]

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Examiner Comments

This response gains a mark for correct use of [] brackets.

1 mark

Question 2 (c) (i)

Candidates responded reasonably well to this question, with more than half identifying the correct content in the pseudocode.

Question 2 (c) (ii)

A minority of candidates recognised that some user action/input would be required to stop the program running.

(ii) State how the user would stop this code running when it is executing on a computer.

(1)

The program running it could be closed using multiple methods, eg. task manager

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Examiner Comments

A good answer.

1 mark

Question 3 (a)

Candidates responded well to this question.

Question 3 (b)

Candidates responded well to this question.

Question 4 (a)

This question was levels-marked.

Most candidates were able to include relevant but independent points about the pseudocode provided, with many candidates achieving a mark in Level 1.

Some candidates were able further to show some linkages and lines of reasoning in their discussion and thereby achieved marks in Level 2. A small number of candidates demonstrated knowledge in sufficient depth to achieve a mark in Level 3.

The question differentiated well, to achieve a broad range of marks.

4 Margaret needs to keep track of how much money she makes. She collects the sales figures on a weekly basis.

(a) The pseudocode of an algorithm is shown.

```
2 w = 0 REPEAT SET w TO w + 1 SEND w TO DISPLAY UNTIL w = 52
```

In some programming languages, if a program is written like this, it could be translated and executed.

Discuss the suitability of this code for humans and how it could be improved.

(6)

This code is not very suitable for humans because it has not been written in a clear and ~~way~~ descriptive way for a human to be able to understand it and read it clearly. While an experienced programmer may be able to understand the code with more ease, ~~and also read it~~ a beginner may not be able to understand it because the different sections of the code with their respective commands are not clearly identifiable. This is why it is important to split each command onto separate lines, which makes it much easier for the human to see and identify every step of the program, which is essentially decomposition of this line. Also, the programmer should leave white space between the different sections of code, so all the ~~eod~~ lines that are related can be written right underneath each other, but if there is another section of code which tries to perform a different command, there should be at least one or two blank lines between the sections so the user can clearly identify ~~the~~ which lines of code are working together. Another improvement could be to ~~on the~~ indent the lines within the iteration loops to ensure the different loops being used are clear. Comments should be added to easily describe what the code is doing, using a # symbol if it is one line and if it is a multi-lined comment it should be surrounded by ~~(""") quotation marks~~ 3 apostrophes, ''' '''. Finally, the programmer should use descriptive variables so it is ~~clear~~ clear ~~which~~ what the code is actually working on, so instead of 'w' the variable could be 'numberWeeks'.

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A comprehensive answer achieving full marks.

Level 3

6 marks

Discuss the suitability of this code for humans and how it could be improved.

(6)

* Not very suitable for humans because the code is all on one line: making it somewhat difficult for a human to read. Also, the code has no indentation to separate out ~~get~~ parts of it, which isn't suitable for most humans. Also, the pseudocode is meant to keep track of the money she makes but instead keeps track of what week it is. In terms of what week it is, the program is suitable for humans ~~but~~ as it is accurate of real time. It could be improved by ~~adding~~ separating the code onto multiple lines so it is easier to read making the debugging time faster. It could also be improved by adding indentation so it is easier to separate the code out. Another improvement could be to use a programming language that can be translated and executed on most computers, such as Python or Java, as these help identify errors as well. Another improvement could be assigning a variable for money earned/made so Margaret could have an annual total: more efficient.

ResultsPlus
Examiner Comments

Level 2

3 marks

Question 4 (b) (i)

Over half of the candidates did not receive any marks on this question.

Indicating an output to display on every pass was the most common error. Alternative versions of the table, where unchanged values were copied down, were allowed.

A very small number of candidates were well-practised in the use of trace tables and gained full marks for the question.

Complete the trace table showing the execution of the pseudocode with these four inputs. You may not need to fill in all the rows in the table.

(6)

num	x	y	Display
0	999	0	
355			
	355	355	
554			
		554	
199			
	199		
409			
			199 554

ResultsPlus
Examiner Comments

An example of a good response achieving full marks.

6 marks

num	x	y	Display
0	—	—	—
0	999	—	—
0	999	0	—
355	355	355	—
544	355	544	—
199	199	544	—
409	199	409	—
409	199	409	409 199

ResultsPlus
Examiner Comments

This response has errors in pass 4 and in the output.

4 marks

num	x	y	Display
0	999	0	
355	~~999~~ 355	355	
554	~~999~~ 554	554	
199	~~999~~ 199	199	
409	~~999~~ 409	409	

ResultsPlus
Examiner Comments

In this response one mark is given for initialisation of variables and one mark for the first pass.

2 marks

Question 4 (b) (ii)

Fewer than half of the candidates were able to identify the purpose of the algorithm provided.

Question 5 (a)

A minority of candidates identified correctly the run time error indicated, and fewer still could explain that it occurs when the computer tries to execute the code.

Question 5 (b)

This question was very well-answered, with a significant number of candidates gaining all 4 marks.

Question 6 (a)

Candidates found this question to be challenging, with only a minority gaining any marks.

Many candidates confused a constant with the 'fixed values in the code' referred to in the question. No marks were awarded for copying the description of a constant given in the pseudocode booklet provided.

Few of the candidates were able to address the question fully and provide an explanation as to why it is good programming practice to define values as constants.

Explain why it is good programming practice to define values as constants, rather than as fixed values in the code.

(2)

It makes the ~~to~~ code easier to understand ~~as~~ as a reader will ~~know what~~ understand what the code is doing when it is multiplying PROFIT with costProd instead of 0.06 * costProd. It also means that if it needs adjusting, it will only have to be changed once, instead of every place where it is used.

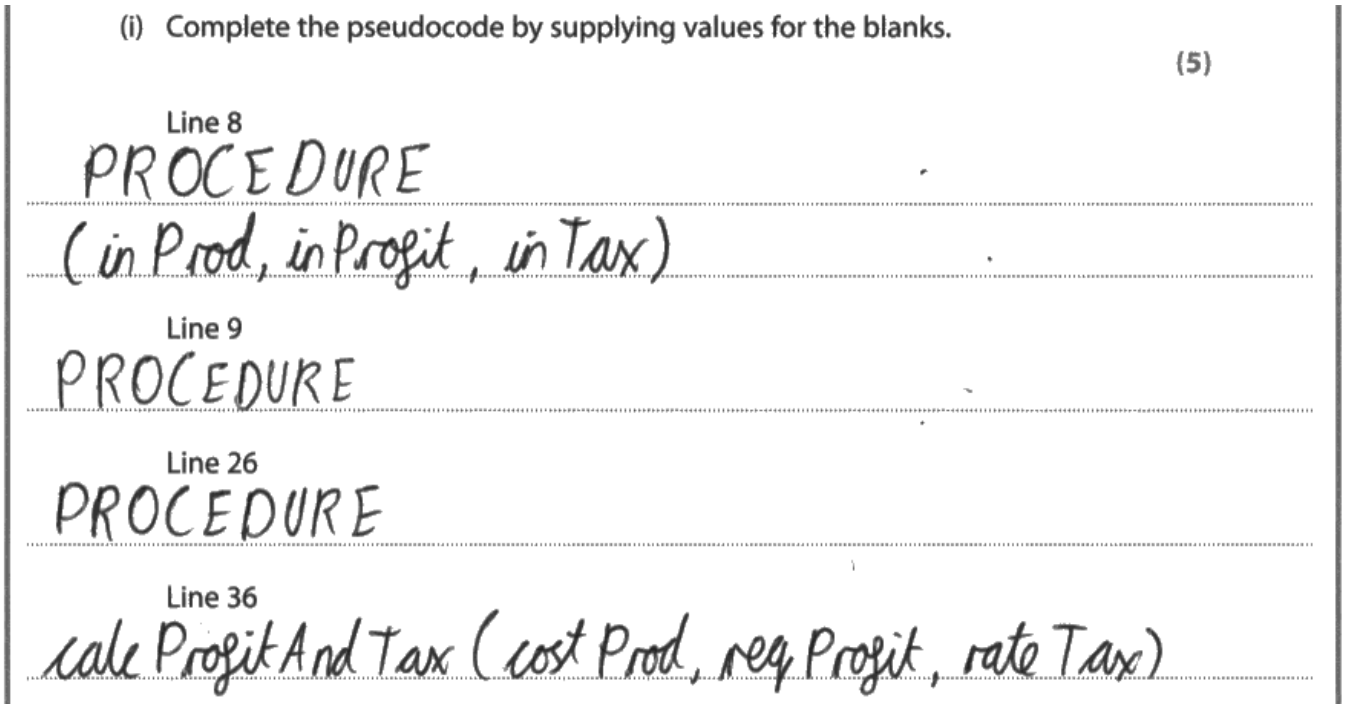
ResultsPlus
Examiner Comments

This response receives both marks.

2 marks

Question 6 (b) (i)

The majority of the candidates received no marks for this question. A small number received 1 mark for including PROCEDURE on three lines of code . Understanding of the process and code for passing parameters is an area for improvement.



(i) Complete the pseudocode by supplying values for the blanks.

(5)

Line 8

PROCEDURE

(inProd, inProfit, inTax)

Line 9

PROCEDURE

Line 26

PROCEDURE

Line 36

calcProfitAndTax (costProd, reqProfit, rateTax)

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Examiner Comments

This response receives full marks.

5 marks

Line 8

procedure: (total cost, production cost, tax, profit).

Line 9

Proceduer

Line 26

Proceduer

Line 36

Display

ResultsPlus
Examiner Comments

A typical response receiving 1 mark for 'PROCEDURE' on lines 8, 9 and 26.

Question 6 (b) (ii)

Candidates found this question to be challenging, with many identifying the variable as having local scope.

A further very small number of candidates included an explanation regarding its declaration within the subprogram.

Question 6 (b) (iii)

Candidates found this question to be challenging, although standard validation test names, such as 'Presence', 'Type' etc were accepted. A few candidates gained all 3 marks for this question, with more gaining 1 or 2 marks.

As previously advised, the test data for 'presence check' should be an empty string, such as "", null, or the word 'nothing'. Many candidates supplied " ", a string of spaces, which has length and content. This was awarded, but responses should be accurate in the context of input validation.

Construct **two** validation tests. Test data for Test 1 is provided.

Give an example of invalid test data for Test 2.

(3)

Test	Validation test	Test data
Test 1	Checks tax rates are above 0	-0.03
Test 2	Checks that the tax rate is a number	A B C

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Examiner Comments

This is one of the few responses that is awarded all marks.

3 marks

Test	Validation test	Test data
Test 1	~~lookup check~~ ~~erroneous~~ ~~erroneous~~ (look up check) (range check)	-0.03
Test 2	normal ~~Erroneous~~ ~~Exceeded~~ ~~Erroneous~~ Type check	~~0 - 6~~ 4 EFG

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Examiner Comments

This response receives 2 marks, both for test 2.

2 marks

Question 7 (a)

A full range of marks was awarded for this question, with quite a large number of candidates gaining all 3 marks.

However, many candidates appeared not to recognise the term 'data structure' and therefore were not able to address the requirements of the question.

Question 7 (b)

Many candidates were able to select the correct type of loop and many of the candidates justified their selection, to gain both marks for the question.

The most frequent error was the selection of a while loop for use with a dataset of known length.

Question 7 (c)

Candidates found this question challenging, although many were able to suggest suitable amendments to the pseudocode involving nested ifs/elseif statements.

A minority of candidates was able to explain how their suggested amendments would improve the efficiency of the algorithm, with only a very few gaining more than 1 mark for the question.

Explain how the algorithm should be amended to address this inefficiency.

(3)

Nestle each if statement into the else of the previous statement so that once the relevant range has been found it doesn't have to carry on checking the other ranges. This works because a number can only ever be in one set of the ranges.

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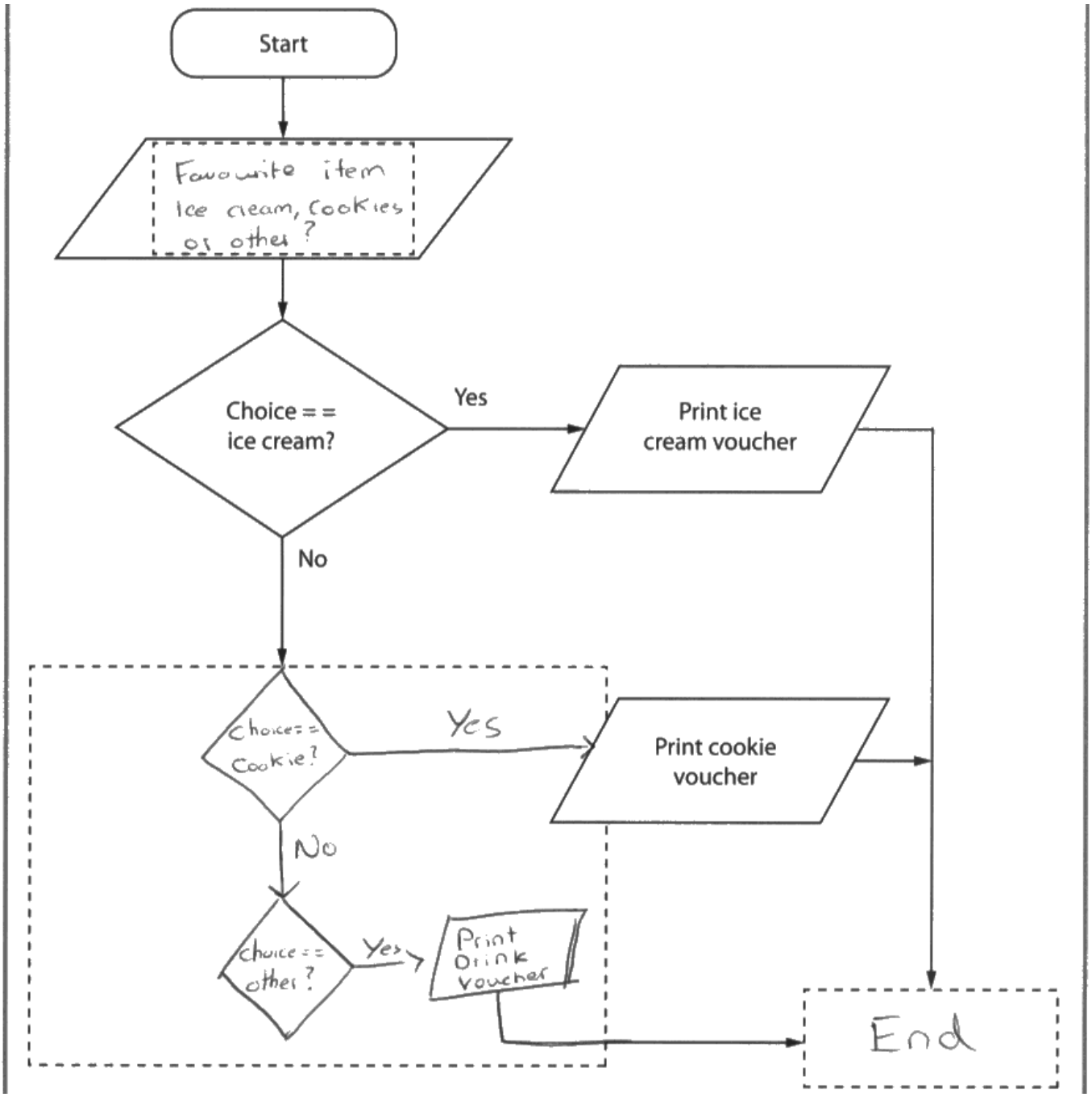
An example of a response that is awarded all of the marks.

3 marks

Question 8 (a)

Candidates responded well to this question, which required the completion of a flowchart for a money-off voucher scheme.

Most candidates were able to represent the required functionality with only minor errors in logic. Most of the flowcharts presented a recognisable convention.



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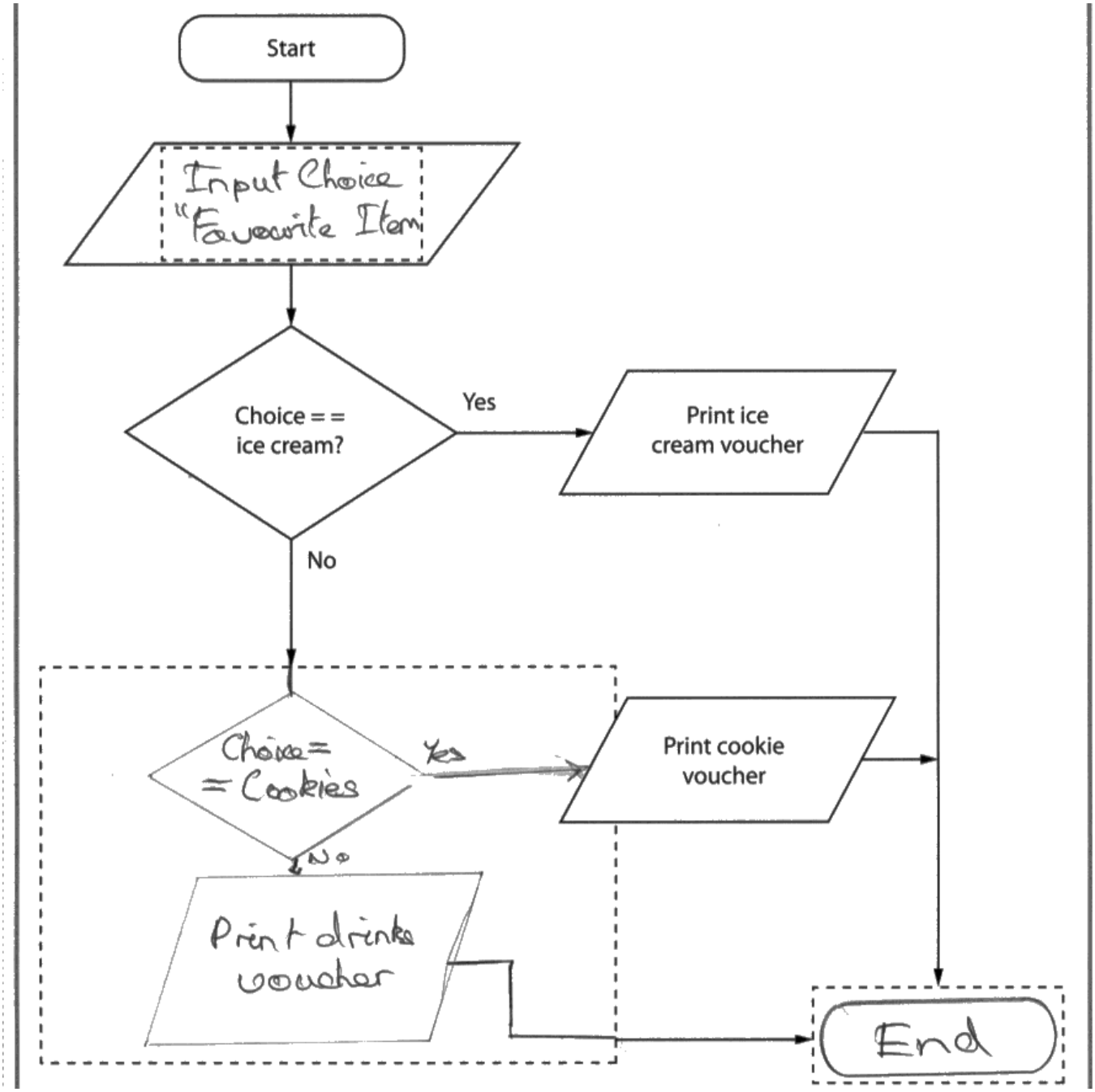
Examiner Comments

The candidate includes an unnecessary decision box and omits the 'end' symbol.

4 marks



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Examiner Comments

This response is an example of a flowchart that achieves full marks.

It is typical of many candidates' responses.

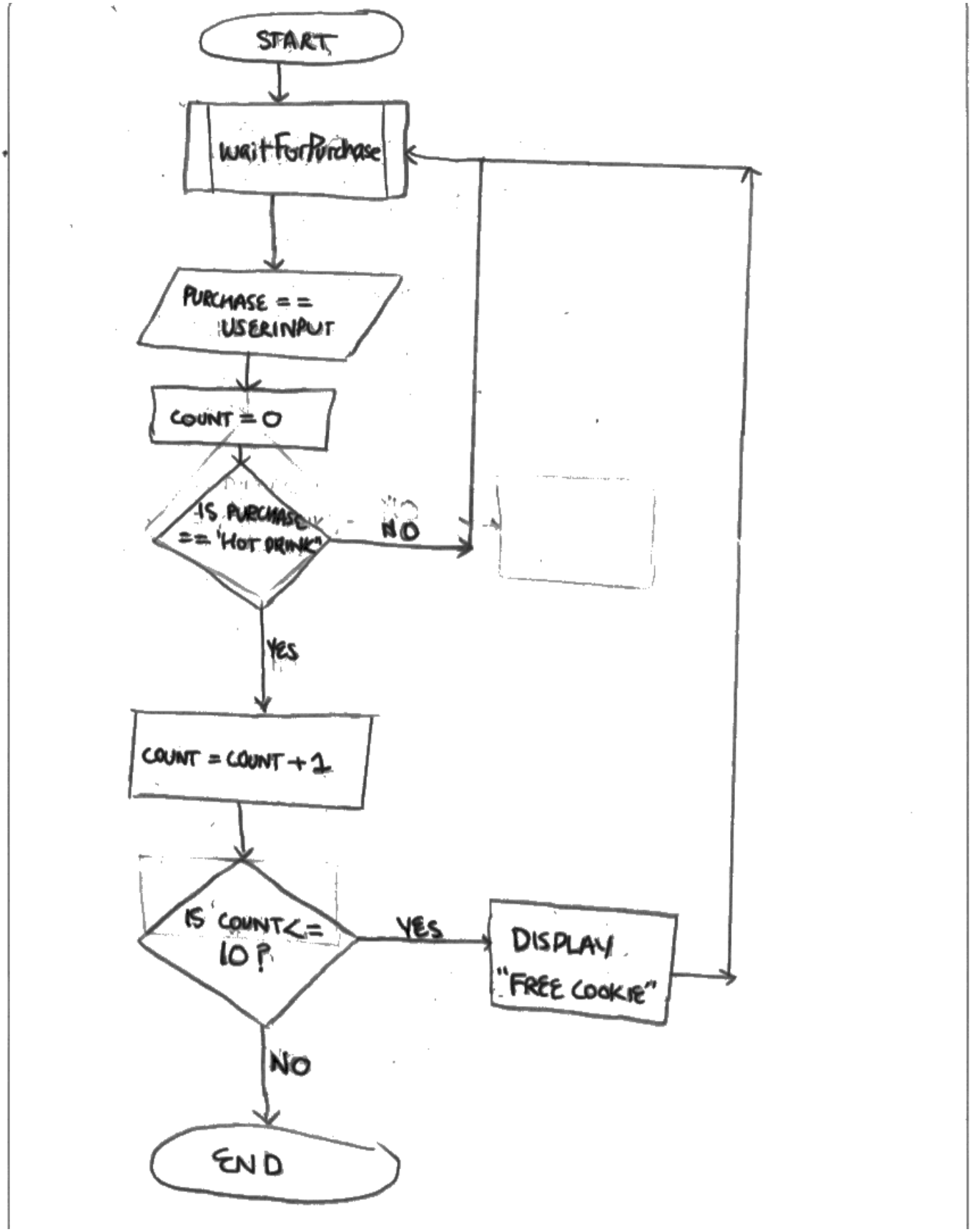
6 marks

Question 8 (b)

This question required candidates to create a flowchart of their own to illustrate a reward scheme for selected customers. The question was levels-marked and produced a full range of marks.

A significant number of candidates achieved a mark in the top level (Level 3) and twice as many achieved a mark in Level 2. A 'Wait for next purchase' symbol was provided and this symbol was required for the award of 3 marks for notation.

Candidates generally achieved well in the notation strand. Most candidates found the functionality strand to be more challenging, where the most frequent errors occurred in the tracking of the number of customers receiving the reward.


START
WaitForPurchase
PURCHASE == USERINPUT
COUNT = 0
IS PURCHASE == 'HOT DRINK'
NO
YES
COUNT = COUNT + 1
IS COUNT <= 10 ?
YES
DISPLAY "FREE COOKIE"
NO
END

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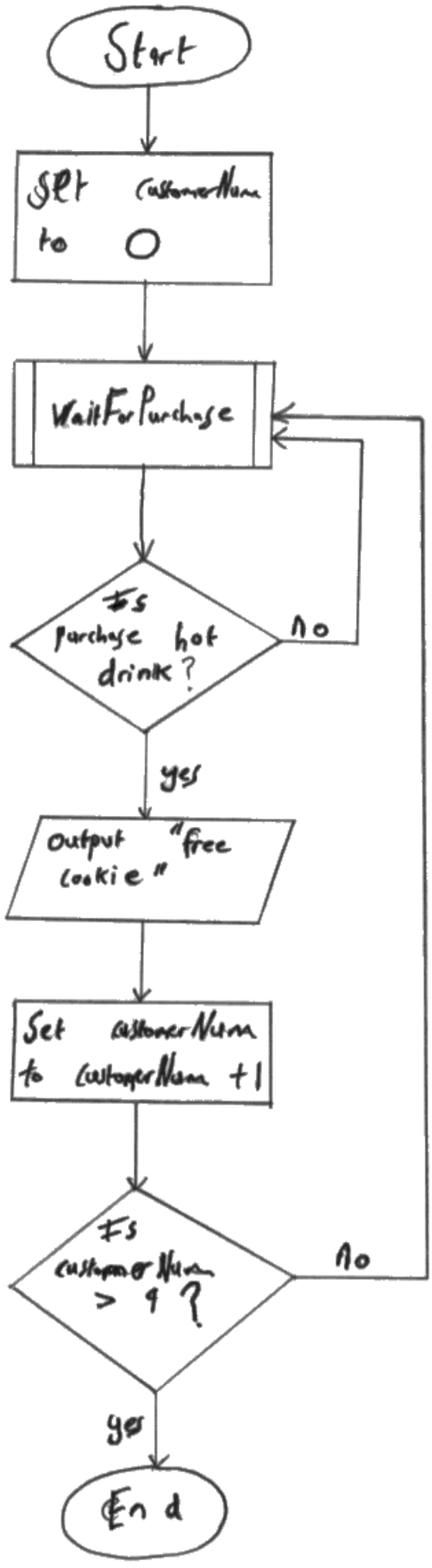
Examiner Comments

Re-setting the count to zero for each customer being considered a significant logic error, this leads to a solution that is not functional.

4 marks


Start
Set CustomerNum to 0
WaitForPurchase
Is purchase hot drink?
No
yes
Output "free cookie"
Set CustomerNum to CustomerNum + 1
Is CustomerNum > 9 ?
No
yes
End

ResultsPlus
Examiner Comments

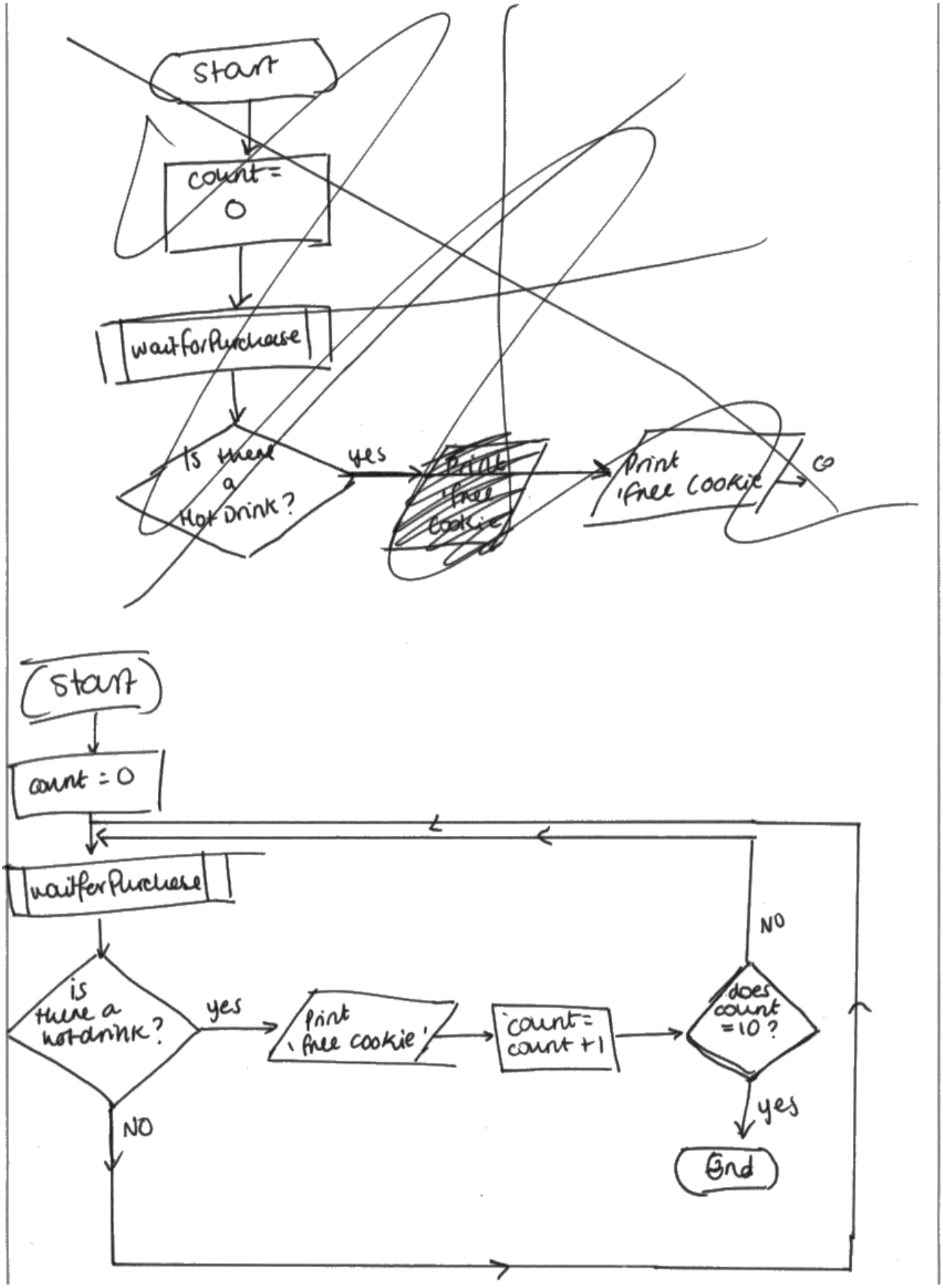
This is an example of a flowchart that achieves full marks.

6 marks

ResultsPlus
Examiner Tip

A clear flowchart is easy to mark and helps to identify any errors

Use the spare pages provided to design the flowchart before drafting a final version


start
count = 0
waitforPurchase
Is there a Hot Drink?
yes
Print 'free cookie'
Print 'free cookie'
Go
start
count = 0
waitforPurchase
is there a hotdrink?
yes
print 'free cookie'
'count = count + 1
does count = 10?
NO
yes
End
NO

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Examiner Comments

Another example of a flowchart receiving full marks.

6 marks

Question 9

This question required candidates to write an algorithm to check that a series of given values is within a permitted range; in this case, temperatures set at -18^0 C, +/- 1^0 C.

The question was levels-marked using levels for functionality, accuracy of notation and efficiency.

The question produced a full range of marks, although candidates found the problem to be challenging, with only a very small number of them achieving marks in the top level, Level 3.

Most of the algorithms were presented either as Python code or pseudocode based on the booklet provided. Candidates who drafted and refined their designs prior to presenting a final solution to the problem, tended to be more successful.

Write an algorithm to inform Margaret if any of the freezers are faulty. Use pseudocode or a programming language with which you are familiar.

Please write your algorithm on pages 29, 30 and 31. You may not need all of this space for your answer.

Please draw a line through any work you do not want to be marked.

(9)

```
SET freezers TO [-20, -19, -18, -17, -16, 0, 1];
FOR
SET freezerNum TO 0;
FOR machine IN freezers DO
FOR EACH machine FROM freezers DO
FOR EACH temp FROM freezers DO
    IF temp <-19 OR temp >-17 THEN
        SEND "Freezer" & freezerNum & "is
        out of tolerance: " & temp;
    ENDIF;
    freezerNum =
    SET freezerNum TO freezerNum+1;
END FOR;
```

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Examiner Comments

This is an example of a Level 3 response that receives full marks.

9 marks

SET freezers TO [-20, -19, -18, -17, -16, 0, 1]

```
SET freezers TO [-20,-19,-18,-17,-16,0,1]
FOR i IN RANGE(7) THEN
    i = 0
    IF freezers [i] <> -18 THEN
        IF freezers [i] <> -17 OR freezers [i] <> -19 THEN
            SEND "Freezer", i, "is out of tolerance:", [i]
            i = i + 1
        END IF
    END IF
END FOR
```

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This is an example of a Level 2 response where the error in incrementing the index has prevented a higher mark.

5 marks

SET freezers TO [-20, -19, -18, -17, -16, 0, 1]

```
SET x TO False
While x = False Do
# Sel freezeri to the number the index relates to
  SET freezeri To i = freezer
  For i from 0 TO (Length(freezers)-1) Do
    while freezers <-19 OR freezers >-17 Do
      SEND "Freezer "& i &" is at" & freezeri
      TO DISPLAY
  END while
  END FOR
```

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This is an example of a Level 1 response, awarded marks for use of an inconsistent convention and identifying the correct range of values.

2 marks

Paper Summary

Based on their performance on this paper, and on performance in the previous series, candidates are offered the following advice:

- Revise subject-specific terminology
- Revise the rules of mathematical precedence (BIDMAS)
- Recognise that fundamental data types may not be the same as in programming languages
- Practise problem-solving using generic programming constructs rather than language-specific functionality
- Read the questions carefully to understand what is, and is not, required
- Avoid repeating parts of the question in a response
- Take care with presentation, both in drawings and in writing. Clearly presented responses allow candidates better to demonstrate their understanding

Grade Boundaries

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