



GCE AS/A LEVEL

2500U20-1



S23-2500U20-1

MONDAY, 22 MAY 2023 – AFTERNOON

COMPUTER SCIENCE – AS unit 2
Practical Programming to Solve Problems

2 hours

INSTRUCTIONS TO CANDIDATES

The question paper is divided into two main sections. Below are the recommended timings for this assessment.

Section A

Answer **ALL** questions in **Section A**.

You are advised to spend no more than **60 minutes** on this section.

You will be required to analyse and deconstruct the scenario to consider its component parts in terms that can be addressed through automated computation.

Section B

Select the programming language of your choice from section **BI**, **BII** or **BIII** and answer **all** questions within your chosen section.

You are advised to spend no more than **60 minutes** on this section.

You will be required to develop programs that solve computing problems referring to the initial scenario.

INFORMATION FOR CANDIDATES

The number of marks is given in brackets at the end of each question or part-question.

The total number of marks available is 60.

You will need a computer with an installed functional copy of the Integrated Development Environment (IDE) appropriate to your chosen programming language and word processing software.

A calculator is allowed in this examination.

Scenario

Sky Balloon Park



Sky Balloon Park is a small hot air ballooning company that offers trips in their hot air balloons.

Sky Balloon Park needs a computer system that will allow it to handle bookings for its hot air balloon trips. ***Sky Balloon Park*** is hoping to encourage repeat bookings for the trips it offers.

Sky Balloon Park maintains a list of possible trips in a table. A trip may be booked by multiple passengers, a passenger may wish to book multiple trips. Some of the details that ***Sky Balloon Park*** needs to store about its trips include: Trip ID, Date of trip, Time and Description.

Sky Balloon Park needs a method that calculates the total weight of the balloon for a given booking to ensure that it can safely ascend on a particular trip.

The main requirements of the new computer system for ***Sky Balloon Park*** are to:

- store details about trips, bookings and customers.
- carry out simple calculations such as calculating the total weight for a booking.

Section A: Analysis and Design

Answer all questions (1–4) in this section.

You have been asked to analyse the scenario as a preliminary step towards creating a prototype computer system for ***Sky Balloon Park***.

Present your answers as a single word-processed document named: **Section A**

1. (a) Create an entity relationship diagram for the booking system described in the scenario. There is no need to include any attributes. [5]

(b) Create a data structure table, including suitable validation checks, for **two** of the tables in your entity relationship diagram. [10]

2. Select and fully justify your proposed programming method of solution for ***Sky Balloon Park***. You should include references to the main programming constructs you will need to use including:
 - User interface
 - Data structures
 - File handling
 - Validation
 - Local and global variables
 - Data types[6]

3. Describe the processes that ***Sky Balloon Park*** could use to protect the security and integrity of data it stores about its customers. [7]

4. (a) **Sky Balloon Park** uses this algorithm to calculate the total weight for the next balloon trip.

```

1  declare weight[4,2] as integer
2  declare constant PASSENGERWEIGHT = 150
3      {average weight of a passenger}
4
5  declare subroutine fillArray(passengers)
6
7      for i = 1 to passengers
8          weight[i,1] = i
9          weight[i,2] = i * PASSENGERWEIGHT
10     next i
11
12     if passengers >0 then
13         return TRUE
14     else
15         return FALSE
16     end if
17
18 end subroutine
19
20 startMainProg
21 declare passengers as integer
22 declare completed as Boolean
23
24 output "Type in the number of passengers"
25 input passengers
26
27 completed = fillArray(passengers)
28 if completed = TRUE then
29     output "Subroutine completed successfully"
30 end if
31
32 endMainProg
33
34 end

```

Copy and complete the table below showing the contents of the array `weight` for the input provided. [8]

passengers = 4

weight [i,1]				
weight [i,2]				

(b) From the algorithm given identify an example of the following and describe its role in the algorithm:

- Constant
- Local variable
- Global variable
- Self-documenting identifier
- Annotation
- Procedure calling
- Parameter passing
- Return a value.

Save your answers as a single word-processed document named: **Section A** [8]

Section B: Develop programs

Select the programming language of your choice from section BI, BII or BIII and answer all questions within your chosen section.

BI Visual Basic

Sky Balloon Park wants a prototype computer system to be developed using Visual Basic.

1. Open the file **skycustomers**
 - Read through the code and familiarise yourself with its contents.
 - The file contains incomplete code which attempts to save customer details and return the number of customers on file that match the search criteria entered.

Complete this code.

Save the changes made to the file. [4]

2. Using the internal facility of your chosen language, **annotate** the code from Question BI above to clearly explain the design of this program to another software developer.

Save the annotation within the file. [4]

3. Create a new program to allow *Sky Balloon Park* to record details about upcoming trips.

The new program must accept:

- o TripID
- o Date
- o Time
- o Description

The program should have a Save facility and a Load facility.

Save the new program as Trips. [8]

BII Java

Sky Balloon Park wants a prototype computer system to be developed using Java

1. Open the file **skycustomers**
 - Read through the code and familiarise yourself with its contents.
 - The file contains incomplete code which attempts to save customer details and return the number of customers on file that match the search criteria entered.

Complete this code.

Save the changes made to the file.

[4]

2. Using the internal facility of your chosen language, **annotate** the code from Question BII above to clearly explain the design of this program to another software developer.

Save the annotation within the file.

[4]

3. Create a new program to allow **Sky Balloon Park** to record details about upcoming trips.

The new program must accept:

- o TripID
- o Date
- o Time
- o Description

The program should have a Save facility and a Load facility.

Save the new program as Trips.

[8]

Bill Python

Sky Balloon Park wants a prototype computer system to be developed using Python.

1. Open the file **skycustomers**
 - Read the code and familiarise yourself with its contents.
 - The file contains incomplete code which attempts to save customer details and return the number of customers on file that match the search criteria entered.

Complete this code.

Save the changes made to the file.

[4]

2. Using the internal facility of your chosen language, **annotate** the code from Question BIII above to clearly explain the design of this program to another software developer.

Save the annotation within the file.

[4]

3. Create a new program to allow **Sky Balloon Park** to record details about upcoming trips.

The new program must accept:

- o TripID
- o Date
- o Time
- o Description

The program should have a Save facility and a Load facility.

Save the new program as Trips.

[8]

END OF PAPER



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COMPUTER SCIENCE – AS unit 2
Practical Programming to Solve Problems

Instructions to Candidates

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Instructions for candidates

WJEC GCE AS Computer Science Unit 2 (2500U20-1)

MONDAY, 22 MAY 2023 – AFTERNOON

1. **The decryption password for the encrypted media files is brown-cq*FiA**
2. You will be issued with a Question Paper and instructions for candidates.
3. You will be using:
 - a dedicated examination account for this examination only which should be inactive until the examination starts
 - 7-Zip pre-installed on each PC
 - a pre-installed functional copy of your chosen IDE (Visual Basic, Python or Java)
 - access to a word processing package (for example, Microsoft Word) to produce your candidate responses
 - the encrypted media files pre-installed on each PC
 - the password for the media files
 - an 'empty' user area or storage device (with only the encrypted media files) on which to save the work.

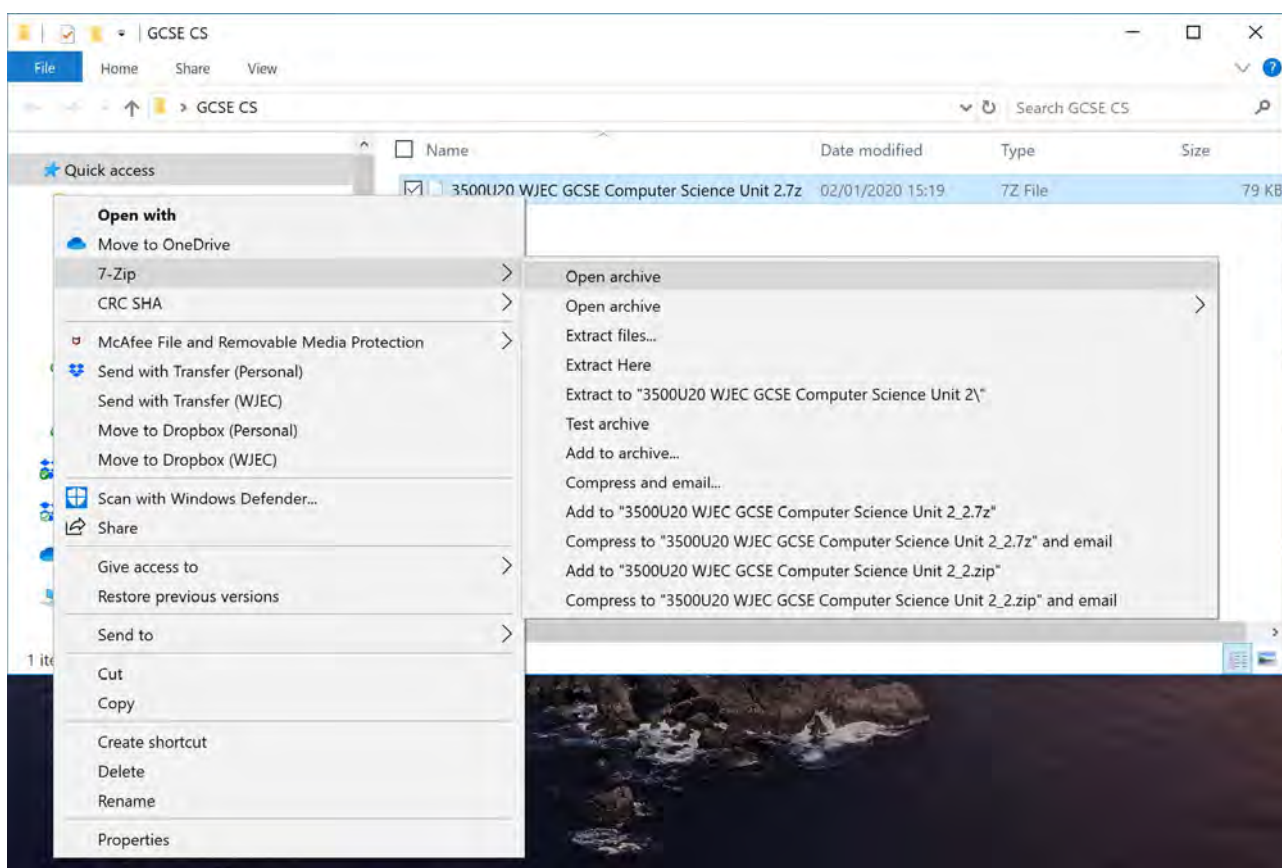
NB: You **must not** have access to the internet, any shared drives, virtual learning environments (VLEs) or email during the examination.

4. In the examination room before the examination starts

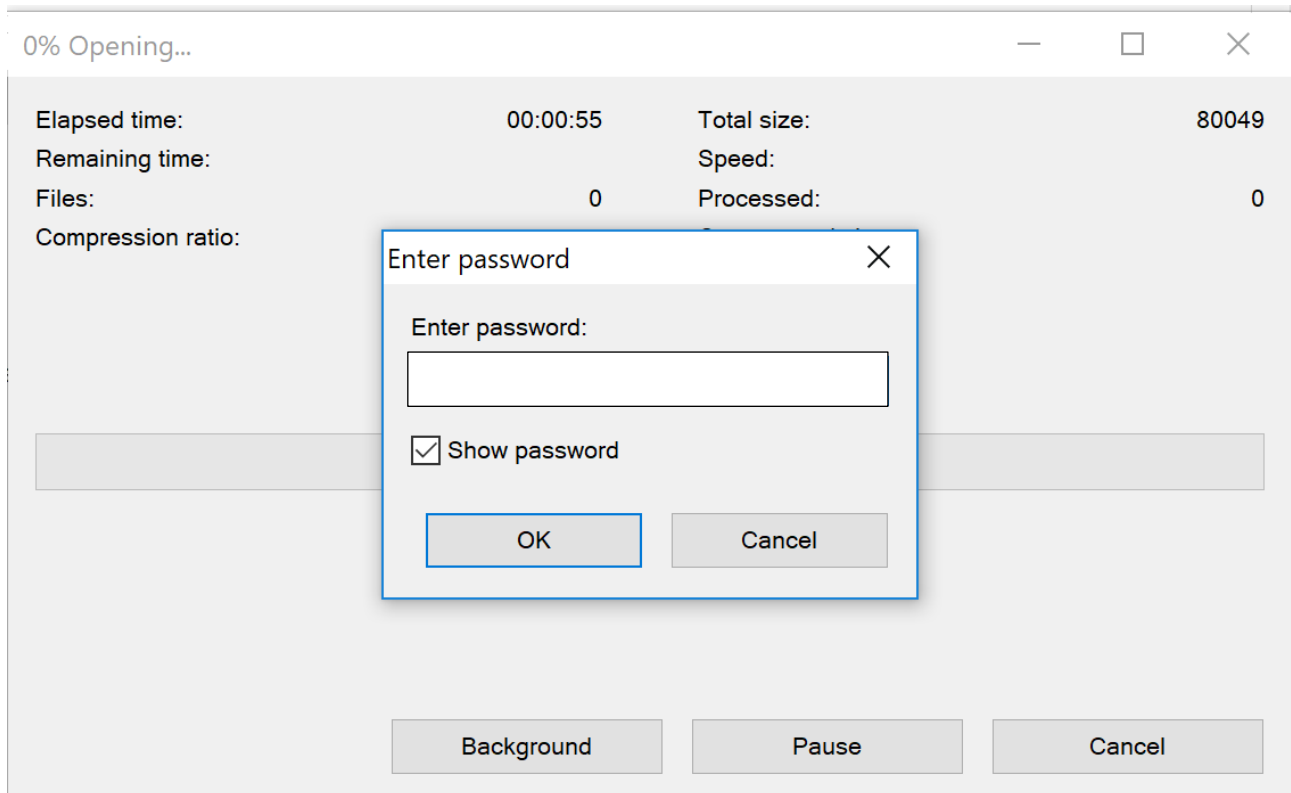
- i. When told to do so by the invigilator, log onto your workstation and follow the instructions below to decrypt the media files using 7-Zip.
- ii. Access your user area on your workstation. Your user area will contain a file with a .7z suffix like this one:

Name	Date modified	Type	Size
3500U20 WJEC GCSE Computer Science Unit 2.7z	02/01/2020 15:19	7Z File	79 KB

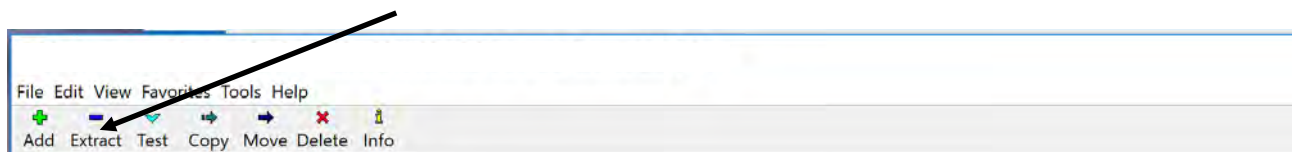
- iii. Right click this file, choose 7-Zip and then Open archive as shown below.



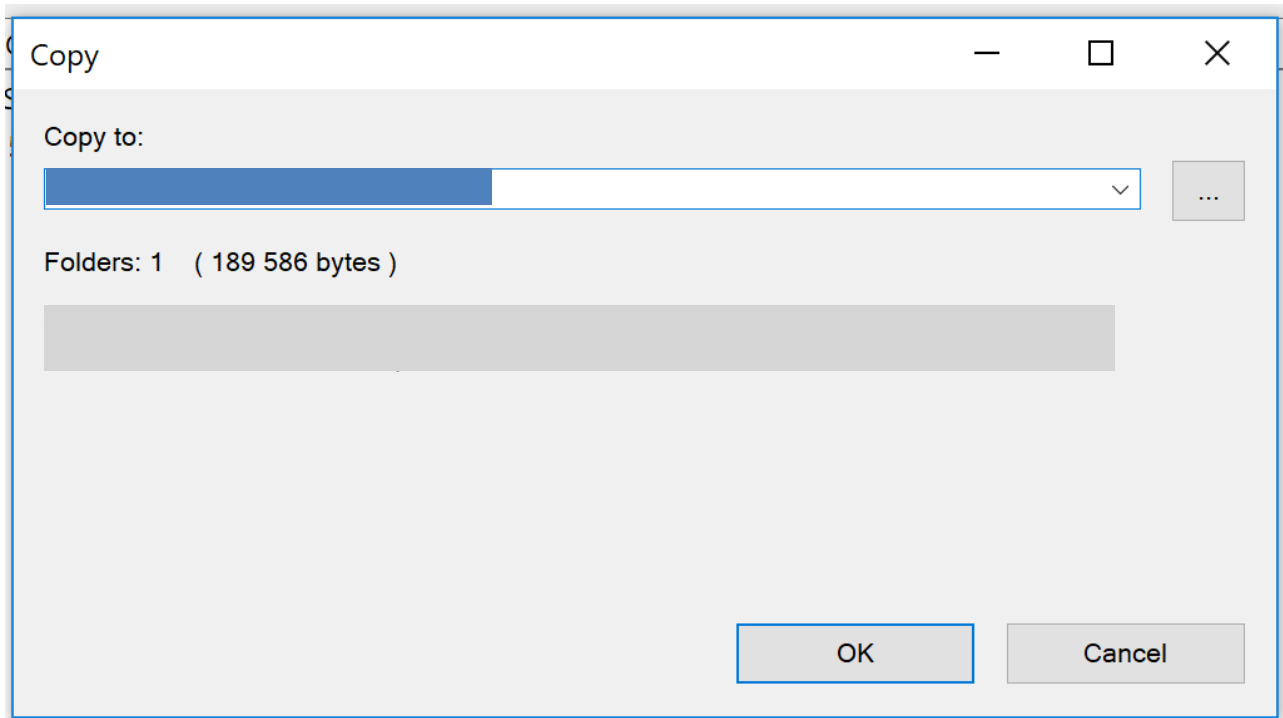
- iv. You will then be asked for the password (this will be case sensitive). You can find this on the first page of these instructions. Type in this password in the box provided. This may be easier if you tick the Show password box as below. Click OK when you've entered the password.



- v. In the next window choose extract.



vi. Just click OK at the next window.



vii. The program will then extract all the files you need, and you are ready to start the examination when told to do so by the invigilator.

5. In the examination room after the examination has finished.

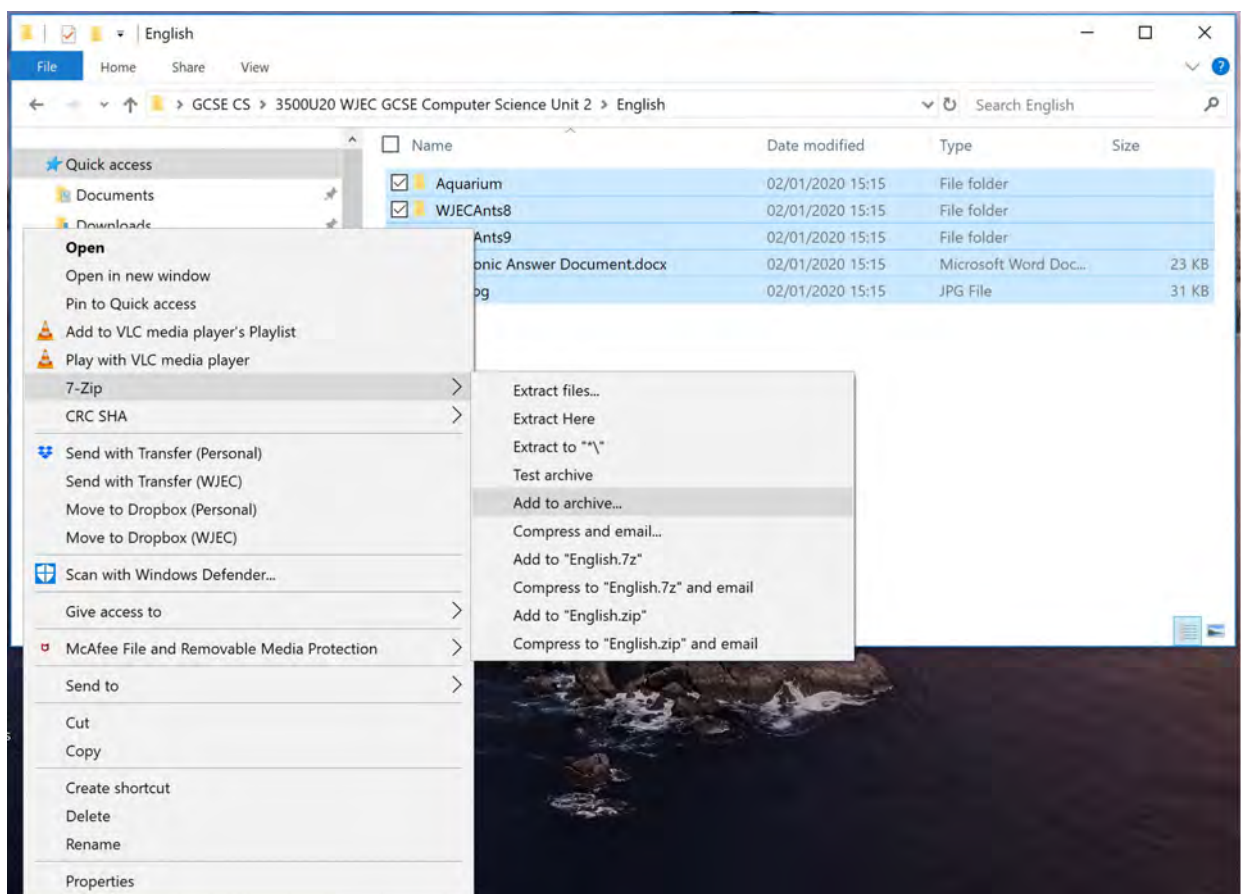
You will need to zip all your files following the instructions below:

- i. Highlight all the files in your folder either by pressing Ctrl A or by using the mouse.

<input type="checkbox"/>	Name	Date modified	Type	Size
<input checked="" type="checkbox"/>	Aquarium	02/01/2020 15:15	File folder	
<input checked="" type="checkbox"/>	WJECAnts8	02/01/2020 15:15	File folder	
<input checked="" type="checkbox"/>	WJECAnts9	02/01/2020 15:15	File folder	
<input checked="" type="checkbox"/>	Electronic Answer Document.docx	02/01/2020 15:15	Microsoft Word Doc...	23 KB
<input checked="" type="checkbox"/>	pets.jpg	02/01/2020 15:15	JPG File	31 KB

1 Example files only

- ii. Right click and choose 7-Zip then Add to archive.



iii. Fill out the archive name with your candidate number followed by your surname and initials.

DO NOT ENTER ANY ENCRYPTION DETAILS. IF YOU DO YOU MAY NOT RECEIVE MARKS FOR YOUR WORK

iv. Then click OK.

The screenshot shows the 'Add to Archive' dialog box with the following settings:

- Archive: 1971 George C
- Archive format: 7z
- Compression level: Normal
- Compression method: LZMA2
- Dictionary size: 16 MB
- Word size: 32
- Solid Block size: 2 GB
- Number of CPU threads: 8 / 8
- Memory usage for Compressing: 1376 MB
- Memory usage for Decompressing: 18 MB
- Split to volumes, bytes: (empty)
- Parameters: (empty)
- Update mode: Add and replace files
- Path mode: Relative pathnames
- Options:
 - Create SFX archive
 - Compress shared files
 - Delete files after compression
- Encryption:
 - Enter password: (empty)
 - Reenter password: (empty)
 - Show Password
 - Encryption method: AES-256
 - Encrypt file names

Buttons at the bottom: OK, Cancel, Help.

6. Leaving the examination room after the examination has finished.

You have now finished and can leave the examination room when told to do so by the invigilation staff.