



Cambridge O Level

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COMPUTER SCIENCE

2210/02

Paper 2 Algorithms, Programming and Logic

For examination from 2023

SPECIMEN PAPER B

1 hour 45 minutes

You must answer on the question paper.

No additional materials are needed.

INSTRUCTIONS

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- Calculators must **not** be used in this paper.

INFORMATION

- The total mark for this paper is 75.
- The number of marks for each question or part question is shown in brackets [].
- No marks will be awarded for using brand names of software packages or hardware.

This document has **16** pages. Any blank pages are indicated.

- 1 A range check is used to check that a value input is above 10 and below 20.

Tick (✓) **one** box to show which value would be accepted.

A 10

B 15

C 20

D 30

[1]

- 2 Four programming concepts and four descriptions are shown.

Draw **one** line to connect each programming concept to the most appropriate description.

Programming concept

Library routine

Structure diagram

Procedure

Function

Description

A subroutine that may **not** return a value.

A standard subroutine that is available for immediate use.

A subroutine that can be used in an assignment statement.

An overview of a program or subroutine.

[3]

3 A program checks if the weight of a baby is at least 2 kilograms.

Give, with reasons, **two** different values of test data that could be used for the baby's weight. Each reason must be different.

Value 1

Reason

.....

Value 2

Reason

.....

[4]

4 (a) Circle the **two** actions that a program needs to take to store data in a file.

- activate calculate close open output
- print read search sort write

[2]

(b) A program halted unexpectedly with the error message 'File not found' whilst trying to read data from a file.

Outline the actions that the program needs to take to prevent this error occurring.

.....

.....

.....

.....

[2]

- 5 (a) Draw a flowchart for an algorithm to:
- allow numbers to be input
 - ignore any numbers that are negative
 - count how many numbers are positive
 - output the count of positive numbers when zero is input and end the algorithm.

(b) Explain the changes you will make to your algorithm to **also** count the negative numbers.

.....

.....

.....

..... [2]

- 6 This section of program code asks for 80 numbers between 100 and 1000 inclusive to be entered. The pseudocode checks that the numbers are in the correct range and then stores the valid numbers in an array. It counts how many of the numbers are larger than 500 and then outputs the result when finished.

```

01 Count ← 0
02 FOR Index ← 1 TO 80
03     INPUT "Enter a number between 100 and 1000 ", Number
04     WHILE Number <= 99 AND Number >= 1001
05     INPUT "This is incorrect, please try again", Number
06     ENDWHILE
07     Num[80] ← Number
08     IF Number > 500 THEN Count ← Count + 1 ENDIF
09 UNTIL Index = 80
10 PRINT Index
11 PRINT "numbers were larger than 500"

```

There are **four** lines of code that contain errors.

State the line number for each error and write the correct code for that line.

Error 1 Line Number

Correct Code

Error 2 Line Number

Correct Code

Error 3 Line Number

Correct Code

Error 4 Line Number

Correct Code

[4]

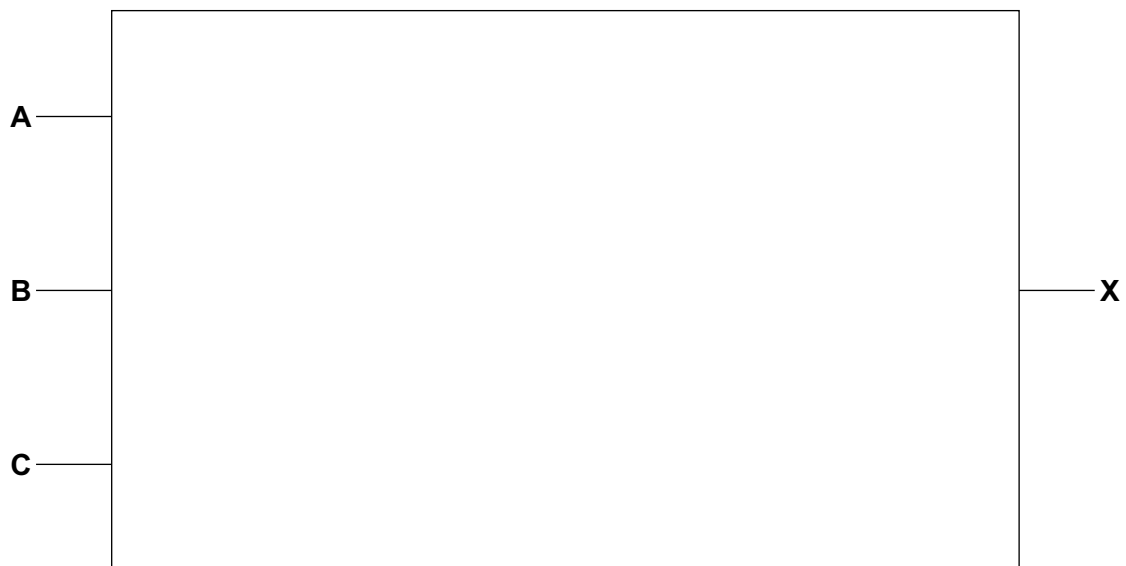
7 Consider the truth table:

A	B	C	X
0	0	0	0
0	0	1	0
0	1	0	0
0	1	1	0
1	0	0	1
1	0	1	0
1	1	0	0
1	1	1	1

(a) Draw a logic circuit to represent the given truth table.

Each logic gate should have maximum of **two** inputs.

Do **not** simplify the logic circuit.



[6]

(b) Write a logic expression for the given truth table.
Do **not** simplify the logic expression.

.....

.....

.....

.....

.....

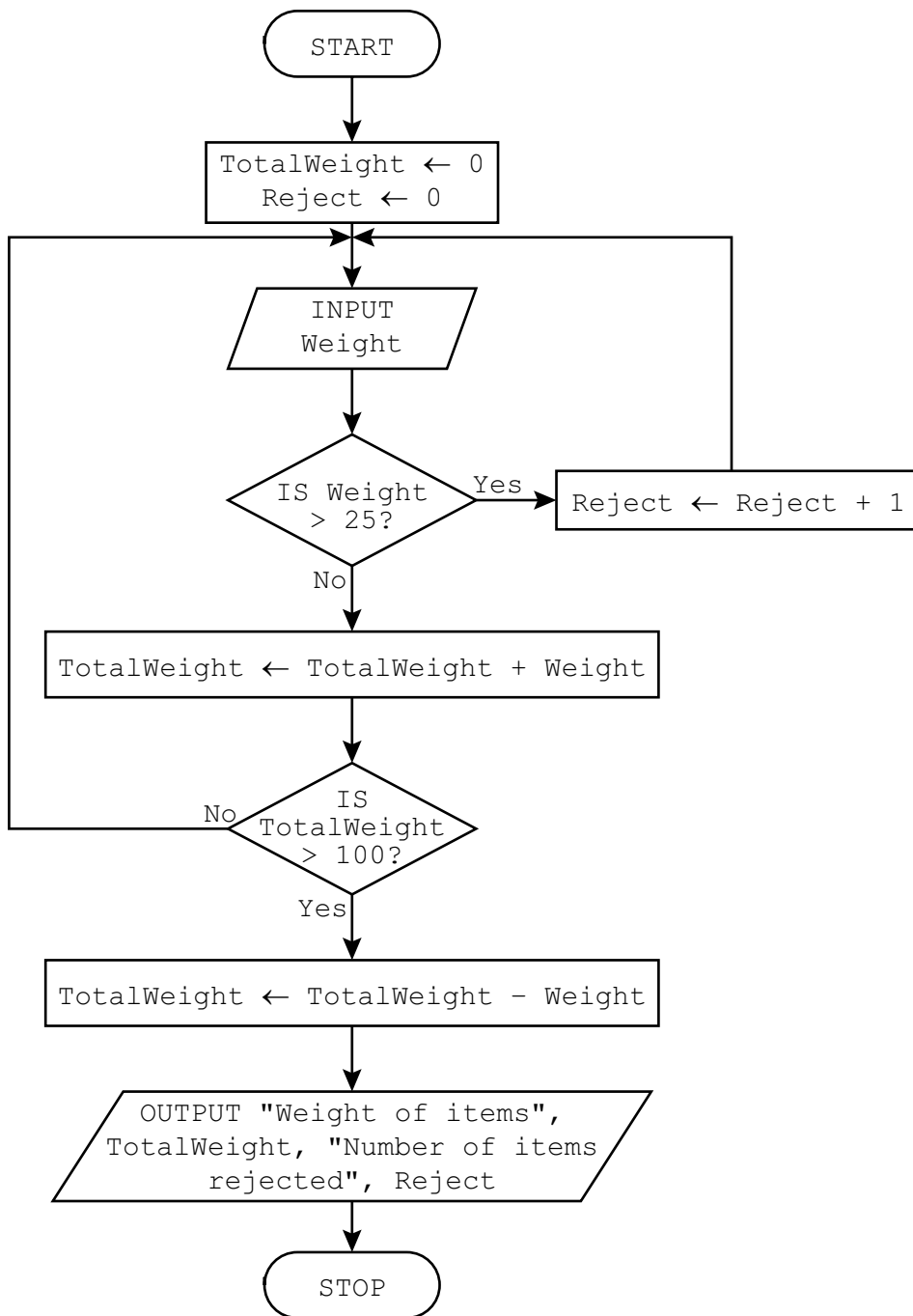
.....

.....

.....

..... [3]

- 8 This flowchart inputs the weight of items, in kilograms, to be loaded on a trailer. Any item over 25 kilograms is rejected. The trailer can take up to 100 kilograms.



10 A function `LENGTH(X)` finds the length of a string `X` and a function `SUBSTRING(X, Y, Z)` finds a substring of `X` starting at position `Y` and `Z` characters long. The first character in the string is position 1.

(a) Show the value of the variable after each pseudocode statement has been executed.

- 01 `P ← "Computer Science"`
- 02 `Q ← LENGTH(P)`
- 03 `R ← SUBSTRING(P, 10, 7)`
- 04 `S ← LENGTH(R)`
- 05 `T ← SUBSTRING(R, 1, 3)` [5]

(b) Write a pseudocode statement to extract the word `Computer` from `P` and store it in the variable `F`.

.....

.....

.....

..... [2]

11 A database table, PERFORMANCE, is used to keep a record of the performances at a local theatre.

ShowNumber	Type	Title	Date	SoldOut
SN091	Comedy	An Evening at Home	01 Sept	Yes
SN102	Drama	Old Places	02 Oct	No
SN113	Jazz	Acoustic Evening	03 Nov	No
SN124	Classical	Mozart Evening	04 Dec	Yes
SN021	Classical	Bach Favourites	01 Feb	Yes
SN032	Jazz	30 Years of Jazz	02 Mar	Yes
SN043	Comedy	Street Night	03 Apr	No
SN054	Comedy	Hoot	04 May	No

(a) State the number of fields and records in the table.

Fields

Records

[2]

(b) Give **two** validation checks that could be performed on the ShowNumber field.

Validation check 1

.....

Validation check 2

.....

[2]

(c) Show the output that would be given by this structured query language (SQL) statement:

```
SELECT Date, Title
FROM PERFORMANCE
WHERE NOT SoldOut AND Type = "Jazz";
```

.....

.....

.....

.....

[2]

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