Name: _____ **Class:** _____ **Index Number:** _____

Anglo-Chinese School
(Barker Road)

PRELIMINARY EXAMINATION 2023

SECONDARY FOUR
EXPRESS

COMPUTING
PAPER 1

7155/01

2 HOURS

INSTRUCTIONS TO CANDIDATES:

Do not open this booklet until you are told to do so.
Write your name and index number clearly in the spaces at the top of this page.
Write in dark blue or black pen. You may use soft pencil for any diagrams, graphs or rough working.
Do not use staples, paper clips, highlighters, glue or correction fluid.

Approved calculators are allowed.

Answer **all** questions.

The number of marks is given in brackets [ ] at the end of each question or part of question.
You should show all your working.
The total mark for this paper is 80.

TOTAL	/ 80

This paper has 15 pages, inclusive of the cover page.

1 The diagram shows four types of data storage devices on the left and six descriptions of data storage on the right.

Draw **one or more** lines from each device to its correct description(s).

Device		Description
		• Data stored is volatile
Magnetic storage	•	• Small storage space < 10 MB
Processor register	•	• Fastest transfer speed
Random access memory (RAM)	•	• Secondary storage
Read-only memory (ROM)	•	• Device has moving physical parts
		• Typically store terabytes of data

[4]

2 Aloysius has a computer that is assigned an Internet Protocol (IP) address. The IPv4 address is:

192.168.86.1

The IPv4 address is represented as denary values.

(a) Convert the denary values 192 and 86 from the IPv4 address to 8-bit binary.

192								
86								

Working space .....

.....[2]

(b) Convert the denary value 192 into hexadecimal. Show your working.

.....[2]

(c) Aloysius's computer is also assigned a MAC address and an IPv6 address.

(i) MAC stands for .....[1]

(ii) Identify **one** similarity between an IP address and a MAC address.

.....

.....[1]

(iii) Identify **one** difference between an IP address and a MAC address.

.....

.....[1]

(iv) Identify **one** difference between an IPv4 address and an IPv6 address.

.....

.....[1]

(d) Aloysius sees the message “Set your browser to accept cookies”.

(i) Explain what cookies are.

.....

.....[1]

(ii) Explain why some websites make this request.

.....

.....[1]

3 **(a)** The table contains statements about types of software.
Tick (✓) one or more boxes in each row to indicate if the statement is true for the type of software.

Statement	FOSS	Proprietary	Public Domain
Protected under copyright			
Can legally copy, modify and distribute			
Available for use at no cost			
Source code is usually kept secret			

[4]

(b) Explain the difference between Creative Commons (CC) and FOSS licenses.

.....

.....

.....

.....[1]

(c) Open courseware often use CC licenses. Explain what open courseware are.

.....

.....

.....

.....[1]

(d) You need to use some copyrighted material in your research project. Describe **two** ways to avoid committing copyright infringement.

.....

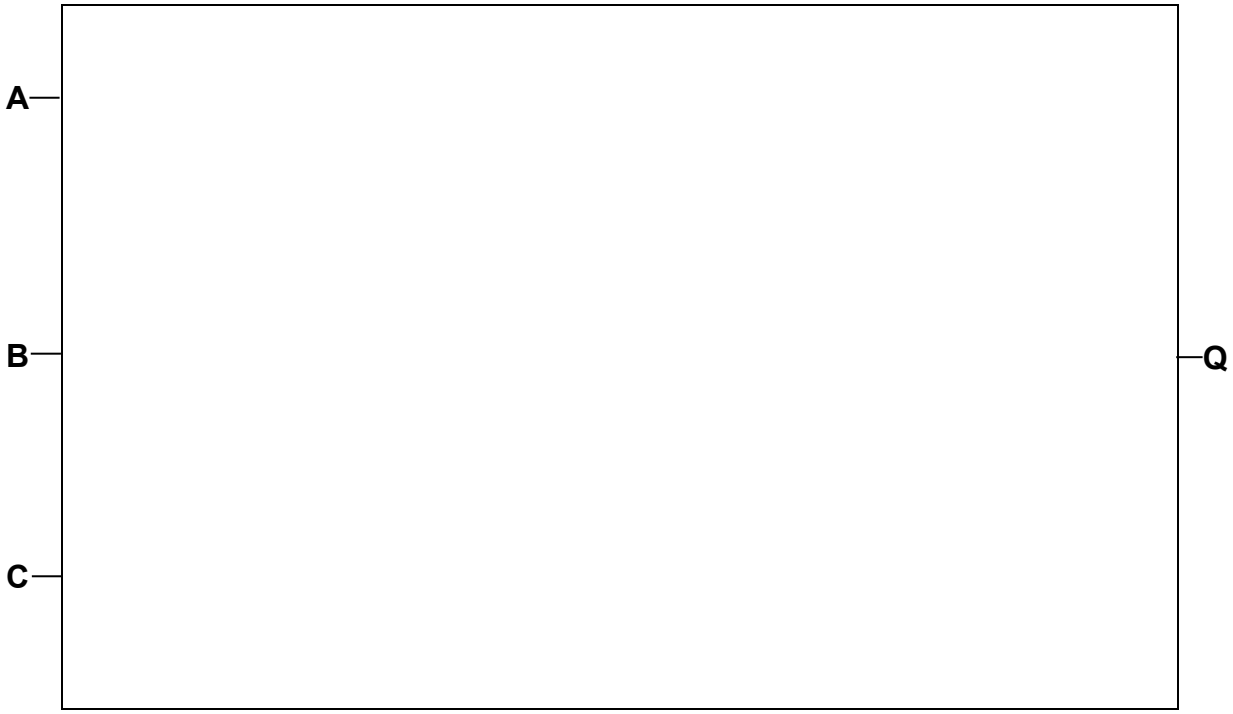
.....

.....

.....[2]

4 **(a)** Draw the logic circuit to represent the following Boolean statement. Do **not** simplify the statement.

Q = **A** NOR (**B** OR **C**) OR (**A** NOR **C**) AND **B**



[4]

(b) Complete the truth table for the Boolean statement.

Q = **A** NOR (**B** OR **C**) OR (**A** NOR **C**) AND **B**

A	B	C	Working Space	Q
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]

(c) Using the truth table from part (**b**), state the simplified Boolean statement using a single logic gate that is equivalent to **Q** = **A** NOR (**B** OR **C**) OR (**A** NOR **C**) AND **B**.

.....[1]

5 A school uses a program to allocate subject combinations to Secondary 3 students for the next academic year.

Each student can choose two elective subjects for their Secondary 3 subject combination, and they will rank their elective subject in order of preference. Depending on subject teachers' availability, each elective subject is limited to a pre-determined maximum number of students. The program takes in the ranked choices of the students and allocates the two elective subjects based on the students' overall results in the most recent examinations.

(a) The ……. technique can be used to create smaller, more manageable parts of the program. One of these parts is **results** where all the students' marks are imported into the program and the program would generate a ranked list of students based on their overall results. [1]

(b) Identify and describe **three** other parts for this program.

1 .....

.....

2 .....

.....

3 .....

.....[3]

6 Program development typically takes place in five stages. Write Code is the third stage.

Identify and describe the two stages before the Write Code stage.

First stage .....

Description .....

.....

Second stage .....

Description .....

.....[4]

7 Technology has enabled rapid advances in transportation all around the world.

(a) Describe **two** economic benefits of using technology in transportation.

1 .....

.....

2 .....

.....[2]

(b) Describe **one** negative social impact of using technology in transportation.

.....

.....[1]

(c) Technology is susceptible to cyberattacks.

(i) Viruses and worms are types of malware. Explain what is meant by a

- Virus .....

  .....

- Worm .....

  ..... [2]

(ii) Complete the following paragraph by filling in the missing words.

Viruses, worms, spyware and ……. horses are all examples of malware that need to run on a user's computer in order to perform their respective attacks. Anti-virus and anti-spyware programs can be used to stop the malware from running. Most anti-virus and anti-spyware programs rely on a list of ……., or unique evidence, for each known version of malware. This list needs to be updated regularly through the ……. to ensure that the protection provided by these programs continues to be effective against new malware. [3]

8 A government organisation dealing in highly classified and strategically important projects has an office housed in the basement level of a secure complex. To enhance security, the organisation implemented a separate network with no internet access and isolated from other routine governmental networks.

(a) State the most appropriate network based on geographical size.

.....[1]

(b) State the network model (client-server or peer-to-peer) that is most appropriate for the network used by this organisation. Give **one** reason why you chose this network model.

.....

.....

.....[2]

(c) Identify and describe the function of **two** network devices that could be used in the network.

Device 1 .....

Function .....

.....

Device 2 .....

Function .....

.....[4]

9 A PE teacher is working on a spreadsheet to store the weight and height information and calculate the body mass index of students in his class. To test his spreadsheet, he uses some functions to generate random test data for weight in integer and height in float. An example from the spreadsheet is shown:

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	S/N	Name	Gender	Weight (kg) in integer (between 40 to 80)	Height (m) in float (between 1.2 to 1.8)	BMI	Status		BMI Range	0 to 18.5	18.5 to 24.9	24.9 to 29.9	> 29.9
2	1	Aisha	F	58	1.35	31.63	Obese		BMI	0	18.5	24.9	29.9
3	2	Alex	M	61	1.62	23.35	Normal		Status	Underweight	Normal	Overweight	Obese
4	3	Bala	M	72	1.44	34.61	Obese						
5	4	Denise	F	72	1.25	46.15	Obese						
6	5	Farhan	M	69	1.46	32.49	Obese						
7	6	Gopi	M	53	1.60	20.61	Normal						
8	7	Irfan	M	58	1.31	33.81	Obese						
9	8	Jun Ming	M	40	1.72	13.60	Underweight						
10	9	Lily	F	45	1.32	25.85	Overweight						
11	10	Mei Ling	F	63	1.63	23.81	Normal						
12	11	Muthu	M	68	1.66	24.69	Normal						
13	12	Nurul	F	45	1.79	14.10	Underweight						
14	13	Priya	F	42	1.67	15.13	Underweight						
15	14	Siti	F	66	1.27	40.63	Obese						
16	15	Wei Meng	M	69	1.24	44.73	Obese						
17													
18					Number of Obese Students		7						

(a) The formulas in cells **D2** to **D16** use a function to randomly generate an integer value between 40 to 80.

Identify the function that will do this.

Function: .....[1]

(b) The formulas in cells **E2** to **E16** use a function to randomly generate a float value with decimal point between 1.2 to 1.8.

Identify the function and state the formula that will do this.

Function: .....

Formula: .....[2]

(c) The formulas in cells **G2** to **G16** use a function to search for a match for the BMI in the range **J1** to **M3** and then display the corresponding status.

Identify the function and the type of matching that will do this.

Function: .....

Type of Matching: TRUE / FALSE (Circle the correct answer) [2]

(d) The formula in cell **G18** shows the number of obese students in the class.

Identify the most appropriate function that will do this.

Function: .....[1]

10 A function is written in pseudo-code.

```
FUNCTION GetMark(Value)
    IF Value >= 70 AND Value <= 80
        RETURN "A"
    ELSEIF Value >= 60 AND Value < 70
        RETURN "B"
    ELSEIF Value >= 50 AND Value < 60
        RETURN "C"
    ELSEIF Value >= 0 AND Value < 50
        RETURN "F"
    ELSE
        RETURN -1
    ENDIF
ENDFUNCTION
```

The main program in pseudo-code is:

```
Number = INTEGER(INPUT("Enter number of students "))
Error = 0
NewData = []

FOR Count = 1 TO Number
    Data = INTEGER(INPUT("Enter mark "))
    RetVal = GetMark(Data)
    IF RetVal == -1
        Error += 1
    ELSE
        NewData = NewData + [RetVal]
    ENDIF
NEXT Count

OUTPUT NewData
OUTPUT Error
```

(a) (i) Complete the following trace table for the following set of data.

5, 55, 84, 62, 46, -15, 78

Main program							GetMark()	
Number	Count	Error	Data	RetVal	NewData	Output	Value	Value Returned

[5]

(ii) Describe the purpose for the algorithm.

.....

.....[2]

(b) The input data for the main program, `Number` must be an integer.

Identify an appropriate data validation technique that can be used to validate `Number`.

.....

.....[1]

(c) For **each** test case condition in the following table, give an example of test data for the `Value` parameter in `GetMark()` function.

Test case condition	Test data
Normal	
Boundary	

[2]

11 A programmer is writing a program to calculate the check digit for a 9-digit integer which represents 10-digit International Standard Book Number (ISBN).

The check digit is related to the previous 9 digits by the following algorithm:

1) Multiply the first digit by 10, the second digit by 9, the third digit by 8, and so on until the ninth digit, which is multiplied by 2, then sum up the results.
2) Divide the result by 11 and keep the remainder.
3) If the remainder is 0, the check digit should be 0. Otherwise, subtract the remainder from 11. The check digit should be the resulting answer. If the check digit is 10, use the letter “X” as the check digit instead.

(a) The program code function `isbn10()` takes a 9-digit number as a parameter. It calculates the check digit and returns the check digit.

Complete the function `isbn10()`.

```
def isbn10(number):
    total = 0
    number2 = str(number)

    for x in range(.....):
        digit = int(number2[x])
        multiply = .....
        total += multiply * digit

    remain = .....
    if remain == 0:
        check_digit = 0
    else:
        check_digit = 11 - remain
        if .....:
            check_digit = "X"

    return .....
```

[5]

(b) The main program:

- takes an input a 9-digit number until a valid 9-digit integer is entered
- calls the function isbn10() with the valid input as a parameter
- outputs the number with the check digit as its 10th digit.

Write program code or pseudo-code for the main program.

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.....[5]

End of Paper