

## MATRICULATION AND SECONDARY EDUCATION CERTIFICATE EXAMINATIONS BOARD

UNIVERSITY OF MALTA, MSIDA

**SECONDARY EDUCATION CERTIFICATE LEVEL****MAY 2014 SESSION**


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SUBJECT: **Computing**  
 PAPER NUMBER: I  
 DATE: 2<sup>nd</sup> May 2014  
 TIME: 9:00 a.m. to 11:00 a.m.

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**Directions to Candidates**

*Write your index number where indicated at the top of the page.*

*Answer **ALL** questions in the spaces provided. You are not allowed to use extra sheets other than those provided in this booklet.*

*Good English and orderly presentation are important.*

*The use of flowchart templates is permitted. The use of calculators is **NOT** permitted.*

*This paper carries 85 marks of the examination.*

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Question Number	1	2	3	4	5	6	7	8	9	10	11	<b>FOR MARKERS' USE</b>
For Markers' use only												Total number of Marks or Grade obtained by candidate
<b>MARKS</b>												

1. (a) Suggest a suitable method of file access for the following :

- i. An airline booking system \_\_\_\_\_
- ii. A payroll system \_\_\_\_\_

[2 marks]

(b) Give reasons for the answers given in part (a).

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[2 marks]

2. The P.E. teacher in a school is to organise a sports tournament for the students. The students will be divided into teams where each student can be part of only one team and each team will be participating in more than one game. All the information regarding the teams and game fixtures will be stored in a relational database.

(a) Identify ONE keyfield for each of the tables: students, teams and fixtures.

[3 marks]

(b) What is the relationship between the student and teams table? Mention ONE other relationship which can exist between tables in a relational database.

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[2 marks]

3. (a) What do the following acronyms stand for?

- i. ALU \_\_\_\_\_
- ii. CU \_\_\_\_\_
- iii. PC \_\_\_\_\_
- iv. IR \_\_\_\_\_

[2 marks]

(b) The steps given below are the stages involved in the fetch execute cycle. By choosing the appropriate acronym from part (a) fill up the missing terms. Note that each acronym may be used more than once.

- i. \_\_\_\_\_ fetches the opcode from memory location indicated by the \_\_\_\_\_.
- ii. \_\_\_\_\_ places opcode in \_\_\_\_\_.
- iii. \_\_\_\_\_ fetches any required operand.
- iv. \_\_\_\_\_ increments \_\_\_\_\_ to point to the next instruction.
- v. \_\_\_\_\_ activates necessary circuits to execute instruction.
- vi. Go back to step 1.

[8 marks]

4. Consider the following truth table where A, B and C are inputs and Z is the output:

A	B	C	X	Y	Z
0	0	0	1	0	0
0	0	1	1	1	1
0	1	0	1	1	1
0	1	1	1	1	1
1	0	0	0	0	0
1	0	1	0	1	0
1	1	0	0	1	0
1	1	1	0	1	0

(a) Determine X,Y and Z in terms of A, B and C.

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[3 marks]

(b) Draw a circuit to represent the output Z in terms of inputs A, B and C.

[5 marks]

5. RAM and ROM are two different types of memory found in a computer system.

(a) What do the acronyms stand for?

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[1 marks]

(b) Identify TWO differences between them.

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[2 marks]

(c) Give ONE function for each of these types of memory within the computer system.

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[2 marks]

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6. (a) Why is a system with a 64-bit data bus faster than one with a 32-bit data bus?

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[1 marks]

(b) How are the width of the address bus and the addressable space related in a computer system? Give reasons for your answer.

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[2 marks]

7. Differentiate between the following terms:

(a) Hard and soft copy

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(b) Raster and vector devices

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(c) MICR and OMR

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(d) LAN and WAN

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(e) Off-the-shelf and tailor-made-software

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[10 marks]

8. During which stage of the computerisation of a system do the following happen?
- i. Study well how the current system works \_\_\_\_\_
  - ii. Discuss with the client what the finished system is required to do \_\_\_\_\_
  - iii. Coding the system \_\_\_\_\_
  - iv. Determining whether the user's requirements can be implemented and whether the system is worth doing in terms of cost \_\_\_\_\_
  - v. Laying out a structure on which the programmer is to base his/her coding \_\_\_\_\_
  - vi. Putting the new system in operation and stop using the old one \_\_\_\_\_
  - vii. Fixing any bugs and implementing any updates required \_\_\_\_\_

[7 marks]

9. (a) Which hardware devices are used to:
- i. convert analogue signals to digital and vice versa? \_\_\_\_\_
  - ii. obtain a soft copy from a hard copy? \_\_\_\_\_
  - iii. have a video conference? \_\_\_\_\_
  - iv. store a large amount of audio and visual data in optical format? \_\_\_\_\_

[4 marks]

- (b) Which type of software is used to:
- i. create web pages? \_\_\_\_\_
  - ii. send and receive messages and files electronically? \_\_\_\_\_
  - iii. view web pages? \_\_\_\_\_
  - iv. store data in cells as a value or formula and make calculations on it? \_\_\_\_\_
  - v. produce a simple document such as a letter? \_\_\_\_\_

[5 marks]



- (d) The program below finds the total of 3 test marks and their average is then displayed on screen. Find ONE syntax, ONE logical and ONE runtime error. Give reasons for your answer.

```
class Test{  
    public static void main (String args[]){  
        int mark1 = 50;  
        int mark2 = 35;  
        int mark3 = 60;  
        int marks = 0;  
  
        double total = mark1+mark2-mark3;  
        double average = total/marks;  
        System.out.print( "The average is : ");  
        System.out.println(average);  
    }  
}
```

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[6 marks]

- (e) From the program given in part (d) find:
- i. A reserved word \_\_\_\_\_
  - ii. The name of the class \_\_\_\_\_

[1 mark]





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## MATRICULATION AND SECONDARY EDUCATION CERTIFICATE EXAMINATIONS BOARD

UNIVERSITY OF MALTA, MSIDA

**SECONDARY EDUCATION CERTIFICATE LEVEL****MAY 2014 SESSION**


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SUBJECT: **Computing**  
 PAPER NUMBER: IIA  
 DATE: 2<sup>nd</sup> May 2014  
 TIME: 4:00 p.m. to 6:00 p.m.

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**Directions to Candidates**

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Question Number	1	2	3	4	5	<b>FOR MARKERS' USE</b>
For Markers' use only						Total number of Marks or Grade obtained by candidate
<b>MARKS</b>						

1. With reference to software and programming languages,

(a) Distinguish between 3<sup>rd</sup> and 4<sup>th</sup> generation programming languages by giving TWO characteristics of each generation.

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[2 marks]

(b) Give ONE example of a 3<sup>rd</sup> generation programming language and ONE example of a 4<sup>th</sup> generation programming language.

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[2 marks]

(c) Explain why a compiled program runs faster than an interpreted one.

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[2 marks]

(d) Distinguish between *freeware* and *shareware* types of software licensing.

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[4 marks]

(e) Identify and briefly describe ONE technique that may be applied by software houses to prevent software piracy.

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[3 marks]

(f) Identify and briefly explain ONE validation technique used to ensure that data entry is correct at run-time

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

[2 marks]

(g) Explain the term ‘software portability’. Why is ‘portability’ important when designing software?

\_\_\_\_\_

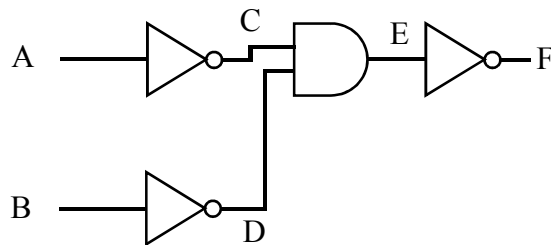
\_\_\_\_\_

\_\_\_\_\_

[2 marks]

2. This question is about logic circuits.

(a) A logic circuit having A and B as inputs and F as output is constructed as follows:



Complete the following truth table for the given circuit:

A	B	C	D	E	F
0	0				
0	1				
1	0				
1	1				

[8 marks]

- (b) By analysing the output obtained in part (a), explain the logic function of the circuit and design a single gate that obtains this logic function.

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[5 marks]

- (c) Using an 8-bit 2's complement register, perform the subtraction operation:  $1_{10} - 29_{10}$  using binary notation. Show your working in binary and represent your answer in both binary and decimal.

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[2 marks]



- (d) Represent  $-50_{10}$ . If  $-120_{10}$  needs to be subtracted from this value, what would happen? Predict the situation which results from this computation.

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[2 marks]

3. With reference to networks and data communication:

- (a) identify TWO services offered through internet and briefly describe their advantages and disadvantages;

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[4 marks]

- (b) identify TWO wired communication media (as opposed to wireless media) used for data communication and compare and contrast their advantages and disadvantages.

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[4 marks]

- (c) With a more interconnected world, data privacy has become even more important. Identify and briefly describe TWO principles that the Data Protection Act 2001 – Malta has so as to safeguard personal data.

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[3 marks]

- (d) How can software tools be used and applied to restrain access to data? Give TWO examples of software techniques and briefly explain how these are used to limit unauthorized access to data.

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[3 marks]

- (e) Explain how privacy can be ensured on a multi-user or network system where several users are entitled to use a common set of resources.

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[3 marks]

4. The following is an assembly language snippet:

```
000: LDA 0000 1111    ; Load the Accumulator register with 0000 1111
002: SHL              ; Logical shift left contents of the Accumulator register by 1
004: ADD #127         ; Add 127 to the contents of the Accumulator register
006: STA 12           ; Store the contents of the Accumulator in memory address 12.
```

Referring to the above code snippet:

(a) Show the contents of the Accumulator register after line 002 is executed.

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[2 marks]

(b) Identify TWO operators from the source code given.

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[2 marks]

(c) By referring to the line number, identify an ‘immediate addressing’ type of instruction.

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[2 marks]

(d) What happens after line 006 is executed? Justify your answer. Identify the type of error associated with the execution of this snippet.

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[2 marks]

(e) By comparing the value obtained after executing instruction in line 002 with the value given in instruction 000, outline the mathematical effect obtained by the instruction in line number 002.

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[2 marks]

(f) Identify the software used to translate the above code snippet into lower level, executable code.

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[1 mark]

(g) Identify the register used to store the op-code of an instruction for execution. How does the CPU know where to fetch and execute the next instruction?

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[2 marks]

(h) Name the TWO units inside the CPU responsible for executing instructions in a computer.

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[2 marks]

- (i) Which of the two units named in part (h) is responsible for executing the instruction in line 004? Explain.

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[2 marks]

5. With reference to operating systems:

- (a) List THREE features of an operating system.

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[3 marks]

- (b) Show how batch operating systems are effectively used by organisations by giving TWO real life situations.

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[4 marks]

- (c) By referring to TWO hardware resources, explain how an operating system manages such resources so that they are used in an efficient and effective way.

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[4 marks]

- (d) What is an embedded system? Distinguish between a general purpose computer system and an embedded system.

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[2 marks]

- (e) Give TWO examples of embedded systems and highlight the main characteristics of these embedded systems.

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[4 marks]

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UNIVERSITY OF MALTA, MSIDA

**SECONDARY EDUCATION CERTIFICATE LEVEL****MAY 2014 SESSION**


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SUBJECT:	<b>Computing</b>
PAPER NUMBER:	IIB
DATE:	2 <sup>nd</sup> May 2014
TIME:	4:00 p.m. to 6:00 p.m.

---

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For Markers' use only						Total number of Marks or Grade obtained by candidate
<b>MARKS</b>						

1. In today’s world networks have become very common because of the advantages they offer.

(a) State what the following acronyms related to networks stand for:

- i. LAN \_\_\_\_\_
- ii. WAN \_\_\_\_\_
- iii. MAN \_\_\_\_\_

[3 marks]

(b) List any TWO advantages offered by networks.

- i. \_\_\_\_\_
- ii. \_\_\_\_\_

[1 mark]

(c) List TWO disadvantages offered by networks.

- i. \_\_\_\_\_
- ii. \_\_\_\_\_

[1 mark]

(d) A telephone cable may be used to link computer networks together. Underline THREE terms from the list provided that may be used to link computer networks:

- Optic fibre
- Hardware
- Database
- Microwave
- Software
- Browser
- Satellite links
- Mouse

[3 marks]

(e) State which of the following are true or false:

		True	False
E-mail	Allows a user to send messages in text form.		
WWW	Is a form of Web Browser		
Video Conferencing	Allows a user to send voice and images in real-time		
Distributed Database	Relates to the sharing of non-centralised data resources		
MODEMS	Are needed for the operation of WANs		

[5 marks]

(f) Data stored in storage devices needs to be protected for **security** and **integrity**. Give an example for each of these measures:

Security \_\_\_\_\_

Integrity \_\_\_\_\_

[2 marks]

(g) Data may be encrypted to prevent it from being read while transmitted.

i. What is the meaning of **encryption**?

\_\_\_\_\_  
\_\_\_\_\_

[1 mark]

ii. Explain what happens when transmitted information is **decrypted**.

\_\_\_\_\_  
\_\_\_\_\_

[1 mark]

2. (a) Distinguish between fixed length records and variable length records.

\_\_\_\_\_  
\_\_\_\_\_

[2 marks]

(b) Fill in the missing terms using the following software related terms:

- |                 |                      |                       |                 |
|-----------------|----------------------|-----------------------|-----------------|
| <b>freeware</b> | <b>programmer</b>    | <b>tailor-made</b>    | <b>upgrades</b> |
| <b>patches</b>  | <b>off-the-shelf</b> | <b>site licensing</b> | <b>piracy</b>   |

When purchasing software one may opt for \_\_\_\_\_ or \_\_\_\_\_ solutions. From time to time one may need to install \_\_\_\_\_ to fix bugs that may be present in the system. If the budget is limited \_\_\_\_\_ software may be installed, allowing users to install the software free of charge. A more costly solution would be that of getting a \_\_\_\_\_ to create a program from scratch. A problem that exists in the software industry is that software is copied illegally. This is known as software \_\_\_\_\_. To solve this problem software companies started offering special packages to large companies known as \_\_\_\_\_ that usually allows these companies to install software and \_\_\_\_\_ at a fraction of the normal cost. [4 marks]

- (c) When designing software it is important to cater for error checking. Place the following terms next to their definition.

**Validation                      Verification                      Check Digit                      Range Check**

Definition	Term
Checks if a number is between 1 and 50	
Checks that numbers are not entered instead of letters	
Uses a number added to a sequence for checking	
Data is entered twice	

[4 marks]

- (d) A programmer enters the following line of code:

```
area = 5 * 3;
```

Use this code to identify:

- i. An Identifier \_\_\_\_\_
- ii. An Operator \_\_\_\_\_

[2 marks]

- (e) Operating Systems allow users to interact with their computers.

- i. Give an example of an Operating System.

[1 mark]

- ii. State whether the following statements about Operating Systems are true or false.

Statement	True or False
Some Operating Systems can run several applications concurrently.	
Operating Systems do not normally have a Graphical User Interface	
Operating Systems can allow data to be shared between applications.	
Operating Systems store files in folders or directories.	

[4 marks]

3. A car manufacturer has implemented a computerized system in its plant. It is using computers for CAD and CAM.

(a) What do CAD and CAM Stand for?

CAD: \_\_\_\_\_

CAM: \_\_\_\_\_

[1 mark]

The introduction of computers in this company had positive and negative effects on employees.

(b) Give TWO examples of such effects:

Positive:

i. \_\_\_\_\_

ii. \_\_\_\_\_

[1 mark]

Negative:

i. \_\_\_\_\_

ii. \_\_\_\_\_

[1 mark]

(c) The implementation of the computerized system followed a Systems Analysis Procedure. Number the steps in the correct order they should have been followed.

Step	Number
Design of a new computerized system	
Implementation and changeover methods	
Project selection and feasibility	
System maintenance	
Control and review	
Programming and documentation	
Present system study and analysis	

[7 marks]

(d) A number of employees had to be employed by the company. Match the job titles with their respective job description:

**Computer Technician**

**Web Master**

**Data Entry Clerk**

<b>Job description</b>	<b>Job Title</b>
Keys in information into the system	
Repairs computers when hardware faults develop	
Creates and maintains the company website	

[3 marks]

(e) The company has installed a number of General Purpose and Dedicated Computers. Briefly explain the difference between the two.

\_\_\_\_\_

\_\_\_\_\_

[2 marks]

(f) Give an example of a:

Dedicated Computer \_\_\_\_\_

General Purpose Computer \_\_\_\_\_

[2 marks]

4. Knowing your computer components is very important.

- (a) From the list provided underline THREE hardware components you would expect to find in any electronic device.

Buses      Operating System      Memory      OCR      DTP      ALU  
[3 marks]

- (b) Underline the best option from (i) to (v) below.  
Bootup relates to the process a computer system goes through when:

- i. shutting down.
- ii. it is copying files.
- iii. it is deleting files.
- iv. it is renaming files.
- v. starting up.

[1 mark]

- (c) State which hardware device is normally used to store the Operating System.

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[1 mark]

- (d) The circuitry of an electronic calculator is based on an unsigned 8-bit system. (Positive numbers only)

- i. What is the smallest number that can be represented using this system?

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[1 mark]

- ii. What is the largest number that can be represented using this system?

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[1 mark]

- iii. Can 0 be represented using this system? If yes what would be the bit pattern for zero?

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[1 mark]

(e) Work out the following conversions:

i. The decimal equivalent of the positive binary number 10001101.

[1 mark]

ii. The binary equivalent of the hexadecimal number C7.

[1 mark]

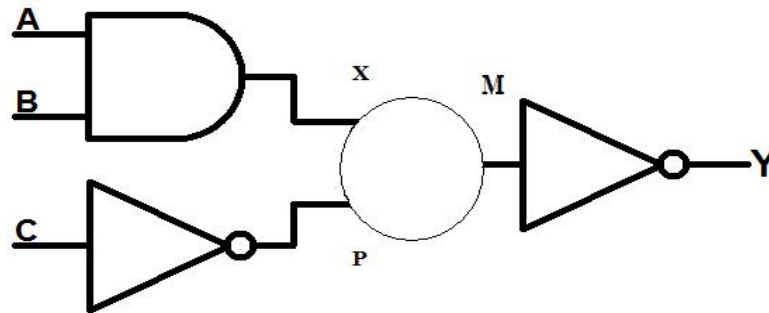
iii. The hexadecimal equivalent of the decimal number 126.

[1 mark]

iv. The decimal equivalent of the hexadecimal number B4.

[1 mark]

(f) i. Use the Truth Table provided to label all the Logic Gates on the diagram itself.



[2 marks]

ii. Complete output Y

A	B	C	X	P	M	Y
0	0	0	0	1	1	
0	0	1	0	0	0	
0	1	0	0	1	1	
0	1	1	0	0	0	
1	0	0	0	1	1	
1	0	1	0	0	0	
1	1	0	1	1	1	
1	1	1	1	0	1	

[3 marks]



5. Answer the following questions related to the Java programming language.

(a) Fill in and Match the following data types with their respective characteristics:

byte      short      float      char      boolean      String

Characteristic	Data type
Can hold a full name	
Can represent numbers between -128 and 127	
A single letter	
Can represent numbers between -32,768 and 32,767	
Can only represent <i>true</i> or <i>false</i>	
Might store a number having a decimal point	

[3 marks]

Observe the following code:

```

class NumbersProcessing {
    public static void main(String[] args) {
        int x=5;
        int y=0;
        for (y = 1; y <=12 ; y++)
            System.out.println(y + "*" + x+ "=" +(x*y));
        System.out.println();
    }
}
    
```

(b) What is the aim of this program?

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[3 marks]

(c) The programmer would like to add a line that comments on the output of this code. Show how such a comment could be entered.

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[1 mark]

(d) The code presented makes use of a loop. Which loop is used?

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[1 mark]

(e) Explain what happens when the statement `y++` is executed.

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[1 mark]

(f) From the above code give:

i. An example of a variable.

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[1 mark]

ii. An example of variable initialization.

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[1 mark]

iii. An example of an output statement.

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[1 mark]

(g) Draw in the space provided the flowchart that corresponds to this code.

[5 marks]

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