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Pre-Leaving Certificate Examination, 2022

Computer Science

Sections A & B

Ordinary Level

Time: 1 hour, 30 minutes

115 marks

Name:
School:
Address:
Class:
Teacher:

Instructions

There are **three** sections in this examination. Section A and B appear in this booklet. Section C is in a separate booklet that will be provided for the computer-based element.

Section A	Short Answer Questions	Attempt any nine questions All questions carry equal marks	45 marks
Section B	Long Questions	Attempt any two questions All questions carry equal marks	70 marks
Section C	Programming	Attempt both parts of one question	80 marks

Calculators may **not** be used during this section of the examination.

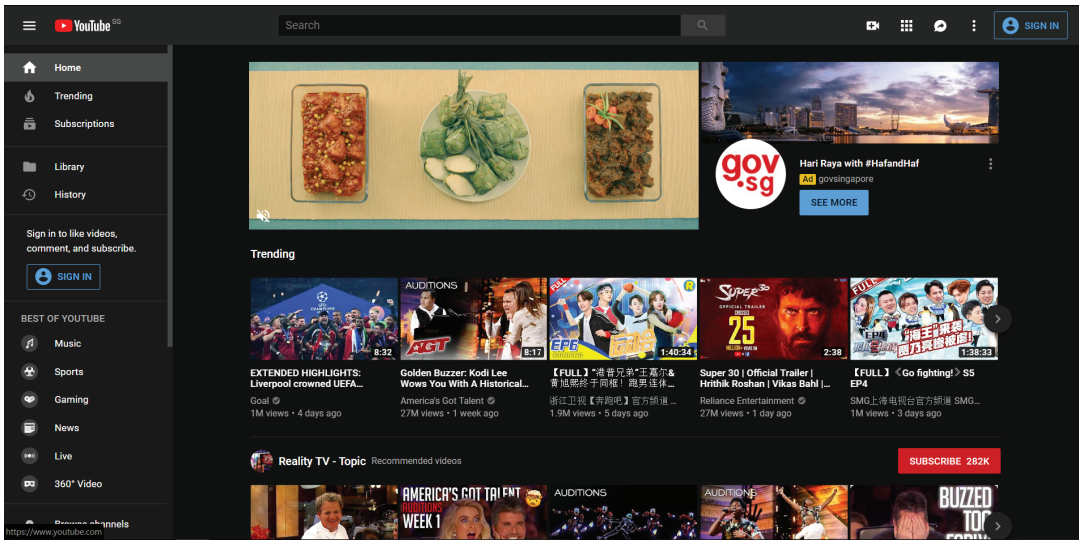
Write your answers for Section A and Section B in the spaces provided in this booklet. There is space for extra work at the end of the booklet. Label any such extra work clearly with the question number and part.

Section A Short Answer Questions 45 marks

Answer any nine questions.

Question 1

(a) Answer the following question by putting a tick (✓) in the relevant box.
Tick one box only.
The image below shows the homepage of YouTube.



Which computer language are webpages primarily written in?

Hypertext Markup Language (HTML)	☐
Python	☐
JavaScript	☐
Structured Query Language	☐

(b) The above image shows the user using YouTube in the "Dark Mode" setting. Suggest a reason why using "Dark Mode" might be better for the user than using the normal "Light Mode".

Question 2

The truth tables for some logic gates are given below. Match the completed truth tables with the correct logic gate by filling the in the table below:

Truth Table	Logic Gate
A	
B	
C	

A

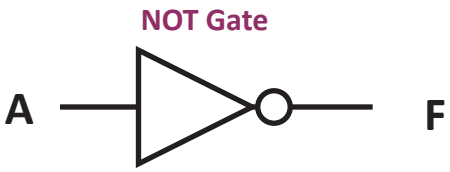
Input		Output
A	B	F
0	C	0
0	1	0
1	C	0
1	1	1

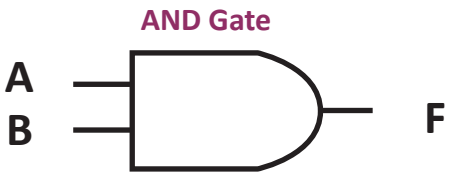
B

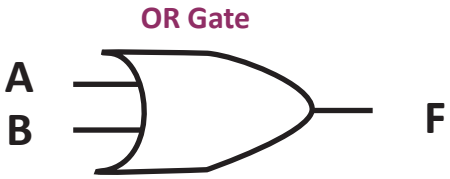
Input		Output
A	B	F
0	0	0
0	1	1
1	0	1
1	1	1

C

Input	Output
A	F
0	1
1	0







Question 3

Convert the decimal number 56_{10} to a binary number. Please show your workings.

Question 4

The diagram below shows a person using a computer game controller. Identify **one** part of the controller that uses digital input. Identify another part of the controller that uses analogue input. Explain your answer in each case.

Digital Input:

Analogue Input:

Question 5

Operating Systems such as Windows, Mac and UNIX offer both Graphical User Interfaces (GUIs) (Figure 1) and Command Line Interfaces (CLIs) (Figure 2). GUIs and CLIs also exist in some games such as Minecraft.

Figure 1 Figure 2

(i) Explain **one** reason why a user would choose to use a GUI over a CLI.

(ii) Explain **one** reason why a user would choose a CLI over a GUI.

Question 6

The code shown in Figure 3 below could be used as the withdrawal process of an ATM. Examine the code carefully and answer the questions that follow.

```
1  balance = 1000
2  print("Your current balance is: ", balance, "euro")
3  withdrawal = float(input("How much would you like to withdraw?:"))
4  balance = 1000 - withdrawal
5  print("Your new balance is: ",round(balance,2), "euro")
```

Figure 3

(i) In Line 3, the withdrawal variable is a float. What is a **floating-point** number?

(ii) If the value of the withdrawal variable was 350, what would the value of the balance variable be when the program finished?

(iii) Suggest a reason why using a float input is more appropriate than an integer in this program.

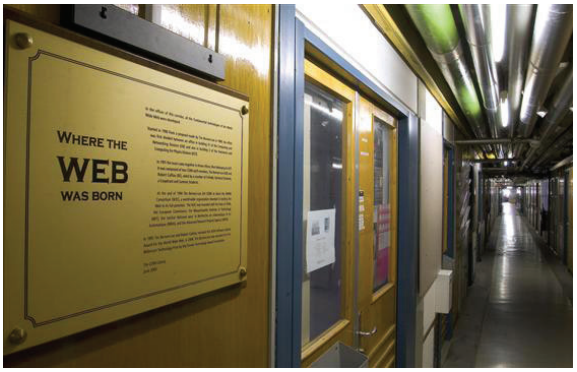
Question 7

Describe **one** precaution someone should take when using the internet to keep their personal information safe.

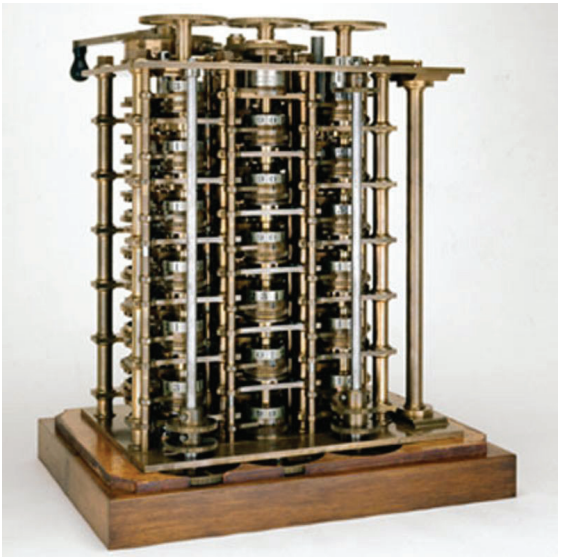
Question 8

The history of computing has been constantly changing for over 200 years. Put these events in the history of computing in the correct order, starting from the oldest (i.e., the one that happened first)

A The World Wide Web is invented in CERN, Switzerland.

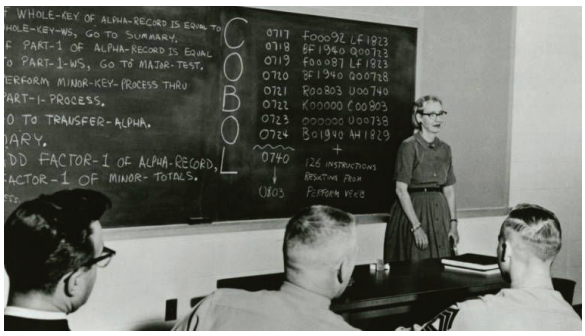


B Charles Babbage invents his Analytical Steam Engine for mathematical calculations.



C Apple releases the iPad.

D Grace Hopper creates the first computing language, COBOL.



E Paul Allen and Bill Gates found Microsoft.

	Event
Oldest	
Newest	

Question 9

You are part of a software development team. You have been asked by a veterinary surgery to create a database for its customers and their pets.

Using the table below, identify the type of data (Character, Integer, Float, Date or Boolean) for each column.

Customer name	Pet Name	Pet Age (Years)	Last Visit	Pet neutered?

Question 10

The diagram below shows some readable/writable CDs and a USB Stick.

(i) Which of these storage devices would be most suitable to store a large video clip on?

(ii) Give a reason for your answer.

Question 11

Hardware is physical equipment that allows for the computer and human to interact. The table below has six pieces of computer hardware, state if each one is input or output. The first has been completed for you.

Hardware	Input or Output
Mouse	Input
Speaker	
Printer	
Scanner	
Keyboard	
Microphone	

Question 12

Machine learning and artificial intelligence have helped revolutionise many areas of society.

(i) Identify **one** area that has been impacted by machine learning/artificial intelligence.

(ii) State **one** ethical concern of using machine learning/artificial intelligence in the area you identified in part (i).

Section B — Long Questions — 70 marks

Answer any two questions.

Question 13

Computational thinking or "Thinking like a computer" is a very important skill in computer science that can also be applied to real-life situations. There are four cornerstones of computational thinking:

- Algorithms
- Pattern Recognition
- Abstraction
- Decomposition

By using some (or all) of these skills, problems that seem difficult at the beginning can be solved with relative ease.

(a) **(i)** Match each term associated with computational thinking with the sentence from under the table that best describes it.

Aspect of Computational Thinking	Description
Algorithms	
Pattern Recognition	
Abstraction	
Decomposition	

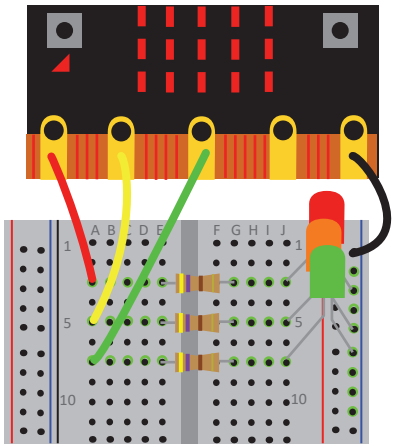
A: Finding the similarities among simpler, smaller problems that can help us solve more complex problems more efficiently.

B: Breaking a big problem up into smaller, more manageable parts.

C: Ignoring parts or areas of problems that do not matter, removing unimportant details from a problem.

D: Using a series of logical steps when solving a problem.

(b) The image below shows an embedded system (A Micro Bit) connected to a breadboard with LEDs.
The Micro Bit is connected to a RED LED, a GREEN LED and an ORANGE LED.



The LEDs are programmed to turn on and off using timers from when the Micro Bit program starts. The pattern of the LEDs turning off and on is shown below:

The RED LED Sequence: 1 minute ON, 2 minutes OFF, then repeat.

The GREEN LED Sequence: 2 minutes ON, 2 minutes OFF, then repeat.

The ORANGE LED Sequence: 1 minute ON, 1 minute OFF, then repeat.

The Micro Bit will display a message of the overall colour depending which light(s) are turned on. The table below shows the combinations of LEDs and the message from the Micro Bit showing the overall colour.

RED LED	GREEN LED	ORANGE LED	OVERALL COLOUR
OFF	OFF	OFF	**NONE**
ON	OFF	OFF	**RED**
ON	ON	OFF	**YELLOW**
ON	ON	ON	**PURPLE**
OFF	ON	ON	**BROWN**
OFF	OFF	ON	**ORANGE**
OFF	ON	OFF	**GREEN**
ON	OFF	ON	**TANGERINE**

(i) Using the table below, what will the overall colour be in the 9th minute after the Micro Bit starts? The first minute has been completed for you.

Minute Number	RED LED	GREEN LED	ORANGE LED	Overall Colour
1	ON	ON	ON	Purple
2				
3				
4				
5				
6				
7				
8				
9				

(ii) Is the LED system above an example of a digital or an analogue output? Give **one** reason for your answer.

(iii) Which component of computational thinking (Algorithms, Pattern Recognition, Abstraction or Decomposition) would you say is the most useful in solving the above problem? Give a reason for your answer.

(c) Computational thinking can be used to solve problems or complete tasks outside of computer science. Pick **one** aspect of computational thinking (algorithms, pattern recognition, abstraction or decomposition). Explain **one** way in which that aspect can be applied to an everyday problem or task e.g. applying decomposition to a jigsaw puzzle.

Question 14

Embedded systems such as the Micro Bit, Raspberry Pi or the Arduino form part of one of the Applied Learning Tasks (ALTs) that you performed during your Computer Science course.

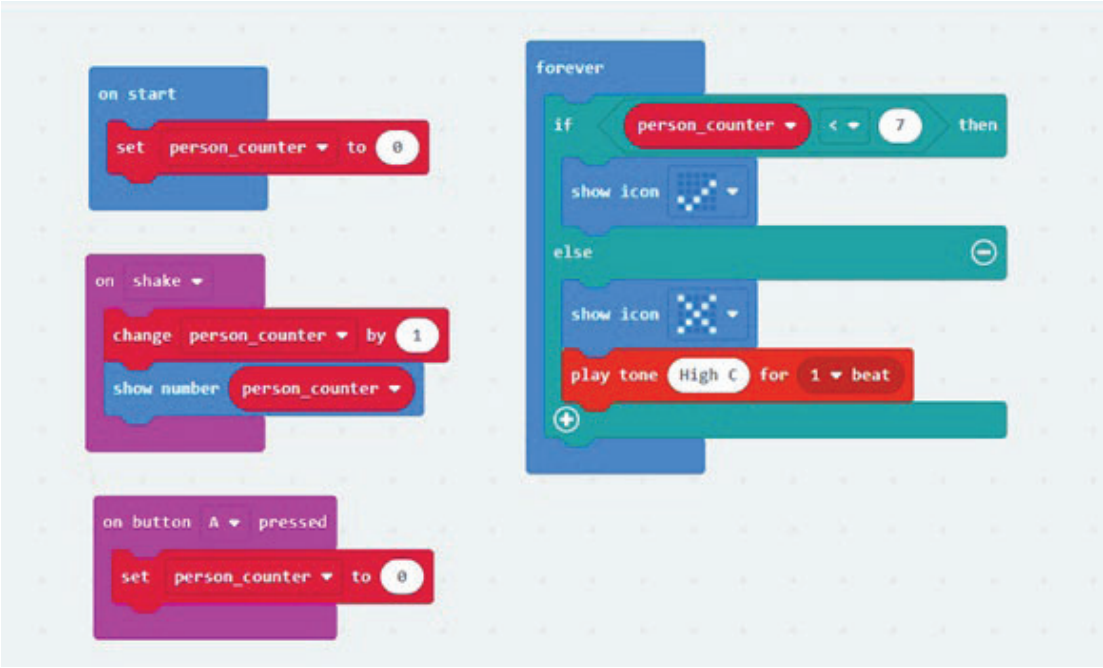
(a) Embedded systems usually have a processing unit and memory.

(i) What is the function of the Central Processing Unit (CPU) in a computer?

(ii) Name **two** types of memory that computers can have.

1.
2.

(b) The graphic below shows code that could be used to program a Micro Bit embedded system. The Micro Bit (with a buzzer) is attached to an anti-viral hand sanitiser at the entrance to a room. Every time the hand sanitiser dispenser is pressed, the Micro Bit will shake. Examine the code carefully below and answer the questions that follow.



(i) Is the "on shake" a digital input or analogue input?

(ii) What is the initial value of the variable `person_counter`?

(iii) What happens when the value of `person_counter` becomes 8 or higher?

(iv) What is the purpose of the on button A pressed input?

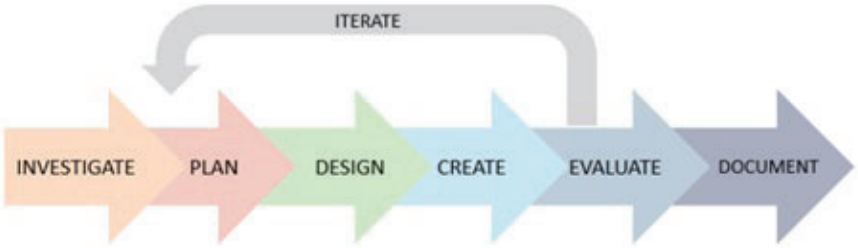
(v) Briefly describe how you could modify the code and/or Micro Bit accessories to improve the functionality of this embedded system.

(c) Embedded systems play an important role in our daily lives.
Give **two** examples of how embedded system are used in society.

1.
2.

Question 15

Following a design process when creating a computational artifact is important.



(a) The diagram above outlines the stages involved in a typical design process. Describe the following stages in the process:

(i) Iteration

(ii) Document

(b) Many electronic devices were created using the design process above. Match each image with its corresponding term in the table below. Match the function of each item.

 **A**	 **B**	 **C**	 **D**

Term	Image	Function
Buzzer		
Capacitor		
Resistor		
Transistor		

Limits the flow of electrical current.
Produces an audio signal after receiving an electric current.
Stores electrical energy.
Controls the flow of electrical energy.

(c) Describe **one** environmental issue with the production and use of electronic devices such as the above.

Acknowledgements

Images

Image on page 3: https://support.google.com/youtube/thread/7503739/my-homepage-video-icon-suddenly-becomes-too-big?hl=en

Images on page 5:
https://www.theguardian.com/technology/gallery/2017/jul/21/joy-of-sticks-10-greatest-video-game-controllers

https://anydifferencebetween.com/graphical-user-interface-vs-command-line-interface/

Images on page 7:
A. Source: https://home.cern/resources/image/computing/world-wide-web-images-gallery
B. Source: https://www.computerhistory.org/babbage/engines/

Imagrs on page 8:
C. Source: https://appleinsider.com/articles/18/04/03/a-brief-history-of-the-ipad-apples-once-and-future-tablet
D. Source: https://digital.hagley.org/gracehopper
E. Source: https://www.theverge.com/2018/10/16/17982604/microsoft-paul-allen-death-co-founder-philanthropy-legacy

Image on page 9: https://www.flaticon.com/collections/MjA5NjYwMDc=