



CANDIDATE
NAME

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CENTRE
NUMBER

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0478/21

October/November 2022

1 hour 45 minutes

You must answer on the question paper.

No additional materials are needed.

- Answer **all** questions.
- **Do not attempt Tasks 1, 2 and 3** in the copy of the pre-release material on page 2; these are for information only.
- 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.

- The total mark for this paper is 50.
- 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.

Section A

You are advised to spend no longer than 40 minutes answering this section.

Here is a copy of the pre-release material.

DO NOT attempt Tasks 1, 2 and 3 now.

Use the pre-release material and your experience from attempting the following tasks before the examination to answer Question 1.

Pre-release Material

A program is needed for a swimming club to manage the annual audit of its membership details.

The data stored about each member includes name, age, gender, type of membership, whether a team member or **not**, annual fee and if the fee has been paid. Team members are allowed a discount of 10% on their annual membership fee.

The types of membership available are:

Membership	Age range in years	Annual fee
junior	≥ 2 and < 18	\$10.00
adult	≥ 18 and < 50	\$20.00
senior	≥ 50 and < 80	\$15.00
golden	80 and over	free

Write and test a program or programs for the swimming club annual audit:

- Your program or programs must include appropriate prompts for the entry of data. Data must be validated on entry.
- All outputs, including error messages, need to be set out clearly and understandably.
- All variables, constants and other identifiers must have meaningful names.

You will need to complete these **three** tasks. Each task must be fully tested.

Task 1 – setting up the system to store the membership details

Set up your program to:

- store the members' details in arrays
- populate the arrays with at least 20 members' details
- use the array index as the annual membership number.

Task 2 – providing annual audit statistics

Count the number of current members by membership type. For each type of membership count the number of members who did **not** pay the annual fee. Display these counts as a percentage of the total number of members for each membership type. Calculate and display the total of the annual fees expected and the annual fees received for this year.

Task 3 – updating the membership details for the next year

Extend your program to:

- check if any members have **not** paid and output a list of all these members
 - remove these members from the system
- update the age of all the members by one year and whether they are in a team
 - update the type of membership and the annual fee if required
- set the fee for every member as **not** yet paid
- display lists of current team members grouped by membership type.

1 All variables, constants and other identifiers must have meaningful names.

- (a) (i) Describe the arrays you have set up in **Task 1** to record the members' details. Include in your description the name, data type and sample data for each array.

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- (ii) Explain how your program for **Task 1** populated the arrays with the members' details.

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- (b) Explain how your program removed the members that have **not** paid their fees from the system in **Task 3**.

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- (c) Write an algorithm for the part of **Task 3** that checks the age of all the members, and whether they are in a team, then updates the type of membership and the annual fee if required.

Use pseudocode, programming statements or a flowchart.

This image shows a full page of white paper with horizontal dashed lines, typical of primary school handwriting practice paper. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

(d) Explain how your program completes these parts of **Task 2**:

- Count the number of members of each membership type who did **not** pay the annual fee.
- Display these counts as a percentage of the total number of members for each membership type.

Any programming statements that you include in your answer must be fully explained.

[5]

Section B starts on page 8.

Section B

2 An algorithm has been written to:

- set 100 elements of the array `Reading[1:100]` to zero
- input integer values between 1 and 100
- end the process with an input of `-1`
- reject all other values
- count and output the number of times each value is input, starting with the largest value.

(a) Complete the pseudocode algorithm:

```

01  FOR Count ← 1 TO .....
02      Reading[Count] ← 0
03  NEXT Count
04  OUTPUT "Please enter next reading "
05  INPUT Value
06  WHILE Value <> -1 DO
07      IF Value <= 0 OR .....
08          THEN
09              OUTPUT "Reading out of range"
10          ELSE
11              Reading[Value] ← .....
12          ENDIF
13      OUTPUT "Please enter next reading "
14      .....
15  ENDWHILE
16  Count ← 100
17  REPEAT
18      OUTPUT "There are ", ..... ,
        " readings of ", Count
19      Count ← .....
20  UNTIL Count = 0

```

[6]

(b) Describe how the algorithm could be changed so that it does **not** output any counts of zero.

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..... [3]

- 3 (a) A PIN (personal identification number) is input into a banking app by the user. Before the PIN is accepted, the following validation checks are performed:

- check 1 – each character must be a digit
- check 2 – there must be exactly four digits
- check 3 – the value of the PIN must be between 1000 and 9999 inclusive.

Describe each validation check.

Check 1

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Check 2

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Check 3

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[6]

- (b) The PIN can be changed by the user.

Describe how the new PIN could be verified before use.

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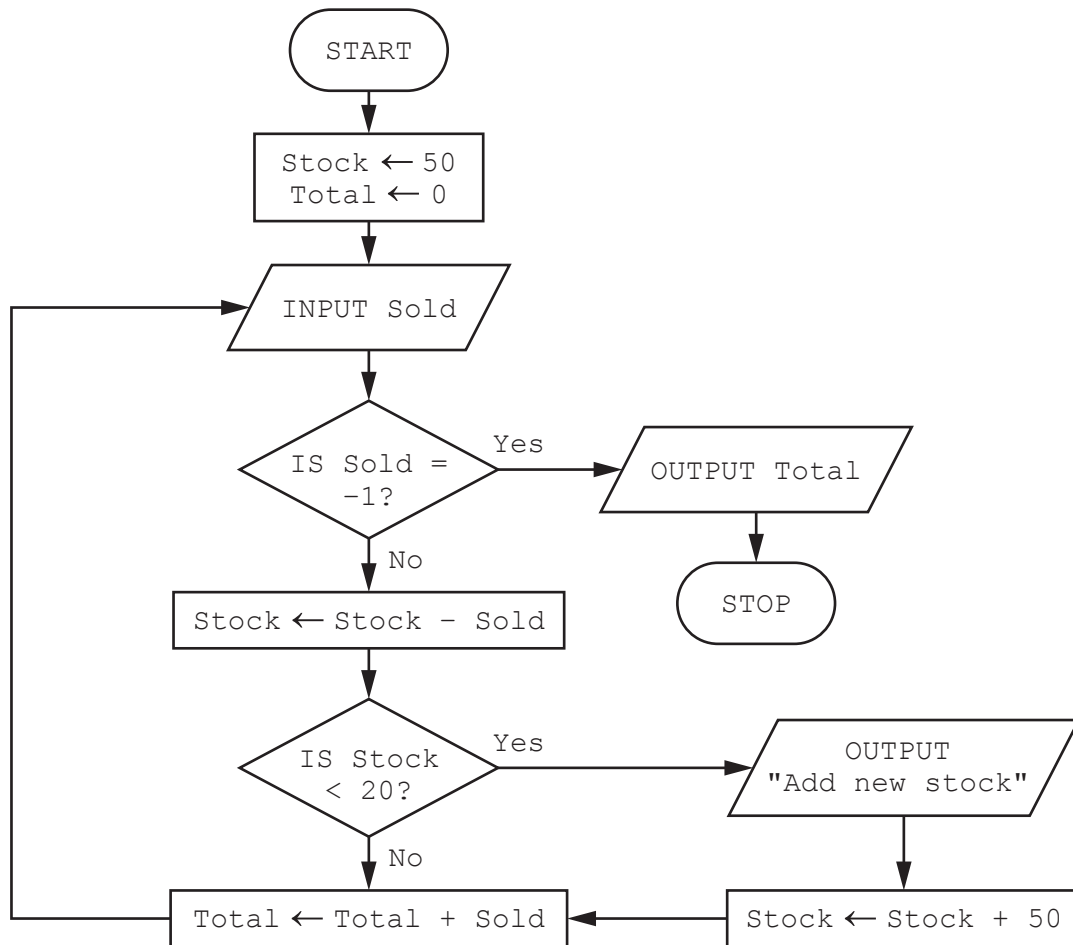
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[3]

Question 4 starts on page 12.

- 4 This algorithm makes sure that there are enough fresh bread rolls available for customers to buy.



- (a) Complete the trace table for the algorithm using this input data:
24, 12, 6, 30, 12, 18, -1, 24

Sold	Stock	Total	OUTPUT

[4]

- (b) Identify the problem that will occur if the input data starts with a value of 70.
Explain how you would correct this problem.

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5 A database table, WAREHOUSE, is used to keep a record of items for sale. The table has these fields:

- ItemCode – code to identify each type of item
- Description – brief description of each item
- Manufacturer – name of manufacturer
- Level – number in stock
- Price – price in dollars (\$).

(a) State which field you would choose for the primary key. Give a reason for your choice.

Field

Reason

..... [2]

(b) Complete the query-by-example grid to display only the item code and the manufacturer where the number in stock is below 10.

Field:				
Table:				
Sort:				
Show:	☐	☐	☐	☐
Criteria:				
or:				

[3]

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