

Annual Examinations for Secondary Schools 2022

YEAR 11	COMPUTING	TIME: 1h 45min
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Name: _____

Class: _____

Directions to candidates:

Answer **ALL** questions on this paper.

The use of a flow chart template is permitted.

Calculators are **NOT** allowed.

Good English and orderly presentation are important.

For office use only:

QUES	1	2	3	4	5	6	7	8	Final Mark
MAX	9	10	9	8	9	10	13	17	85%
MARK									

1. The Royal Air Force Aerobatic Team organises several aerobatic performances worldwide. The team is made up of pilots, engineers, and other professionals. An online database system is used to manage the scheduling of their performances which can be viewed on their website.



- a. A database administrator is responsible for managing the database. [2]
Mention **TWO** other IT roles related to the development, upkeep, and maintenance of the Red Arrows IT systems.

- b. Do you suggest using a Low-Level Language, 3GL or 4GL to develop the Red Arrows database system? Explain. [2]

- c. The table below displays some of the records that are found in the PERFORMANCE table. Answer the questions that follow:

PERFORMANCE				
Performance no.	City	Country	Date	Time
21037	Qawra	Malta	24/09/2021	17:30hrs
21038	Cologne	Germany	18/12/2021	17:00hrs
21039	Qawra	Malta	25/09/2021	17:30hrs
21040	Berlin	Germany	20/10/2021	16:30hrs

- i. Which is the primary key used in the PERFORMANCE table? [1]

- ii. By which column (field) is the above table sorted? [1]

- iii. The Red Arrows website allows visitors to search for a specific performance. Is it ideal to allow website visitors to search records using the performance no.? Explain. [2]

- iv. Mention and explain **ONE** security measure needed to protect the data that is being stored in servers and accessed online through the website. [1]

2. Locally, health-related services and information are available through the portal servizz.gov.mt. This portal provides various services including the registration for organ donation.



Organ donation registration requires the user to specify which organ/s he wishes to donate from: kidneys, small bowel, pancreas, liver, lungs, and heart.

Once logged in the system, the user can view personal information. The JAVA code snippet below shows the list of organs and which ones are confirmed for donation.

```
String[] organs = {
    "kidneys", "small bowel", "pancreas",
    "liver", "lungs", "heart"
};

System.out.println ("ID number: " + idNumber);
for(int i = 0; i < 6; i++){
    System.out.print(organs[i] + ":");
    if (donateOrgan[i] == true)
        System.out.println ("Yes");
    else
        System.out.println("No");
}
```

- a. The above code uses an array called `donateOrgan`. How would you declare this array? [1]

- b. Name a looping structure used in this code. [1]

- c. Mention one other type of looping structure and explain why it is not feasible to use in the code snippet above. [2]

- d. Java is a High-Level Language. Explain **ONE** way in which Java differs from Assembly language. [1]

- e. High-Level Languages need to be translated using compilers or interpreters before being run.

- i. Tick whether the below statements represent the role of a compiler or that of an interpreter: [3]

Statement	Compiler	Interpreter
Produces object code.	☐	☐
Translates and executes one statement at a time.	☐	☐
Ideal during program debugging.	☐	☐

- ii. Does Assembly language need to be translated? Explain. [2]

3. In mid-2021 *Microsoft* announced a new version of its highly popular Operating System, Windows 11.



Windows 11

- a. Name **TWO** functions of an Operating System.

- b. New versions of an Operating System often introduce changes into the User Interface to make it more user-friendly. Mention **TWO** features that make the user interface of a desktop computer more user-friendly. [2]

- c. The operating system is a type of system software. A computer system also runs application software. State whether the following are system or application software.

i. Word Processor:		[1]
ii. Bootstrap Loader:		[1]
iii. Web Browser:		[1]

- d. MS Windows hosts several system utilities. Mention **ONE** and briefly describe its use. [2]

4. Windows 11 requires a 64-bit processor, which is likely to work with 64-bit buses and 64-bit registers.

- a. Are the below statements True or False?

i. A 64-bit data bus can transfer 64 bits of data at a time.		[1]
ii. A 64-bit address bus can access 2^{64} memory locations.		[1]
iii. A 64-bit register can hold 2^{64} bits of data.		[1]

- b. The spec sheet states that Windows 11 requires at least 4GB of RAM. Give **ONE** property of RAM. [1]

- c. Why is it not recommended to have only 4GB on a Windows 11-based laptop for the day-to-day running of application software? [1]

- d. The minimum hard disk capacity to run Windows 11 is 64GB. How is a hard disk different from RAM? [1]

- e. Different storage media can access files directly or serially. For each of the following applications suggest whether serial access would be feasible or not. Explain.

- i. Buying products from an e-commerce website. [1]

- ii. Print a list of all gym members. [1]

5. A sports & fitness initiative has been setup in Gozo College for all primary and secondary students on Saturday mornings. The idea is to foster a healthy lifestyle and a love for sports. The sport activities will be as follows:

Sports activity	Age	Time
Fitness	4 – 8	10:00 – 11:00
Athletics	9 – 13	09:00 – 10:00
Gymnasium	14 - 16	09:00 – 10:00

The school sports committee decided to develop a mob app so that students together with their parents/guardians can apply online.

The app algorithm:

- starts by asking the student to enter the age,
- displays the sports activities according to the student's age,
- displays a warning message and asks the student to re-enter the age if the number entered is out of range,
- asks the student to confirm registering for the activity or to exit the app,
- prompts the student to enter the ID Card number, if confirmation is done,
- displays an appropriate message whether the user confirms activity or exits the app.

Draw a flowchart to represent the algorithm for this app. [9]

Space for flowchart.

6. A circuit is being designed to automate the safety procedures of a factory that produces two polluting chemicals, A and B. These chemicals must be monitored for safety reasons.

- If a chemical exceeds the safety threshold, it becomes dangerous ($A = 1$ OR $B = 1$).
- A warning sound ($S = 1$) will be triggered if either A, or B are at a dangerous level.
- When both chemicals A and B are at a dangerous level, they neutralise each other and no warning sound will be triggered ($S = 0$).

Answer the questions that follow:

a. Represent this scenario in a truth table. [3]

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b. Derive the Boolean expression. [2]

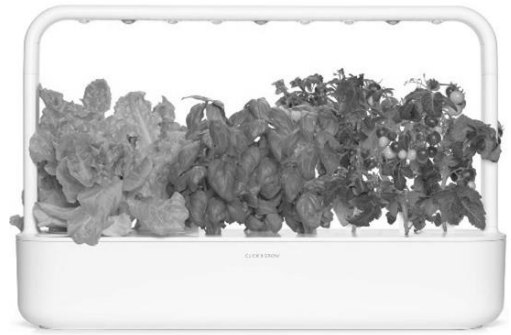
--

c. Draw the logic circuit. [5]

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7. Click'n Grow is a smart garden that includes an 8-bit microprocessor to automate the cultivation of home plants and aromatic herbs.

To provide optimal conditions for the plants to grow, it has a:



- light sensor to monitor the ambient light that controls the light intensity of the LED Strip,
- water reservoir and a water level sensor to switch on a red LED to notify the user that the reservoir is almost empty.

Answer the following questions:

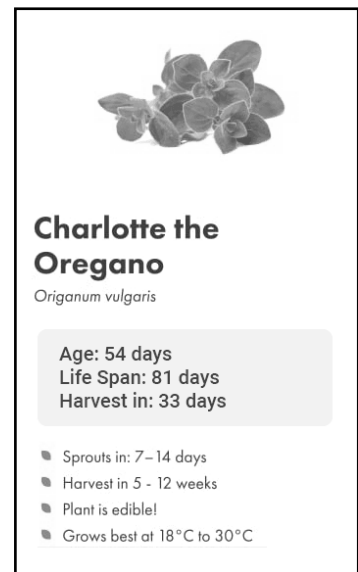
- a. Mention **ONE** input and **ONE** output component of the Click'n Grow. [2]

- b. Provide **ONE** example of Data and **ONE** example of Information in the above-mentioned scenario. [2]

- c. This smart garden can also be monitored through a mob app whereby the user can view the:

- intensity of the LED Strip,
- water level in reservoir,
- battery status.

Besides, it also displays information about the status of the planted plants, including the: life span, current age and the days remaining until the plants can be harvested. A sample interface is shown on the right.



Answer the following questions:

- i. Express the life span of the Oregano plant (81 days) in binary. [2]

- ii. Currently the oregano can be harvested in 33 days' time. The app [3]
calculates this by subtracting the current age from the life span,
i.e. 81-54. Work this out using two's complement binary
representation. *Show your working.*

- iii. Would the embedded microprocessor handle the data for plants [2]
with a lifespan of 300 days? Explain.

- iv. The user can view the status of the plants from the mob app [2]
because the Click'n Grow smart garden is connected to the
Internet. Mention **TWO** ways how the smart garden can be
connected to the Internet.

8. Online hotel reservation systems allow users to book their stay through a hotel's website.

- a. When placing their booking, users are asked to enter their personal data. This is stored in variables as per the table below:

Variable name	Information held
name	Name of person placing the booking
surname	Surname of person placing the booking
num of nights	Number of nights (value can be 1 - 100)
beds	Number of beds (value can be 1 - 3)
breakfast	Whether breakfast is required

- i. One of the variable names above is invalid. Identify this variable [2]
name and give a reason for your answer.

- ii. Choose the appropriate data type for each of the variables below.
Some data types may be used more than once or not at all.

String	int	byte	double	boolean
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name:		[1]
beds:		[1]
breakfast:		[1]

- b. While booking a hotel room, the user might make data entry errors. [1]
In the data entry screen below the user mistakenly swapped his name and surname.

Name:	Borg
Surname:	Joseph
Number of nights:	3
Number of beds:	2
Breakfast:	Yes

Identify the data entry error shown above by underlining the correct answer:

Transcription error	Transposition Error	Omission Error
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- c. The hotel offers an option of 1, 2 or 3 beds per room. Complete the following code such that it restricts the user to enter a valid number. [2]

```

beds = 0;

_____{

    System.out.println ("Beds: ");

    beds = Keyboard.readInt();

}while (_____) ;

```

- d. Underline the type of validation test that is being implemented in the code snippet above. [1]

Range Check	Control Data	Check Digit
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- e. Despite this validation test, the user may still cause a runtime error when entering a value for the beds per room. Mention **ONE** instance when this can happen. [1]

- f. When a client checks out of the hotel and pays in full, the hotel issues a receipt. This receipt may be emailed to the client or printed.

- i. Give **ONE** advantage of emailing the receipt rather than printing it. [1]

- ii. Name with a reason what type of printer you would expect the hotel to have. [2]

- iii. Is the printer mentioned in your answer a vector or a raster device? Briefly explain your answer. [2]

- g. Besides making reservation in hotels, restaurants etc., computers have various applications in leisure and entertainment. Name and briefly describe one such application. [2]

--- END OF PAPER ---