Cambridge International AS & A Level

Cambridge Assessment International Education
Cambridge International Advanced Subsidiary and Advanced Level

CANDIDATE NAME

CENTRE NUMBER | | | | | |

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1936554559

COMPUTER SCIENCE **9608/13**

Paper 1 Theory Fundamentals **October/November 2019**

1 hour 30 minutes

Candidates answer on the Question Paper.

No Additional Materials are required.

No calculators allowed.

READ THESE INSTRUCTIONS FIRST

Write your centre number, candidate number and name in the spaces at the top of this page.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams, graphs or rough working.
Do not use staples, paper clips, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.
No marks will be awarded for using brand names of software packages or hardware.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.

The maximum number of marks is 75.

This document consists of **14** printed pages and **2** blank pages.

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1 In a supermarket, a self-checkout machine allows customers to scan the barcodes of products and then pay for their shopping. These are an alternative to the traditional cashier-staffed checkout.



(a) The self-checkout machine has a touchscreen.

(i) Identify **two** other input devices that self-checkout machines have.

1 .....

2 .....

[2]

(ii) Identify **two** other output devices that self-checkout machines have.

1 .....

2 .....

[2]

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(iii) The touchscreen uses capacitive technology.

The sequence of steps 1 to 6 describes the internal operation of the touchscreen.

The statements **A**, **B**, **C** and **D** are used to complete the sequence.

A	Charge is drawn to the point of contact.
B	The screen has a layer that stores an electrical charge.
C	There is a change in the electrostatic field.
D	The coordinates are sent to the touchscreen driver.

Write **one** of the letters **A** to **D** in each appropriate row to complete the sequence.

1 .....

2 When the user touches the screen

3 .....

4 .....

5 The coordinates of the point of contact can be calculated.

6 .....

[2]

(b) The self-checkout machines have primary storage.

(i) Give **two** reasons why the self-checkout machine needs primary storage.

1 .....

.....

2 .....

.....

[2]

(ii) The self-checkout machines use Static RAM (SRAM) for their cache.

The following table has statements about SRAM or Dynamic RAM (DRAM).

Tick (✓) **one** box in each row to identify whether the statement is about SRAM or DRAM.

Statement	SRAM	DRAM
More expensive to make		
Requires refreshing (recharging)		
Made from flip-flops		

[2]

(c) The self-checkout machines connect to a server that stores all the data for the supermarket. This is a client-server network.

(i) Describe, using an example for the supermarket, the client-server network model.

.....

.....

.....

.....

.....

.....

.....

..... [4]

(ii) The supermarket is concerned about the security and integrity of the data on the server.

Identify **two** methods that can be used to minimise the security risk to the data, and **one** method to protect the integrity of the data.

Security 1 .....

.....

Security 2 .....

.....

Integrity .....

.....

[3]

2 Leonardo's mobile phone has an operating system (OS).

(a) Describe the following key management tasks that the mobile phone operating system carries out.

Process management .....

.....

.....

.....

.....

.....

Memory management .....

.....

.....

.....

.....

.....

[6]

(b) Leonardo uses the mobile phone to record his voice.

(i) Describe how sound sampling is used by the mobile phone to encode the sound.

.....

.....

.....

..... [2]

(ii) Leonardo records his voice twice. Each recording is the same length and has the same sampling resolution.

The first recording has a sampling rate of 44 100 Hz. The second recording has a sampling rate of 21 000 Hz.

Describe how the different sampling rates will affect the recording and the sound file.

.....

.....

.....

..... [2]

(iii) Leonardo transfers the recordings to his laptop computer. He uses sound editing software to delete some sections of the recordings, and copy and paste to replicate other sections.

Describe **two** other features of sound editing software Leonardo can use to edit the recordings.

1 .....

.....

.....

.....

2 .....

.....

.....

.....

[4]

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3 A hotel needs to record information about customers and their bookings.

(a) The hotel has two types of room: double and family. Each room has a unique room number.

The hotel stores information about the customers including their name, address and contact details.

When a customer books a room, they give the start date and the number of nights they want to stay. If a customer wants more than one room, each room must have a separate booking. Each booking has an ID number.

The hotel creates a normalised, relational database to store the required information. There are three tables:

- CUSTOMER
- ROOM
- BOOKING

(i) Complete the database design for the hotel by writing the attributes for each table.

CUSTOMER(.....

.....

.....)

ROOM(.....

.....

.....)

BOOKING(.....

.....

.....)

[3]

(ii) Identify the primary key for each table that you designed in **part (a)(i)**.

CUSTOMER .....

ROOM .....

BOOKING .....

[2]

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[Turn over

(iii) Identify **one** foreign key in the tables that you designed in **part (a)(i)**.

Table name .....

Foreign key .....

[1]

(b) The hotel wants to use a Database Management System (DBMS) to set up and manage the database.

Describe, using examples, how the hotel can use the following DBMS tools:

Developer interface .....

.....

.....

.....

.....

Query processor .....

.....

.....

.....

.....

[5]

(c) The following table has four SQL scripts.

Tick (✓) **one** box in each row to identify whether the script is an example of a Data Definition Language (DDL) statement or a Data Manipulation Language (DML) statement.

Script	DDL	DML
`CREATE TABLE FILMS`		
`SELECT FilmID FROM FILMS`		
`ALTER TABLE FILMS ADD PRIMARY KEY (FilmID)`		
`CREATE DATABASE MYDATA`		

[2]

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4 **(a)** Convert the unsigned binary number 0101 1111 1100 into denary.

..... [1]

(b) Convert the denary number –239 into 12-bit two's complement.

..... [1]

(c) Convert the two's complement number 0110 0101 into denary.

..... [1]

(d) Convert the Binary Coded Decimal (BCD) value 0110 0101 into denary.

..... [1]

(e) Convert the denary number 222 into hexadecimal.

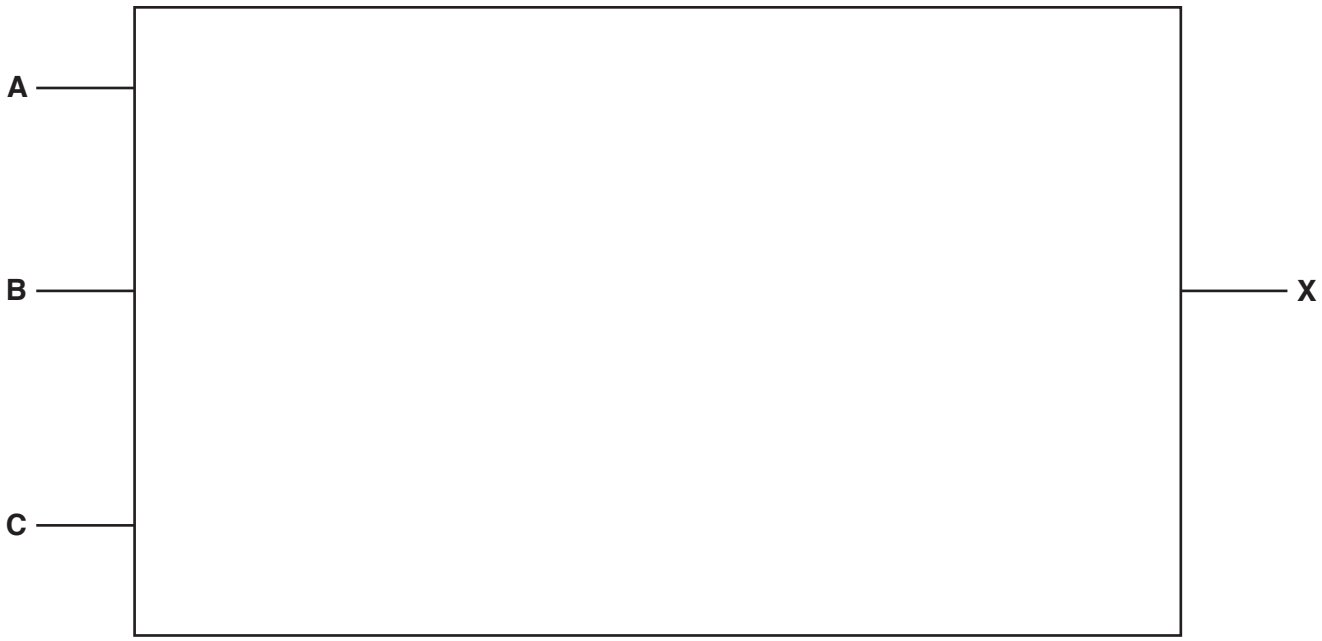
..... [1]

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[Turn over

5 **(a)** Draw a logic circuit to represent the logic expression:

X = NOT (**A** OR **C**) OR (**A** AND NOT **B**)



[5]

(b) Complete the truth table for the logic expression:

X = NOT (**A** OR **C**) OR (**A** AND NOT **B**)

A	B	C	Working space	X
0	0	0		
0	0	1		
0	1	0		
0	1	1		
1	0	0		
1	0	1		
1	1	0		
1	1	1		

[4]

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Question 6 begins on the next page.

6 Willow is creating a website.

One of the web pages includes the following JavaScript code and HTML tags.

```
01  <html>
02  <body>
03  <form>
04    <p id="displayQuestion"></p>
05    <input type="text" id="answer">
06    <button id="submit" onclick="checkAnswer()"> Submit </button>
07  </form>
08  </body>
09  <script>
10    val1 = Math.floor((Math.random() * 10) + 1);
11    val2 = Math.floor((Math.random() * 10) + 1);
12    document.getElementById("displayQuestion").innerHTML = "What is" +
      val1.toString() + "*" + val2.toString() + "?";
13    function checkAnswer(){
14      userAnswer = document.getElementById("answer").value;
15      answer = val1 * val2
16      if (userAnswer == answer.toString()){
17        alert("Correct, well done");
18      }else{
19        alert("Sorry that's incorrect");
20      }
21    }
22  </script>
23  </html>
```

(a) (i) Name **three** functions in the JavaScript code.

1 .....

2 .....

3 .....

[3]

(ii) Identify **every line number** of the JavaScript code that generates an output.

.....

..... [2]

(iii) Identify the line number of the JavaScript code that takes data the user has input and stores it in a variable.

..... [1]

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(iv) Describe the purpose of the code on line `16`.

.....

.....

.....

..... [2]

(b) Willow used functions from a JavaScript program library in the web page.

Describe the benefits to Willow of using program libraries to create the web page.

.....

.....

.....

.....

.....

.....

.....

..... [4]

7 The following table has descriptions of modes of addressing.

Complete the table by writing the name of the addressing mode for each description.

Addressing mode	Description
	Form the address by adding the given number to a base address. Load the contents of the calculated address to the Accumulator (ACC).
	Load the contents of the address held at the given address to ACC.
	Load the contents of the given address to ACC.
	Form the address from the given address + the contents of the Index Register. Load the contents of the calculated address to ACC.
	Load the given value directly to ACC.

[5]

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