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B 5 1

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	45 marks
		All questions carry equal marks	
Section B	Long Questions	Attempt any two questions	70 marks
		All questions carry equal 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.
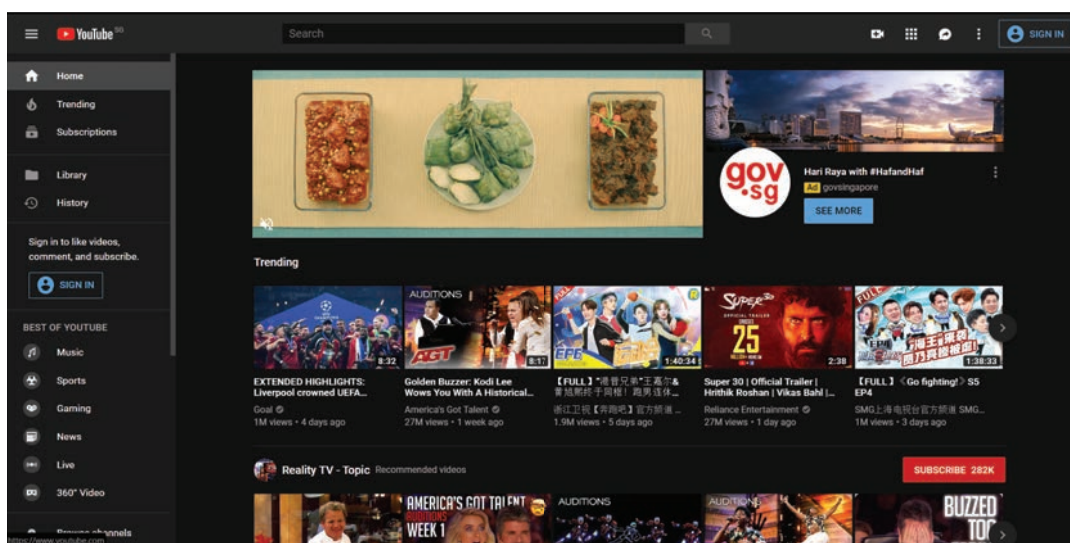
Which computer language are webpages primarily written in?

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".
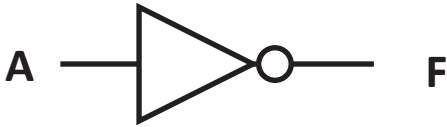

Question 2

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

NOT Gate

A ▷o— F

B

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

AND Gate

A
B ⊐— F
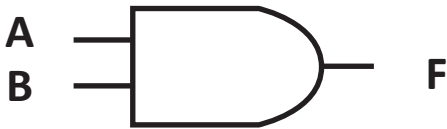
C

Input	Output
A	F
0	1
1	0

OR Gate

A
B ⊐— F

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.

4

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.
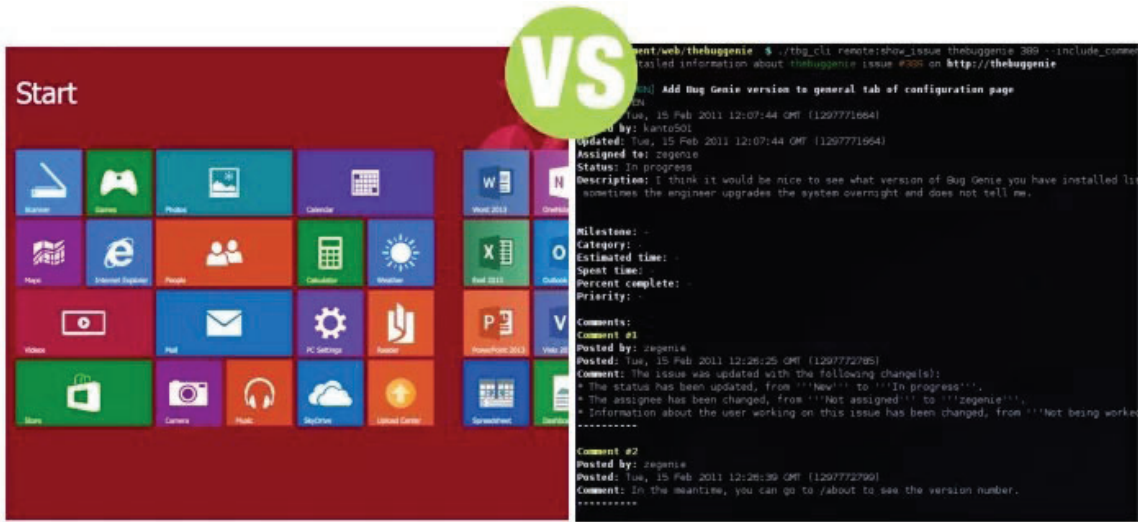

Figure 1   Figure 2

(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.

6

Question 7

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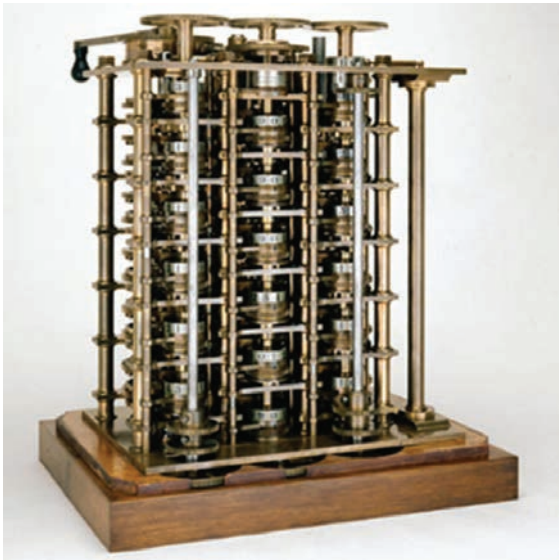

Question 8

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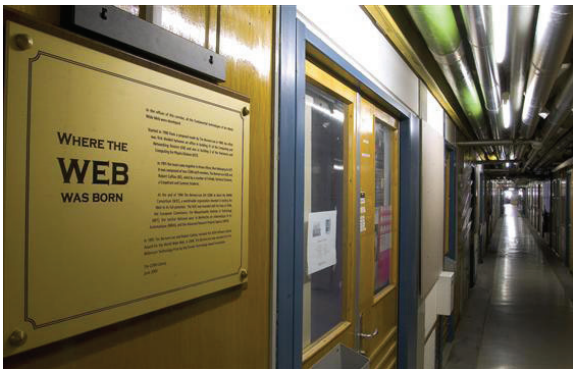
B Charles Babbage invents his Analytical Steam Engine for mathematical calculations.

C Apple releases the iPad.

D Grace Hopper creates the first computing language, COBOL.

E Paul Allen and Bill Gates found Microsoft.

|	**Event**
Oldest	
2	
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.
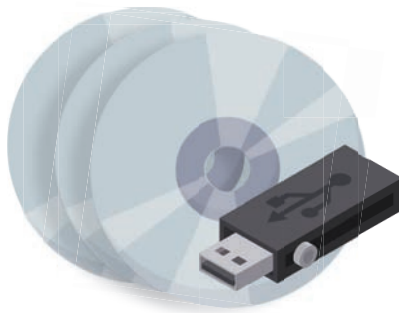
(i) Which of these storage devices would be most suitable to store a large video clip on?

(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).

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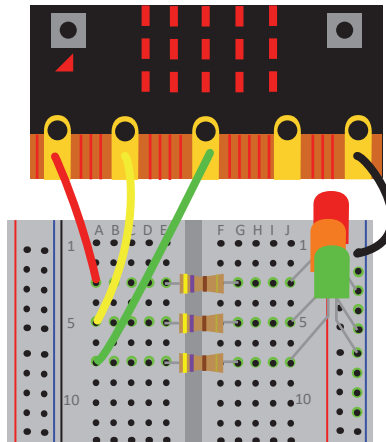
The LEDs are programmed to turn on and off using timers from when the Micro Bit program starts. The pattern of the LEDs turning off and on is shown below:

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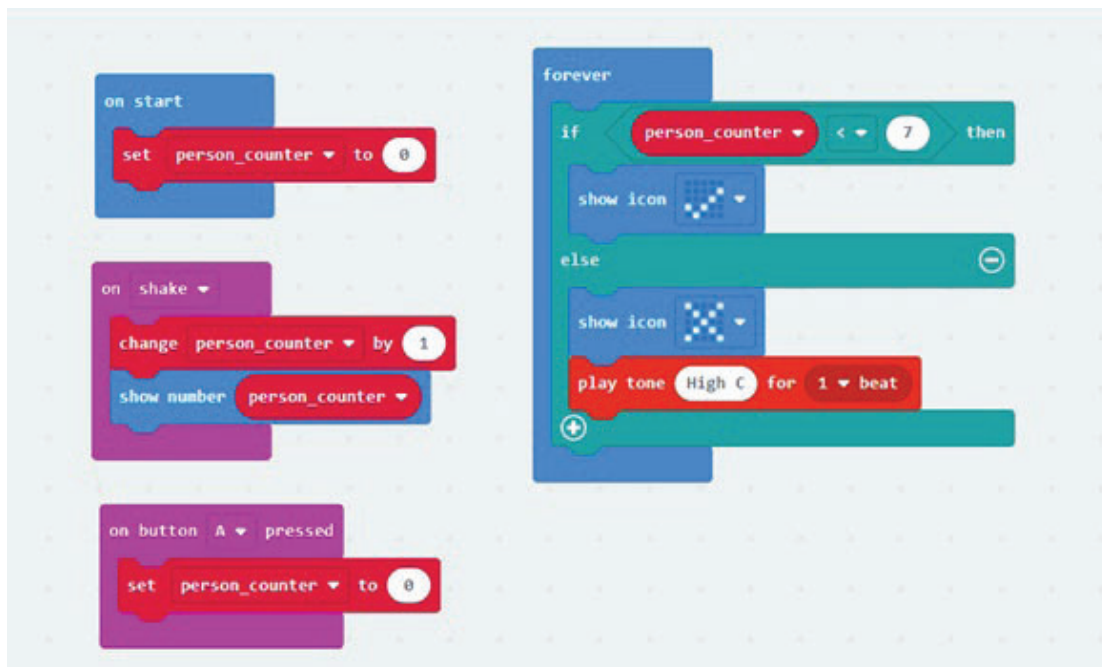
    (i) Is the "on shake" a digital input or analogue input?

| |
| |

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

	1

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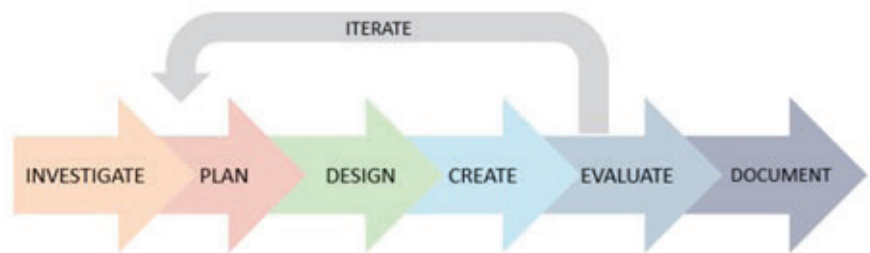
(a) The diagram above outlines the stages involved in a typical design process. Describe the following stages in the process:

(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.
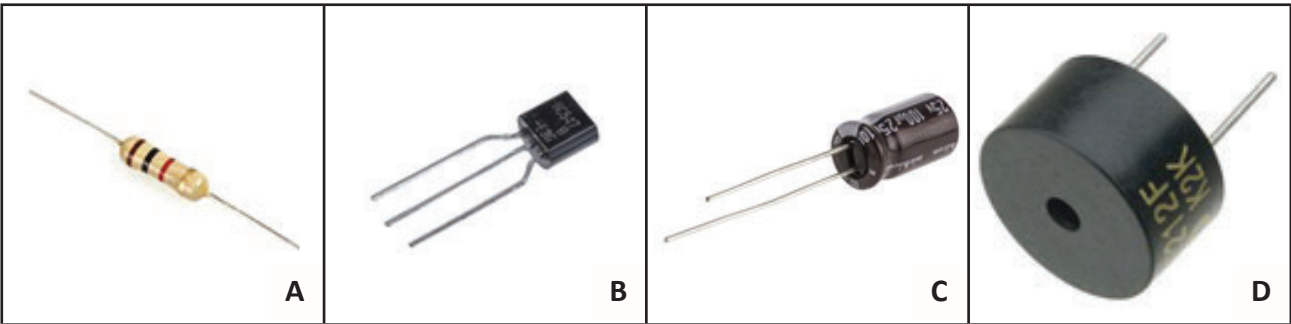
Term	Image	Function
Buzzer		
Capacitor		
Resistor		
Transistor		

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.

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Pre-Leaving Certificate Examination, 2022

Computer Science

Section C

Ordinary Level

Time: 1 hour

80 marks

Instructions

There is one section of the examination paper in this booklet.

Section C	Programming	One question	80 marks
		Answer all question parts	

Answer all parts of the question on your digital device.

Calculators may be used during this section of the examination.

Ensure that you save your work regularly and when you complete each question part.

Do not change the file names or save your work under different file names.

If you are unable to get some code to work correctly, you can comment out the code so that you can proceed. The code that has been commented out will be reviewed by the examiner.

Rough work pages are provided at the end of this booklet. Please note that this work will **not** be reviewed by an examiner.

At the end of the examination it is your responsibilty to ensure that you have saved all of your files onto your external media.

Answer all question parts.

Question 16

(a) Open the program called **Question16_A.py** from your device.
Enter your name in the space provided on **Line 2.**

This is a simple program that can find the perimeter and area of a quadrilateral. When this program is run, it prompts the user to select either perimeter or area.
The user enters the letter "p" if they wish to find the perimeter or enters the letter "a" if they wish to find the area.

```
1   # Question 16(a)
2   # Student name:
3
4   length = 6
5   width = 4
6
7
8   choice = input("Do you want to find the (p)erimeter or (a)rea? ")
9
10  if choice == "p":
11     print(length + length + width + width)
12  elif choice == "a":
13     print(length*width)
```

(i) Modify the program to output a message to the user describing what the program does. This message should be displayed at the start of the program.
When the program is run the output may look as follows:

```
This program can find the perimeter or area of a quadrilateral
Do you want to find the (p)erimeter or (a)rea? p
20
```

(ii) Modify the program to prompt the user to enter their name. A suitable variable should be used to store the name. The program should output a suitable message using the user name when the program ends.
When the program is run the output may look as follows:

```
This program can find the perimeter or area of a quadrilateral
Please enter your user name: John
Do you want to find the (p) erimeter or (a) rea? a
24
Thank you for using the program John
```

(iii) Currently the variables length and width are hard coded to the values of 6 and 4 respectively. Modify the code so that the user will be asked to enter the values as floating-point numbers for these variables.

When the program is run the output may look as follows:

```
This program can find the perimeter or area of a quadrilateral
Please enter the length: 7.5
Please enter the width: 4.7
Please enter your user name: John
Do you want to find the (p) erimeter or (a) rea? a
35.25
Thank you for using the program John
```

(iv) Modify the code so that the output of both the area and perimeter will be rounded to two decimal places.

When the program is run the output may look as follows:

```
This program can find the perimeter or area of a quadrilateral
Please enter the length: 7.52367
Please enter the width: 4.457249
Please enter your user name: John
Do you want to find the (p) erimeter or (a) rea? a
33.53
Thank you for using the program John
```

(v) Modify the program so that when the program is run the output will be more informative to the user. The output will look as follows:

```
This program can find the perimeter or area of a quadrilateral Q
Please enter the length: 7.532
Please enter the width: 4.674
Please enter your user name: John
Do you want to find the (p) erimeter or (a) rea? p
A quadrilateral with a length of 7.532 and a width of 4.674 h
as a perimiter of: 24.41
Thank you for using the program John
```

```
This program can find the perimeter or area of a quadrilateral Q
Please enter the length: 7.542
Please enter the width: 4.876
Please enter your user name: John
Do you want to find the (p) erimeter or (a)rea? a
A quadrilateral with a length of 7.542 and a width of 4.876 h
as an area of: 36.77
Thank you for using the program John
```

(vi) In the perimeter calculator part of the code, change the code so that instead of using the formula: Perimeter = `length + length + width + width`, the perimeter will be found using the formula: Perimeter = `(2 X length) + (2 X width)`. You can test the functionality of your code by using the data in the following table.

Length	Width	Perimeter	Area
3.7	7.4	22.2	27.38
2.6	10.5	27.3	26.7
8.8	11.4	100.32	40.4

Save and close your file before moving on to the next part.

(b) Open the program called **Question16_B.py** from your device.
Enter your name in the space provided on **Line 2**.

In this code, the player will play a game of Rock Paper Scissors against the computer.
The rules of the game are described below:
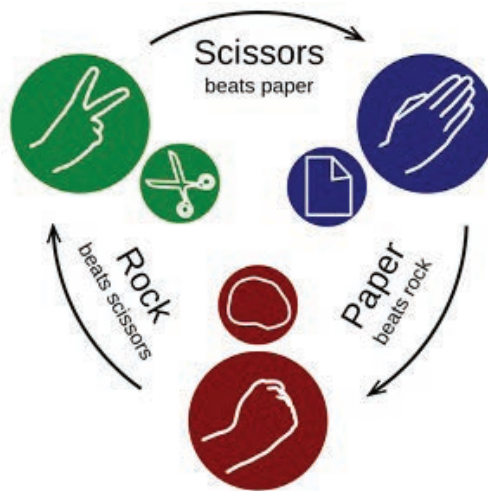
If both the player and computer pick the same, the game ends in draw.

```
1    # Question 16(b)
2    # Student name:
3
4    import random
5
6    computer_options = ["rock", "paper", "scissors"]
7
8
9    computer_choice = computer_options (random.randint(0,2)]
```

(i) Modify the program so that:
- The user should be prompted to enter their choice of rock, paper or scissors when the program starts.
- A suitable variable should be used to store the user input.
- The user's choice should be printed out with an appropriate message.
- The computer's choice should be printed out with an appropriate message.
  When the program is run the output may look as follows:

```
Enter rock, paper or scissors: rock
Player chose: rock
Computer chose: paper
```

(ii) Modify the program so that it will tell the user who won the game. Use the rules of the game above to help.

When the program is run the output may look as follows:

```
Enter rock, paper or scissors: rock
Player chose: rock
Computer chose: paper
Computer wins
```

```
Enter rock, paper or scissors: paper
Player chose: paper
Computer chose: rock
Player wins
```

```
Enter rock, paper or scissors: paper
Player chose: paper
Computer chose: paper
Draw!
```

Save your file.

Ensure that you have saved and closed all files before you finish the examination.

Space for rough work.

This page will not be reviewed by an examiner.

Space for rough work.

This page will not be reviewed by an examiner.

Space for rough work.

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Thanking you in advance,

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