Class/ Index Number	Centre Number/ 'O' Level Index Number	Name
/	/	

新加坡海星中学

MARIS STELLA HIGH SCHOOL
PRELIMINARY EXAMINATIONS
SECONDARY FOUR

COMPUTING **7155**

Paper 1 Written **26 August 2020**

2 hours

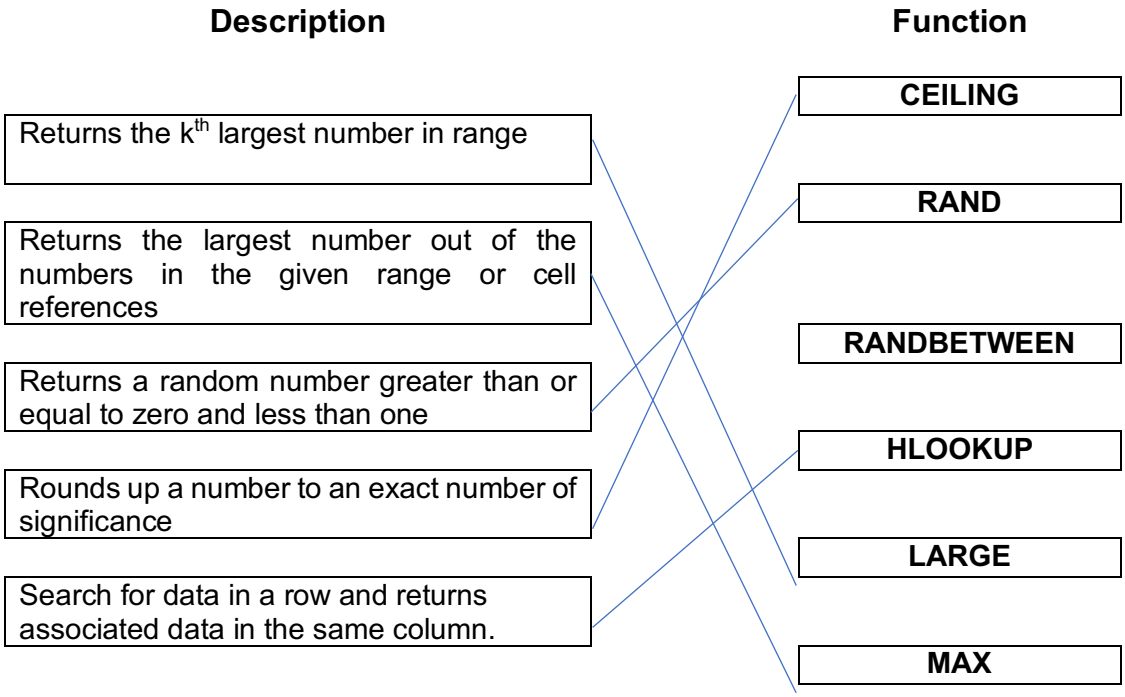
Candidates answer on the Question Paper
No Additional Materials are required.

SOLUTION

For Examiner's Use
80

This document consists of **14** printed pages.

1 Draw a line between the description and the correct spreadsheet function.



[5]

2 (a) A sports event company uses a digital camera attached to a drone to video their events from the sky.

The video is stored as it is captured, on a device that is attached to the drone.

Circle the most suitable type of media to store the video.

(i) Optical Magnetic (Solid State) [1]

(ii) Give two reasons to justify your choice.

Three from:

- It has no moving parts so it will be durable as the drone moves/ able to withstand large impact/ less prone to data loss from shaking/impact
- It is small/compact so it can easily fit onto the device
- It is light so it will not be difficult to lift for the drone
- It can hold a large amount of data needed for the video/film footage [2]
- Uses less power so drone battery will last longer
- Solid state provides faster access/transfer of data than the other two

Comment:
To earn each mark,
state one characteristic of storage media + explain how this characteristic makes it suitable (1m)

Unacceptable:
Solid state is portable (characteristic stated) but no explanation provided.

3 Insert **three** of the following words about different types of software in the correct place in each scenario below.

public domain software | proprietary software | open courseware | shareware | freeware

(a) Ali's company requires productivity software that can be used in his business for emailing customers, creating orders, and tracking of the company's profits and losses. He would also like regular customer support and updates from the software company that owns the source code of the software.

The most suitable category of software for this usage is **proprietary software**

(b) Mingxuan wants to learn more about Python programming during the school holidays. He wants to enrol for free online lessons provided by a university's website that contains videos and training materials for his learning.

The most suitable category of software for this usage is **open courseware**

(c) Sharon wants to purchase accounting software for her company's use. She wants to try out a few features of the software before making a decision whether to purchase the full version.

The most suitable category of software for this usage is **shareware**

[3]

4 Five statements about interpreters and compilers are shown in the table below.
Tick (✓) to show whether the statement refers to an interpreter or to a compiler.

Statement	Interpreter	Compiler
Translates the entire program in one go.		√
Takes one statement at a time and executes it.	√	
Program runs at a faster speed because translation was completed earlier.		√
Stops the translation process as soon as the first error is encountered.	√	
Syntax errors are detected before program runs.		√

[5]

5 (a) Convert the positive whole denary number **388** into a 12-bit binary number.

Divide $(398)_{10}$ successively by 2 until the quotient is 0:
388 / 2 = 194 with 0 remainder
194 / 2 = 97 with 0 remainder
97 / 2 = 48 with 1 remainder
48 / 2 = 24 with 0 remainder
24 / 2 = 12 with 0 remainder
12 / 2 = 6 with 0 remainder
6 / 2 = 3 with 0 remainder
3 / 2 = 1 with 1 remainder
1 / 2 = 0 with 1 remainder

000110000100

[2]

(b) Convert this binary pattern into hexadecimal.

1	0	1	1	0	0	1	0	1	0	0	1	0	1	1	0

B296

[4]

(c) RGB codes are one example of where hexadecimal numbers are preferred to binary numbers. Give **two** reasons to explain so.

- hexadecimal numbers are more compact than binary numbers/ the number of digits used to represent a given hexadecimal number is fewer than in binary
- uses less storage than binary numbers / a small number of hex digits can represent more data
- quick and easy to convert between hexadecimal numbers and binary
- easier to identify values using hexadecimal
- easier to spot errors using hexadecimal

[2]

(d) State another **two** ways in which hexadecimal numbers are used to represent data.

- Colour codes / Colour in HTML / CSS
- Error messages
- Locations in memory
- Memory dump / debugging
- IPv6 address (Unacceptable: IP address, version not stated)
- ASCII / Unicode
- Assembly language
- URL
- M.A.C Addresses

[2]

6 Complete the following paragraphs by filling in the missing words about networks.

A **local area network** is a network of computing devices connected within a small geographical area, typically within the same building, such as in an office. A **wide area network** is a network of computing devices covering across multiple geographical locations, such as those between a main office in a country and branch offices in other countries.

In an office, there would typically be many **client/node** computers that initiate connections to request for resources and services from a centralised computer to perform operations. This computer which fulfils these requests is known as a **server** as it centrally manages resources and services. This type of network is more **secure/safe** than a peer-to-peer network as access rights are centrally controlled. ***X efficient***

[5]

7 A program asks the user for a string and prints out the string in reverse order.

For example, “Computing” returns a result of “gnitupmoC”.

For **each** test case condition below, write down **one** expected input and **one** expected output.

Test Case 1 for Normal Conditions	
Expected Input	“Apple”
Expected Output	“elppA”

Test Case 2 for Boundary Conditions	
Expected Input	““
Expected Output	““

Test Case 3 for Erroneous Conditions	
Expected Input	-50 / “-50” / [1,2,3]
Expected Output	Invalid input. A string is expected.

[6]

Comments:

No marks if student leaves out “” (normal conditions)
No marks for single character (boundary conditions)
Message should be meaningful on expected type required. (erroneous condition)

8 Personal information needs to be kept safe from unauthorised access.

Explain how the following industries verify personal information.

For each industry, identify the authentication method and explain how it is implemented to verify user identity.

(a) **Online banking services by banks**

(i) Authentication Method: Two-factor authentication [1]

(ii) How it is implemented:

Any two:

- Users are issued a security token/device for them to access online banking OR
- User registers his phone/email address as a 2FA device.
- There are two levels of authentication where user first confirms identity by providing a secret password or personal identification number (PIN) to the website
- This is followed by a one-time password (OTP) generated from the security token or a mobile phone that the user owns, which has to be keyed into the website
- OTP is single-use only/expires after a short duration

[2]

(b) **Passport checking by Immigrations Department**

(i) Authentication Method: Biometrics [1]

(ii) How it is implemented:

Any two:

- A user is identified though measuring a physical trait/characteristic
- This characteristic is unique
- Thumbprint or retina eye scan or facial recognition may be used
- Data is matched and checked against a database

[2]

(c) Explain **two** ways in which a user can protect against unauthorised access of personal information when using social networking websites.

Any two of the following:

- Read and fully understand the privacy policy of the social networking site.
- Set your sharing settings to 'private' so that only people you know in real life can read your posts.
- Think twice before posting any personal photographs or information that you may feel uncomfortable sharing.
- Accept friend requests wisely. Make sure you know everyone in your friends list.
- Set 2FA when logging to social networking websites
- Clear cookies from web browsers regularly

- Use secure passwords to prevent unauthorised access / change password regularly/every 90 days

[2]

Comment:

Some misunderstood the question as unauthorized access of computer

9 A computer has both an IP address as well as a MAC address.

(a) Explain what an IP address is and its function.

Internet Protocol Address
It is used to uniquely identify a device/computer on a network.
……...

[2]

(b) Explain what a MAC address is and its function.

Media Access Control
It is used to uniquely identify a network interface card.
……...

[2]

10 The spreadsheet below contains information about students who registered at a running club. The ID field is a text that consists of the gender (first character), year of birth (second to fifth character) and member number (last three characters). Columns C and D are displayed using data in column B.

	A	B	C	D
1	**Student Name**	**ID**	**Gender**	**Year of Birth**
2	Johnny Tan	M2004101	M	2004
3	Kathleen Koh	F2000102	F	2000
4	Muhammad Imran	M2002103	M	2002
5	Joy Tang	F2005106	F	2005
6	Ravi Veloo	M2004110	M	2004
7	Tan Ming Huat	M2006108	M	2006
8				
9	**Number of Students**	**6**		
10	**Number of Female Students**	**2**		

(a) Identify the most appropriate data type for the following cell references.

A2 Text

B9 Number [2]

(b) Cells **D2** to **D7** need to display Year of Birth information using data from column B.

Identify the most appropriate function that will need to be entered in cell **D2** using cell **B2**.

MID [1]

(c) Cell **B9** needs to display the count of students using the cell range B2:B7.

Identify the most appropriate function that will need to be entered in cell **B9**.

COUNTA [1]

(d) Complete the function used in cell B10 to display the number of female students.

= COUNTIF (C2:C7, "F")

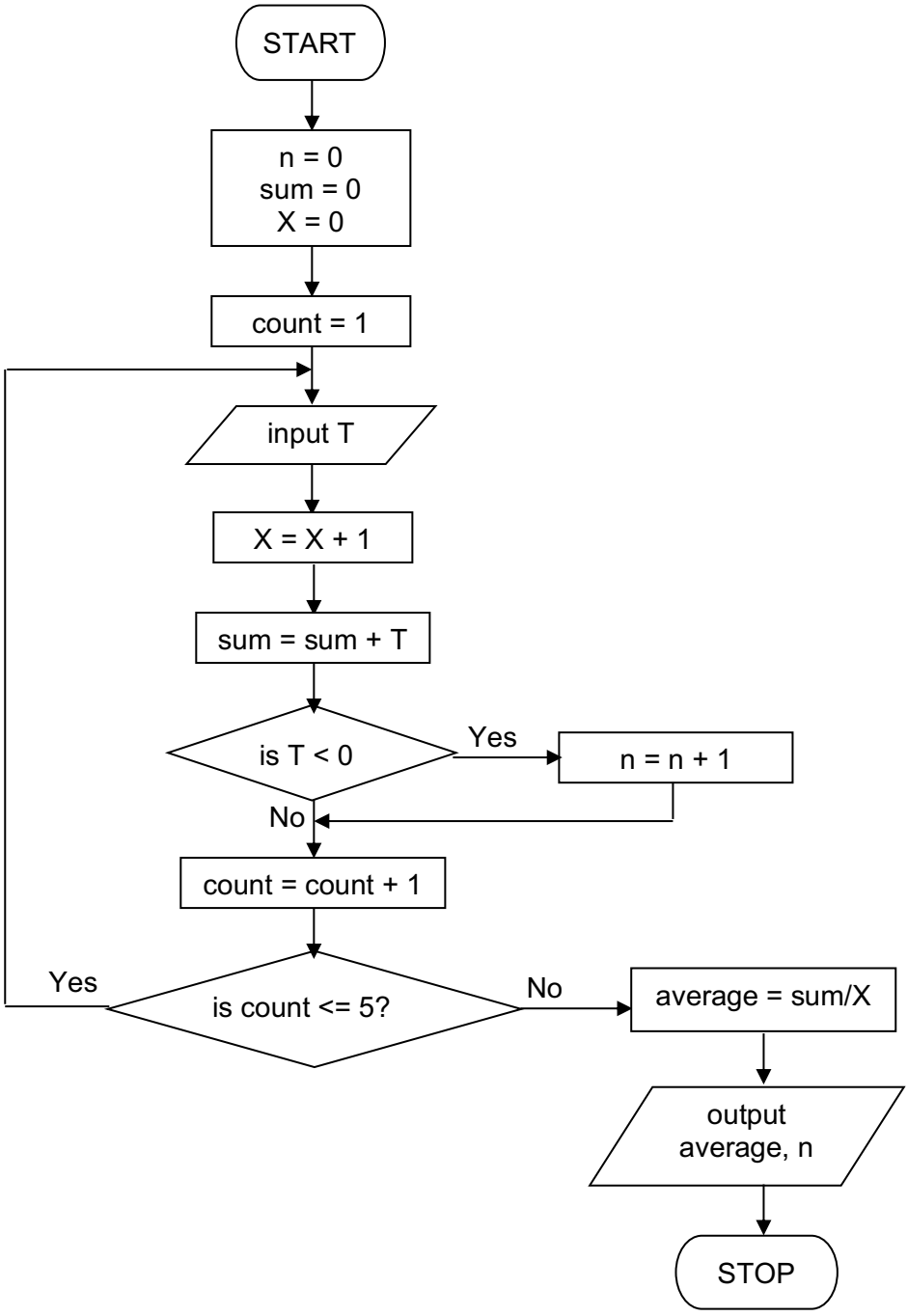
[2]

(e) Cells **C2 to C7** need to have a red background if the cell value has a value of F. Otherwise, it will have a blue background. State how the cells can be set to automatically change colour depending on the values inside them.

Conditional formatting

[1]

11 The following flowchart shows an algorithm that inputs five temperatures and outputs the average temperature and the number of temperatures which were negative.



Complete the trace table for this flowchart using the following test data:

18, 7, 23, –2 , 0

n	sum	X	count	T	OUTPUT
0					
	0				
		0			
			1		
				18	
		1			
	18				
			2		
				7	
		2			
	25				
			3		
				23	
		3			
	48				
			4		
				-2	
		4			
	46				
1					
			5		
				0	
		5			
	46				
			6		
					9.2, 1
[1m]	[1m]	[1m]	[1m]	[1m]	[1m]

[6]

12 (a) Consider the following Boolean statement.

X = NOT (**A** OR **B**) OR (NOT (**C** AND **A**))

Complete the corresponding truth table.

A	B	C	Working Space				X
			A OR B	NOT (A OR B)	C AND A	NOT (C AND A)	
0	0	0	0	1	0	1	1
0	0	1	0	1	0	1	1
0	1	0	1	0	0	1	1
0	1	1	1	0	0	1	1
1	0	0	1	0	0	1	1
1	0	1	1	0	1	0	0
1	1	0	1	0	0	1	1
1	1	1	1	0	1	0	0

[4]

(b) Two-way switches allow a single light to be switched on or off from two different locations easily. In the diagram below, Light R is at the centre of a long corridor, which is controlled by Switches P and Q at both ends of the corridor.

Each switch has two states: 0 for “off” and 1 for “on”. Light R also has two states: 0 for “off” and 1 for “on”. Light R will be on only when both Switches P and Q are off or on concurrently. However, if only one switch is on and the other is off, Light R will be off.

The truth table for the two-way switches is given as below.

P	Q	R
0	0	1
0	1	0
1	0	0
1	1	1

Write down the Boolean statement for the two-way switch.

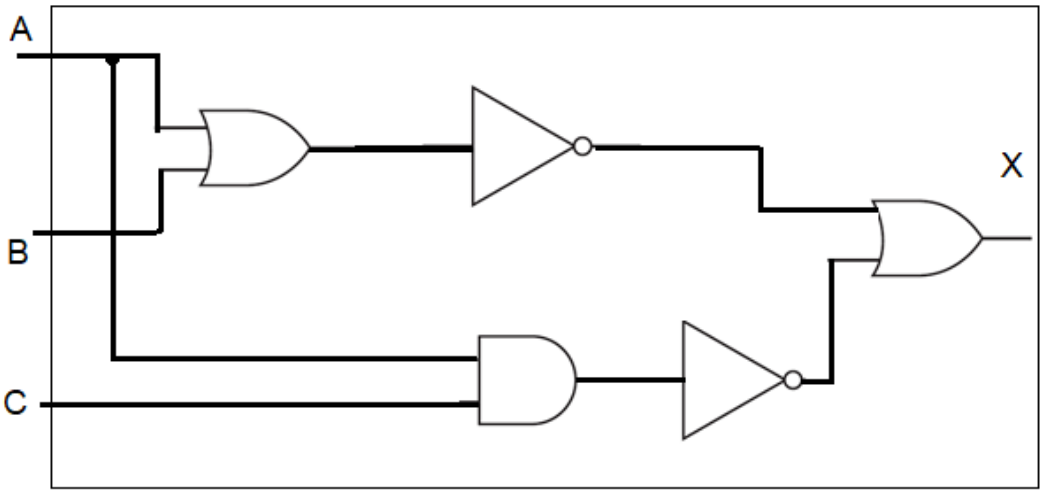
R =
Any one below:

(P AND Q) OR (NOT P AND NOT Q)
(P AND Q) OR (P NOR Q)
(P AND Q) OR (P NAND Q)
NOT (P XOR Q)

[2]

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

X = NOT (**A** OR **B**) OR (NOT (**C** AND **A**))



[5]

13 The Elections Department is using a computer program to read in the ages of 100 citizens and then outputs the results based on the conditions below. Each age is a whole number greater than 0. You **must** validate this input.

Write an algorithm, using only pseudo-code or a program flowchart that takes the ages of 100 citizens as input and then

- outputs the count of eligible voters who are aged 21 or above.
- outputs the count of non-eligible voters.
- outputs the average age of an eligible voter.

……..

……..

……..

……..

……..

……..

……..

……..

……..

……..

……..

……..

……..

……..

……..

……..

……..

……..

……..

……..

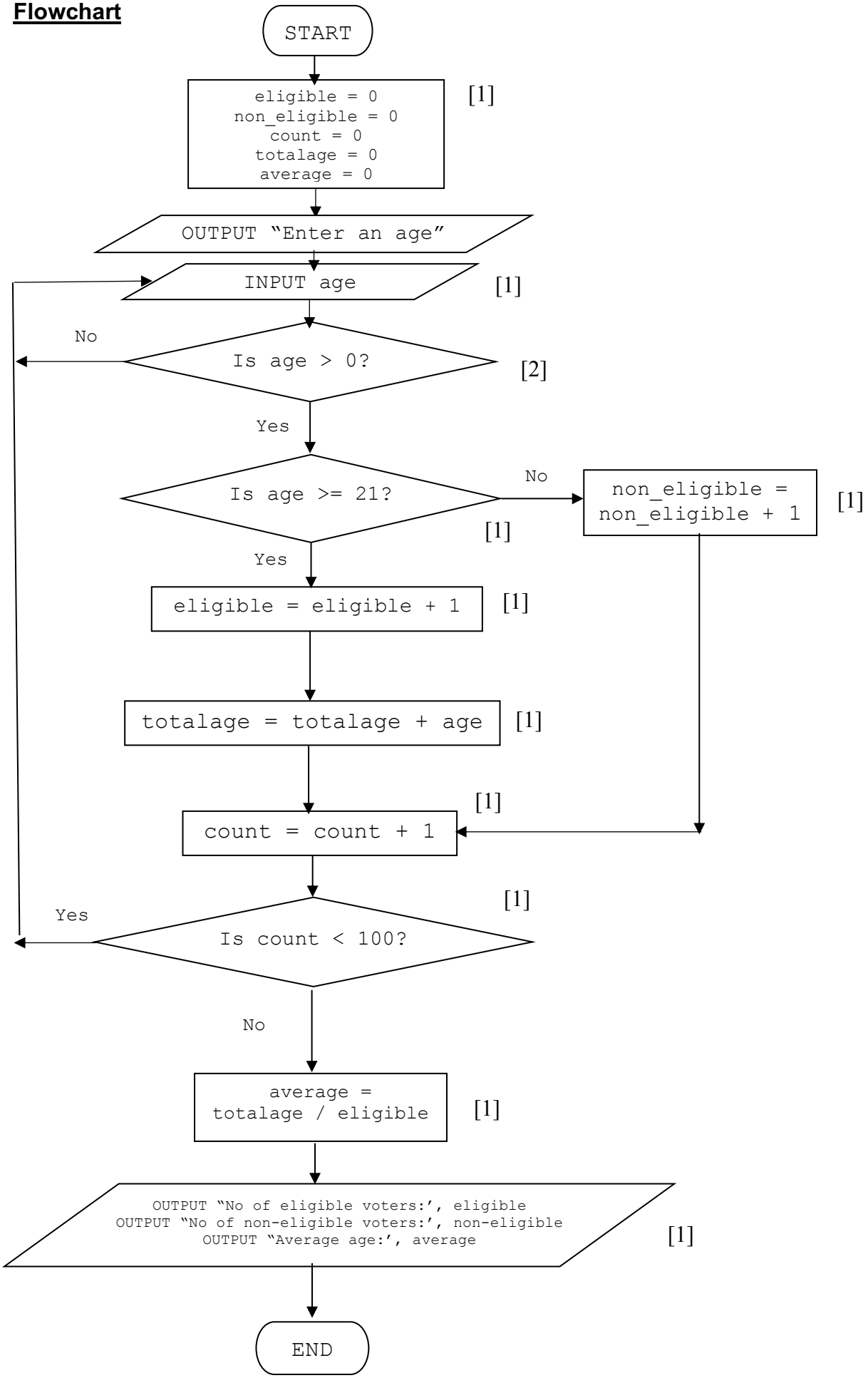
……..

……..

……..

[9]

13 **Flowchart**



[9]

Pseudo-code

```
eligible = 0
non_eligible = 0
count = 0
totalage = 0
average = 0

WHILE count < 100
          REPEAT UNTIL
             OUTPUT "Enter an age"
             INPUT age
          age > 0

          IF age >= 21
               eligible = eligible + 1
               totalage = totalage + age
          ELSE
               non_eligible = non_eligible + 1
          ENDIF
   count = count + 1
ENDWHILE

average = totalage / eligible

OUTPUT "Count of eligible voters: " + eligible
OUTPUT "Count of non-eligible voters: " + non-eligible
OUTPUT "Average age of eligible voter is: " + average
```

	Total	[9]

IMPORTANT NOTE:

- Before INPUT, there should be a meaningful OUTPUT message to inform user on the type of input required.

- OUTPUT should comprise of message that indicates the type of variable printed,
  i.e. `OUTPUT "Count of eligible voters: " + eligible` (CORRECT)
  i.e. `OUTPUT eligible` (INCORRECT)

-End of Paper-