OCR
Oxford Cambridge and RSA

Friday 27 May 2022 – Afternoon

GCSE (9–1) Computer Science

J277/02 Computational thinking, algorithms and programming

Time allowed: 1 hour 30 minutes

Do not use:
- a calculator

Please write clearly in black ink. **Do not write in the barcodes.**

Centre number | | | | | | Candidate numb

First name(s) _____

Last name _____

The 'How do I get all of the marks?' Version

Answer **all** the questions

1 **(a)** Tick (✓ ... ven
is an e

OCR
for next
whil endw
if p endi
swit ends

[4]

(b) Write

score = score + 1

[1]

(c) State t

Breaki

Decomposition

Hiding

Abstraction

[2]

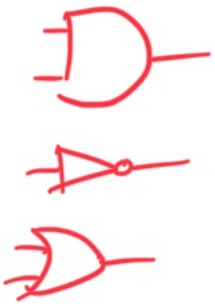
2 A fast food restaurant offers half-price meals if the customer is a student or has a discount card. The offer is not valid on Saturdays.

A computer system is used to identify whether the customer can have a half-price meal.

The table i

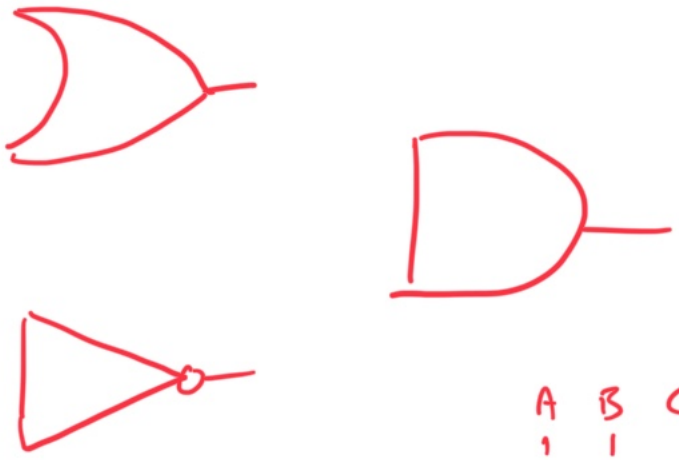
Input	
A	I
B	I
C	T

AND



(a) The lo

(i) C ne
lo



A B C P
1 1
1 0
0 1

[3]

(ii) A

D

1
0
1 1
0 1
0 0

. .....

To show every output for each of the possible inputs in a logic circuit.

. .....

. .....

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

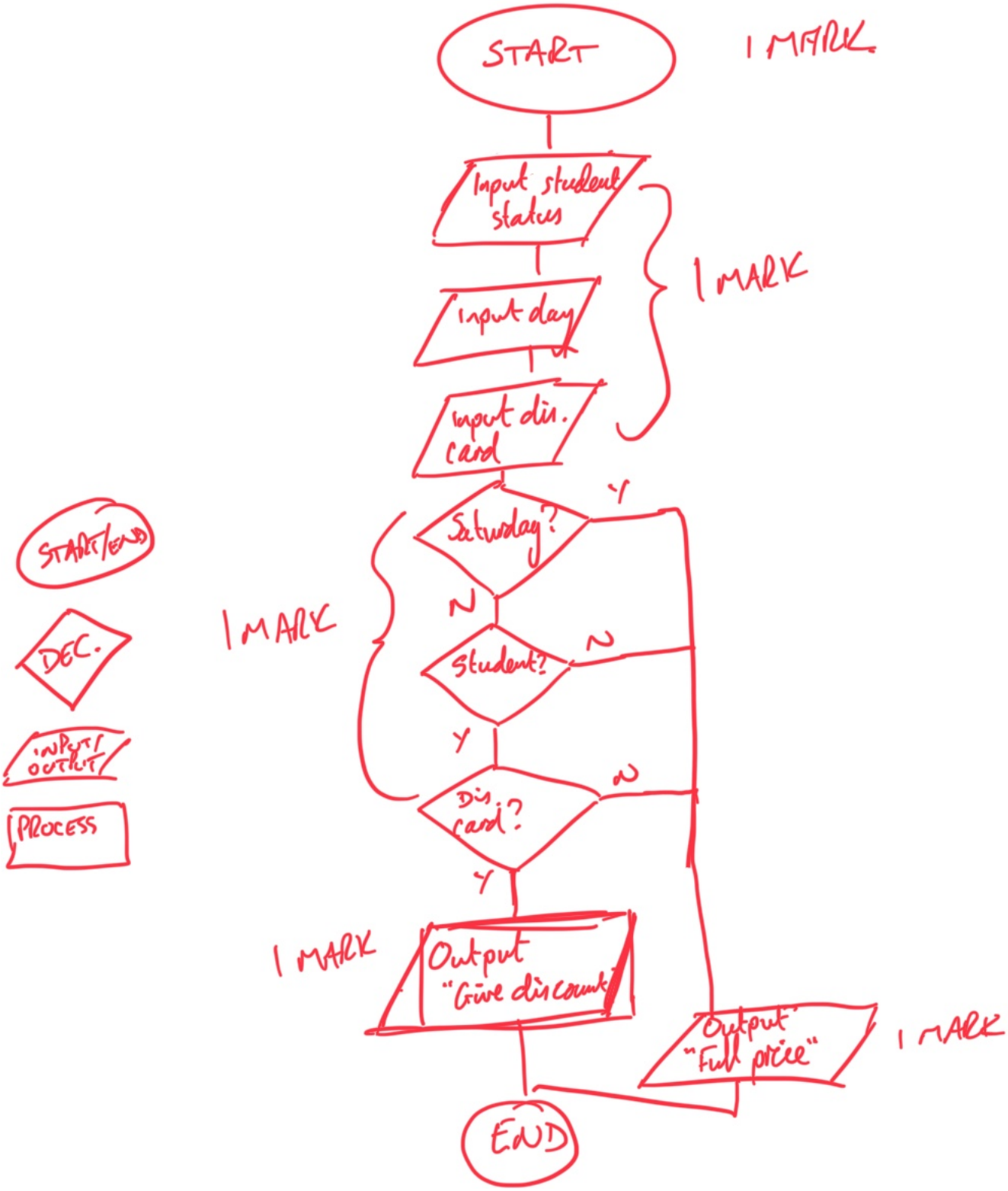
(iii) S for the
lo

8

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

(b) The restaurant needs an algorithm designing to help employees work out if a customer can have a half price meal or not. It should:

Are they a student?
Do they have a discount card?
Is it Sat.?



[3]

(c) The restaurant adds a service charge to the cost of a meal depending on the number of people at a table. If there are more than five people 5% is added to the total cost of each meal.

Customers can also choose to leave a tip, this is optional and the customer can choose between a percentage of the cost, or a set amount.

Identify **all** the additional inputs that will be required for this change to the algorithm.

How many people are at the table
Choice of tip as amount or percentage.

[2]

(d) Each member of staff that works in the restaurant is given a Staff ID. This is calculated using the following algorithm.

```
01  surname = input("Enter surname")
02  year = input("Enter starting year")
03  staffID = surname + str(year)
04  while staffID.length < 10
05       staffID = staffID + "x"
06  endwhile
07  print("ID " + staffID)
```

(i) Define the term **casting and** give the line number where casting has been used in the algorithm.

Changing a data type into a different data type

03

.....

.....

.....

[2]

and

03

05

05

07

Kofi2021

Kofi2021x

Kofi2021xx

ID Kofi2021xx

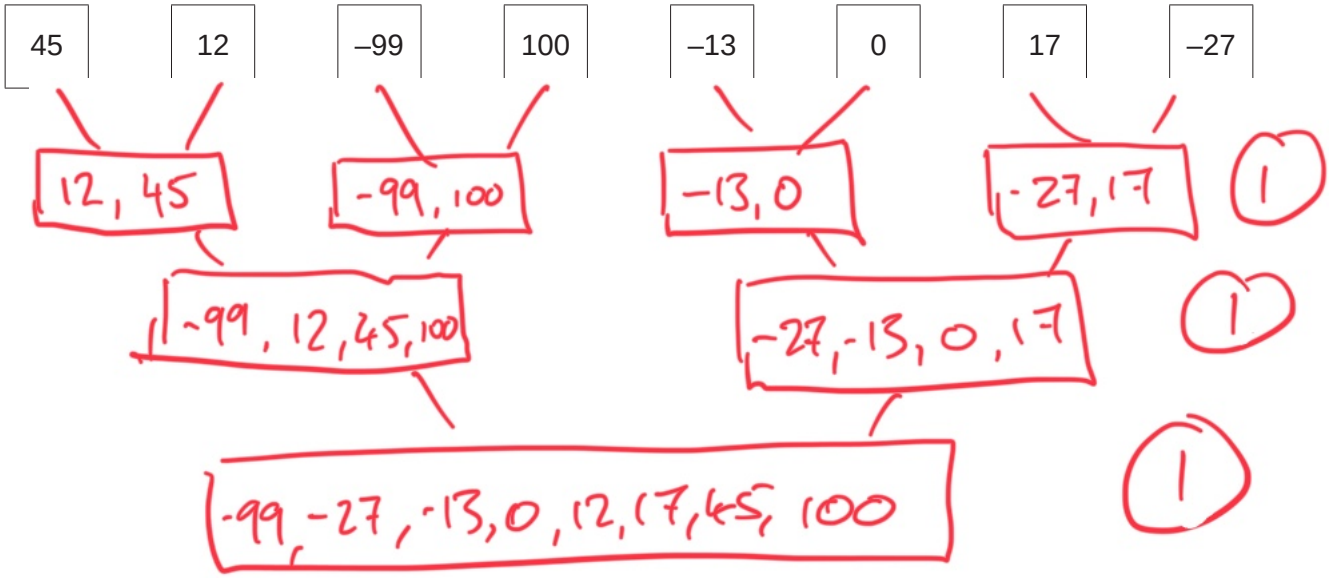
[4]

3 A program stores the following list of positive and negative numbers. The numbers need sorting into ascending order using a merge sort.

45	12	–99	100	–13	0	17	–27

(a) The first step is to divide the list into individual lists of one number each. This has been done for you.

Complete the merge sort of the data by showing each step of the process.



[3]

(b) Once the numbers are in order, a binary search can be run on the data.

Describe the steps a binary search will follow to look for a number in a sorted list.

Identify the mid-point. ✓
Compare the mid-point to the searched value ✓
If the searched value is less than the mid-point value then remove all values to the right (higher) than the mid-point ✓
Repeat this process until either the searched value is found or the list is finished without finding the value. ✓

]

(c)

Start with the first value.
Check every value in order.

.....

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

4 Jack is writing a program to add up some numbers. His first attempt at the program is shown.

```
a :
b :
c :
d :
e :
f :
pr:
```

(Give his variables more sensible names)

(a) Giv

1 .. Write comments for each line to explain what the code does. ...

....

2 .. Use iteration for the inputs ...

....

2]

(b) Jac

(i)

Ari
Multiplication
Division

[2]

(ii) Complete the description of programming languages and translators by writing the correct term from the box in each space.

J high level needs to be

tr his is done using

a

C and then

e stops /crashes when an error is

fc This translator is

h

A and produces

a no ..... errors.

T executable without ..... the

compiler.

[5]

(c) Jack decides to improve his program. He wants to be able to input how many numbers to add together each time the algorithm runs, and also wants it to calculate and display the average of these numbers.

Write an algorithm to:

- ask the user to input the quantity of numbers they want to enter and read this value as input
- repeatedly take a number as input, until the quantity of numbers the user input has been entered
- calculate and output the total of these numbers
- calculate and output the average of these numbers.

```
number = int(input("How many numbers?"))
for i in range(0, number):
    temp = int(input("Enter a number"))
    total = total + temp
print(total)
print(total/number)
```

[6]

SECTION B

We advise you to spend at least 40 minutes on this section.

Some questions require you to respond using either the OCR Exam Reference Language or a high-level programming language you have studied. These are clearly shown.

5 Customers at a hotel can stay between 1 and 5 (inclusive) nights and can choose between a basic room or a premium room.

(a) A typical booking record is shown in the table:

f	
s	Ling
r	
r	um
s	

(i) ate data type for the following fields:

Integer

.....

String

.....

[2]

(ii) eld that could be stored as a Boolean data type.

stayComplete

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

(iii) Booking records are stored in a database table called `TblBookings`.

The following SQL statement is written to display all customer bookings that stay more than one night.

```
SELECT ALL
FROM TblBookings
IF Nights < 1
```

The SQL statement is incorrect.

Rewrite the SQL statement so that it is correct.

SELECT *
FROM Tbl Bookings
WHERE Nights > 1

[4]

(b) When a new booking is recorded, the details are entered into a program to validate the values. The following criteria are checked:

- `firstName` and `surname` are not empty
- `room` is either "basic" or "premium"
- `nights` is between 1 and 5 (inclusive).

If any invalid data is found "NOT ALLOWED" is displayed.
If all data is valid "ALLOWED" is displayed.

(i) Complete the following program to validate the inputs.

You must use **either**:
- OCR Exam Reference Language, **or**
- a high-level programming language that you have studied.

```
firstName = input("Enter a first name")
surname = input("Enter a surname")
room = input("Enter basic or premium")
nights = input("Enter between 1 and 5 nights")
stayComplete = False
valid = True
if firstName == "" OR surName == "":
    valid = False
end if
if room != "basic" AND room != "premium":
    valid = False
end if
if nights <1 OR nights >5:
    valid = False
end if
if valid == True:
    print ("ALLOWED")
else:
    print ("NOT ALLOWED")
```

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

..... **[5]**

(ii) Complete the following test plan to check whether the number of nights is validated correctly.

Test data (number of nights)	Type of test	Expected output
	NORMAL	ALLOWED
5	y	ALLOWED
6	nvalid	NOT ALLOWED

[3]

(c) A Basic room costs £60 each night. A Premium room costs £80 each night.

ights and the type of room

ed.

```
def newPric (nights, roomType):
    if roomType == "Premium":
        cost = nights * 80
    else:
        cost = nights * 60
    return cost
```

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

rice of staying in a Premium

ed.

```
print(newPrice("premium", 5))
```

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

(d) The hotel has nine rooms that are numbered from room 0 to room 8.

The number of people currently staying in each room is stored in an array with the identifier `room`.

The index of `room` represents the room number.

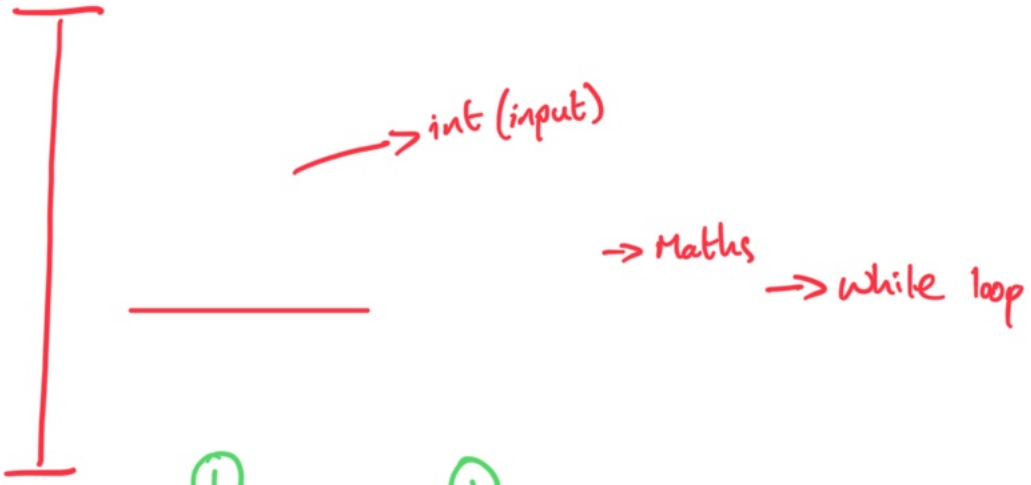
Array `room`

We need to move the total variable to be outside the for loop, as it currently resets the total variable to 0 every iteration through the loop. We need to change the for loop range to run from 0 to 8 as currently room 0 will not be counted.

..... [2]

? per

electric




```
while hours != 0:
    hours = int(input("How many hours? "))
    electric = input("Is your car electric? ")
    if electric == "y":
        cost = hours * 2      price = 2
    else:
        cost = hours * 4
print(cost)
```

[6]

END OF QUESTION PAPER

ADDITIONAL ANSWER SPACE

If additional space is required, you should use the following lined page(s). The question number(s) must be clearly shown in the margin(s).