UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CANDIDATE NAME

CENTRE NUMBER | | | | | |

CANDIDATE NUMBER | | | | |

2907193166

COMPUTER STUDIES **0420/13**

Paper 1 **May/June 2012**

2 hours 30 minutes

Candidates answer on the Question Paper.

No Additional Materials are required.

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
You may use a soft pencil for any diagrams, graphs or rough working.
Do not use staples, paper clips, highlighters, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.
No marks will be awarded for using brand names of software packages or hardware.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.

For Examiner's Use

This document consists of **21** printed pages and **3** blank pages.

1 Video conferencing, Voice over Internet Protocol (VoIP) and instant messaging are a... as communication methods. Certain devices are essential to enable each of t... communication methods to be used.

For ...iner's

Tick (✓) the appropriate cells in the table below to show which one or more devices are **essential** for each method.

	keyboard	microphone	speaker	webcam
VoIP				
video conferencing				
instant messaging				

[3]

2 Describe ways to guard against **each** of the following Internet security issues. (A different method should be given in each case.)

viruses .....

.....

.....

hacking .....

.....

.....

spyware .....

.....

.....

phishing .....

.....

.....

tapping into wireless networks .....

.....

..... [5]

3 An airport is converting all its manual information systems to computerised systems.

(a) One stage in analysing the existing system is *fact finding*.
State **three** methods of fact finding:

1 .....

2 .....

3 ..... [3]

(b) Which of your named methods would be best suited to this application?
Give **two** reasons for your choice.

Method .....

Reason 1 .....

.....

Reason 2 .....

..... [2]

4 Michael is preparing a multimedia presentation.

(a) What **three** features should he include in his presentation to make it more interesting?

1 .....

2 .....

3 ..... [3]

(b) Give **two** reasons why a presentation would be better than just printing out and distributing a newsletter.

1 .....

.....

2 .....

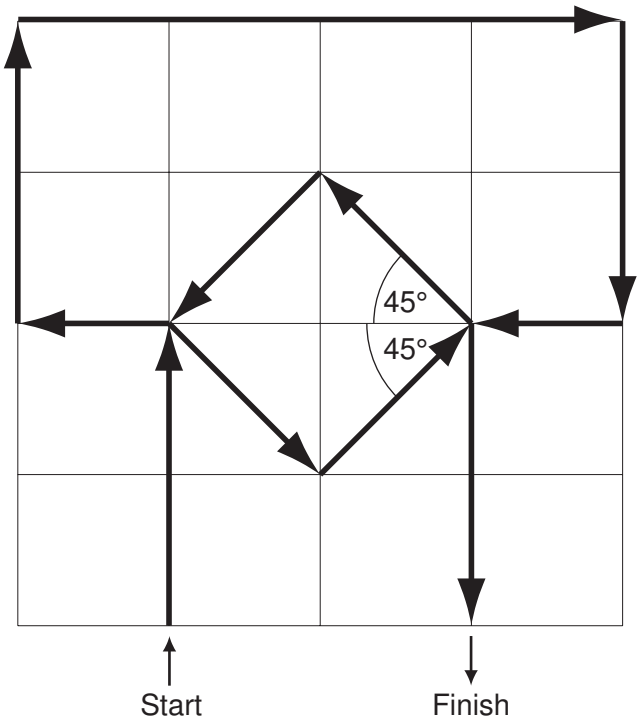
..... [2]

5 A floor turtle can use the following instructions.

Instruction	Meaning
FORWARD ***x***	Move ***x*** cm forwards
LEFT ***t***	Turn left ***t*** degrees
RIGHT ***t***	Turn right ***t*** degrees
REPEAT ***n***	Repeat next set of instructions ***n*** times
ENDREPEAT	Finish repeated instructions
PENUP	Lift the pen
PENDOWN	Lower the pen

Each square = 10 cm by 10 cm

Each diagonal line = 14 cm

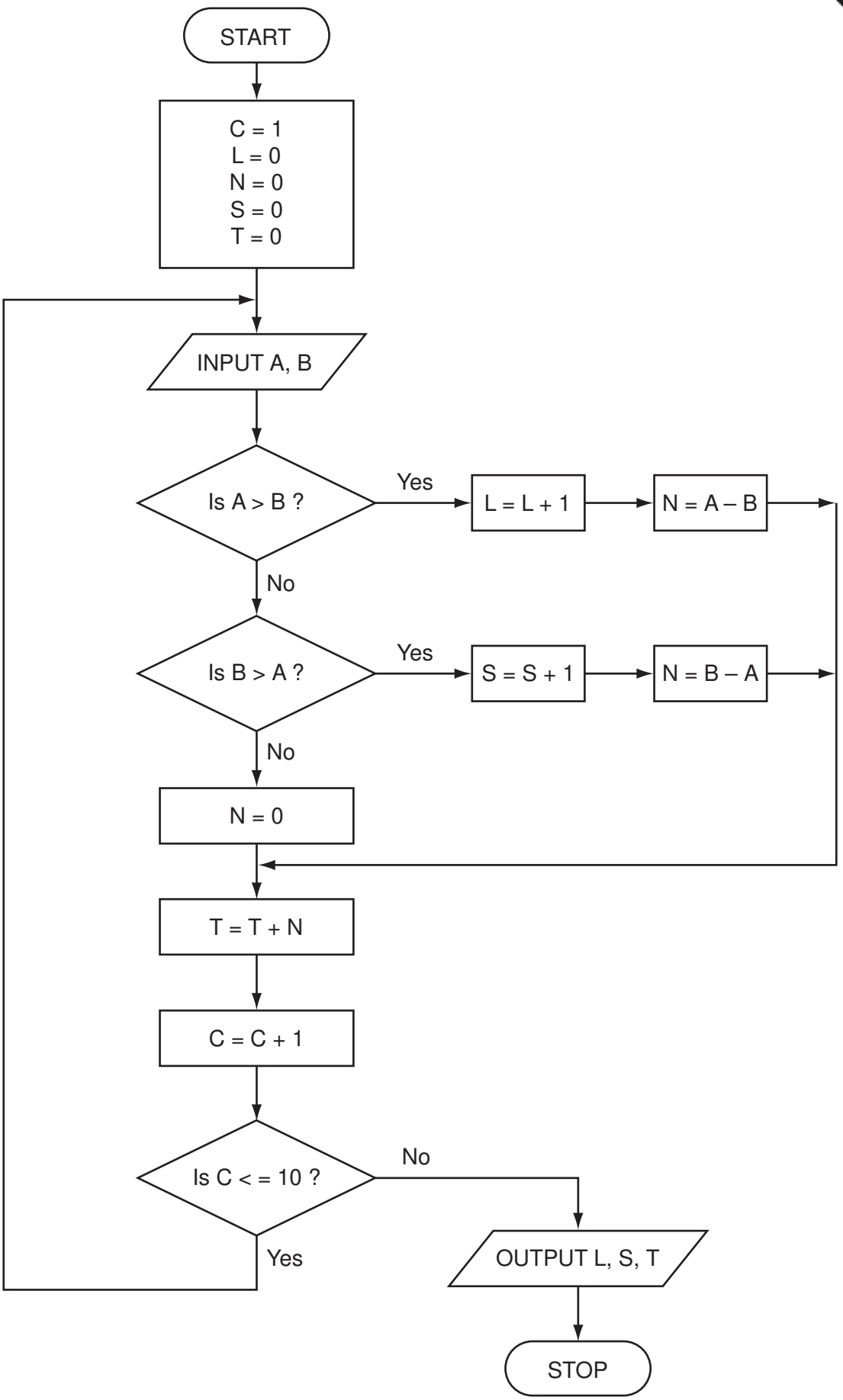


Complete the set of instructions to draw the above shape in the direction shown arrows.

PENDOWN	.....	.....
FORWARD 20	.....	.....
LEFT 90	.....	.....
.....	.....	.....
.....	.....	.....
.....	.....	.....
.....	.....	.....
.....	.....	.....
.....	.....	.....
.....	.....	.....
.....	.....	.....

[5]

6 Carefully study the following flowchart.



(a) Complete the trace table for the following data:

8, 4, 3, 1, 5, 8, 4, 2, 1, 3, 2, 2, 1, 2, 5, 5, 4, 0, 5, 4

C	L	N	S	T	A	B

[6]

(b) What is the final output from the algorithm?

L = ...

S = ...

T = ... [2]

7 A large hotel has a website. The website offers the following facilities:

- a virtual tour of the hotel
- an interactive map
- the ability to book rooms online

(a) Give **two** features you would expect to find in each facility.

virtual tour

1 .....

.....

2 .....

.....

interactive map

1 .....

.....

2 .....

.....

room booking online

1 .....

.....

2 .....

..... [6]

(b) Describe **one** other feature you would expect to see on the hotel's website.

.....

.....

..... [1]

8 A spreadsheet has been set up to record employees' hotel expenses for one year. The data for one employee is shown below.

	A	B	C	D	E	F	G
1	**Hotel**	**Tariff Sunday to Thursday ($)**	**Tariff Friday to Saturday ($)**	**No of nights (Sunday to Thursday)**	**No of nights (Friday to Saturday)**	**Total cost ($)**	**Maximum allowance ($)**
2	**Grand**	150	90	3	2	630	600
3	**Station**	200	120	2	1	520	800
4	**Northern**	90	60	5	0	450	360
5	**Western**	120	80	4	1	560	480
6	**George**	180	100	2	2	560	720
7	**Quality**	100	70	3	1	370	400

(a) What formula is in F2 to calculate the employee's costs at the *Grand Hotel*?

.....

..... [2]

(b) The maximum allowance is *four times the Sunday to Thursday* tariff.
What formula is in G2?

.....

..... [1]

(c) A manager wants to know whether an employee exceeded their maximum allowance at each hotel.

Describe how the spreadsheet could be used to do this.

.....

.....

.....

..... [2]

(d) A macro was written to convert the tariff rate into different currencies. The exchange rate was taken directly from a website.
What is the advantage of using a macro to do this?

.....

.....

..... [1]

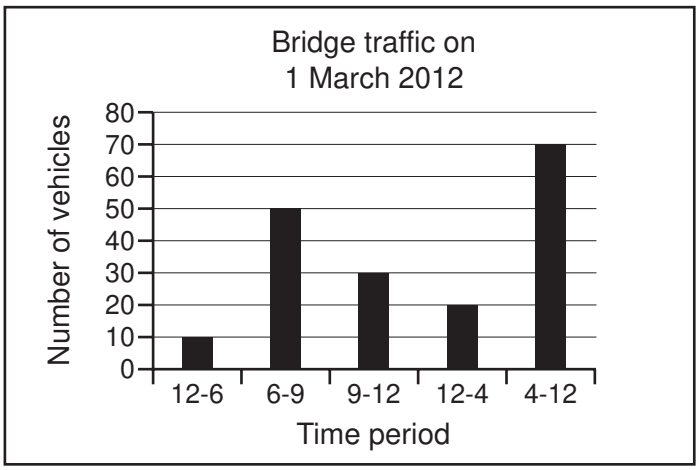
9 Vehicles passing over a bridge are detected automatically using sensors and a comp

(a) What sensors could be used?

.....

[1]

(b) The graph below shows the number of vehicles counted during certain periods of the day. This graph is produced automatically at the end of each day.



A record is created each time a vehicle is detected. These records are processed to generate the graph and for other purposes.

What data need to be stored in each record?

.....

.....

.....

.....

[2]

(c) State **two** other methods of automatic data capture. In each case, name an application which would use this method.

Method 1 .....

Application 1 .....

.....

.....

Method 2 .....

Application 2 .....

.....

.....

[4]

10 Jatinder uses Internet banking.

(a) Give **one** benefit and **one** drawback of using Internet banking.

Benefit .....

.....

Drawback .....

..... [2]

She uses a 5-digit PIN.

(b) Every time she logs on, she is asked to give 3 random digits from the PIN. She was asked to give her 3rd, 1st and 4th digit. This changes every time she logs on.

Give a reason for this.

.....

..... [1]

(c) A different application needs the whole PIN to be input.
The following code has been written to check the PIN:

```
c = 0
INPUT PIN
x = PIN
REPEAT
   x = x/10
   c = c + 1
UNTIL x < 1
IF c < 5
   THEN
      PRINT "error in PIN entered"
   ELSE
      PRINT "PIN OK"
ENDIF
```

(i) What value of `c` and what message would be output if the following PINs were entered?

5 1 0 2 0 Value of `c`: .....

Message: .....

5 1 2 0 Value of `c`: .....

Message: ..... [2]

(ii) What type of validation check is being carried out here?

..... [1]

11 A simulation using a mathematical model is being used to forecast the weather one w… advance.

(a) (i) State what data are gathered for this model.

.....

.....

.....

(ii) Explain how the data are gathered for this model.

.....

.....

..... [2]

(b) (i) Describe how the simulation can predict the weather for the next seven days.

.....

.....

.....

(ii) Describe in what format the predicted weather can be shown.

.....

.....

..... [2]

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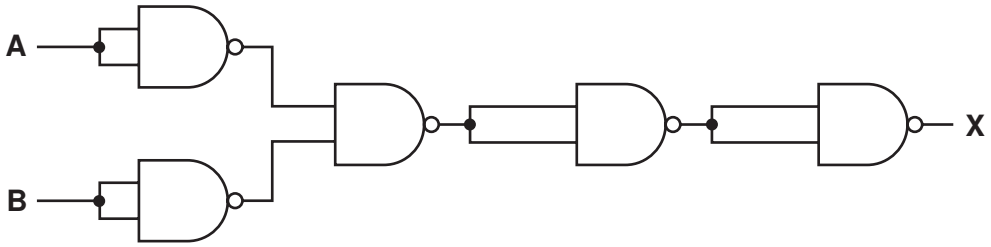
12 (a) (i) Complete the truth table for the following logic circuit, which is made up of gates:



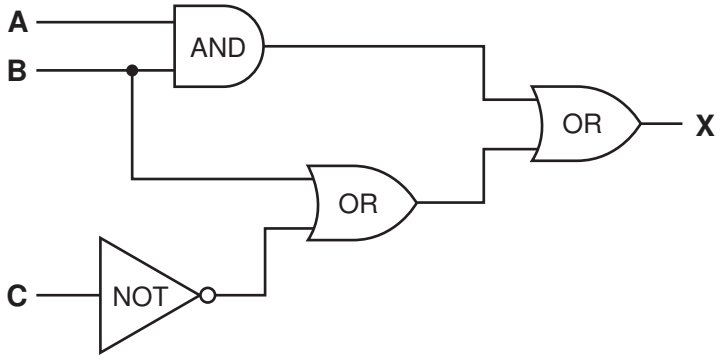
A	B	X
0	0	
0	1	
1	0	
1	1	

[2]

(ii) What single logic gate has the same function as the above logic circuit?

..... [1]

(b) Complete the truth table for the following logic circuit:



A	B	C	X
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]

13 Andrew is sending a large document to a printer.

(a) State the name for the area of memory used to store temporarily the data being sent to the printer.

.....

[1]

(b) The printer runs out of paper during the printing job. A signal is sent back to the computer to temporarily stop its current task.

Name this type of signal.

.....

[1]

(c) When trying to save this document after it was printed, the computer stops responding.

Give **two** reasons why the computer might stop responding.

1 .....

.....

2 .....

.....

[2]

(d) Andrew ended up losing his electronic document.

How could that have been prevented?

.....

.....

.....

[1]

14 A database was set up to show the properties of certain chemical elements. Part
database is shown below.

Name of element	Element Symbol	Atomic Number	Atomic Weight	Melting Point (C)	Boiling Point (C)	State at room temp
oxygen	O	8	16	- 218	- 183	gas
iron	Fe	26	56	1538	2861	solid
mercury	Hg	80	201	- 38	356	liquid
bromine	Br	35	80	- 7	59	liquid
osmium	Os	76	190	3033	5012	solid
caesium	Cs	55	133	28	671	solid
gallium	Ga	31	70	30	2204	solid
argon	Ar	18	40	- 189	- 186	gas
silver	Ag	47	108	961	2162	solid

(a) How many fields are in each record?

.....

[1]

(b) The following search condition was entered:

(**Melting Point (C)** < 40) AND (**Atomic Weight** > 100)

Using **Element Symbol** only, which records would be output?

.....

.....

[2]

(c) We need to know which elements have an atomic number greater than 50 and are solid at room temperature.

Write down the search condition to find out these elements.

.....

.....

[2]

(d) The data are to be sorted in *descending order* of **Boiling Point (C)**.

Write down the new order of records using the **Element Symbol** only.

.....

.....

[2]

15 A vending machine has the choices shown below.

10	tea	11	with milk	12	with sugar	13	with milk and sugar
20	coffee	21	with milk	22	with sugar	23	with milk and sugar
30	hot chocolate	31	extra milk	32	extra sugar	33	with extra milk and extra sugar
40	cold water	41	hot water	42	fizzy water		
50	coke	51	orange	52	lemon		
60	chicken soup	61	tomato soup				

A customer uses a keypad to make their choice. Each number entered is represented in a 6-bit binary register.

For example, key press 33 (hot chocolate with extra milk and extra sugar) is represented by:

1	**0**	**0**	**0**	**0**	**1**
32	16	8	4	2	1

(a) (i) If a customer chooses coffee with milk and sugar what is the key press?

(ii) How is it represented in the 6-bit register?

32	16	8	4	2	1

[2]

(b) If the 6-bit register shows

1	**0**	**1**	**0**	**0**	**1**

what drink has the customer chosen?

..... [1]

(c) A customer using the vending machine gets an error message after keying in a selection.

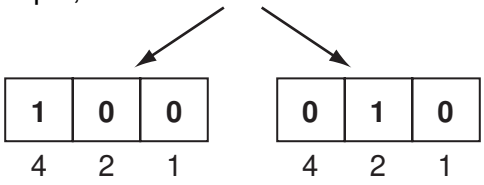
What could have caused this error message?

.....

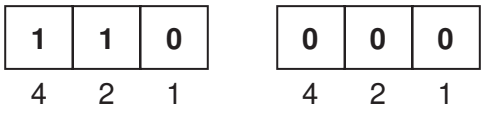
..... [1]

(d) It was decided to split the register so that **each digit** was represented by its own 3-bit register:

For example, 4 2 would now be represented as:



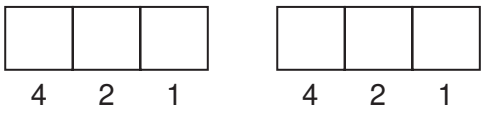
(i) What drink has been chosen if the 3-bit registers contain:

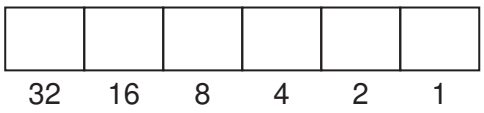


.....

..... [1]

(ii) How would the *lemon* option be shown on **both** types of register?





[2]

(iii) What is the advantage of using two 3-bit registers rather than one 6-bit register?

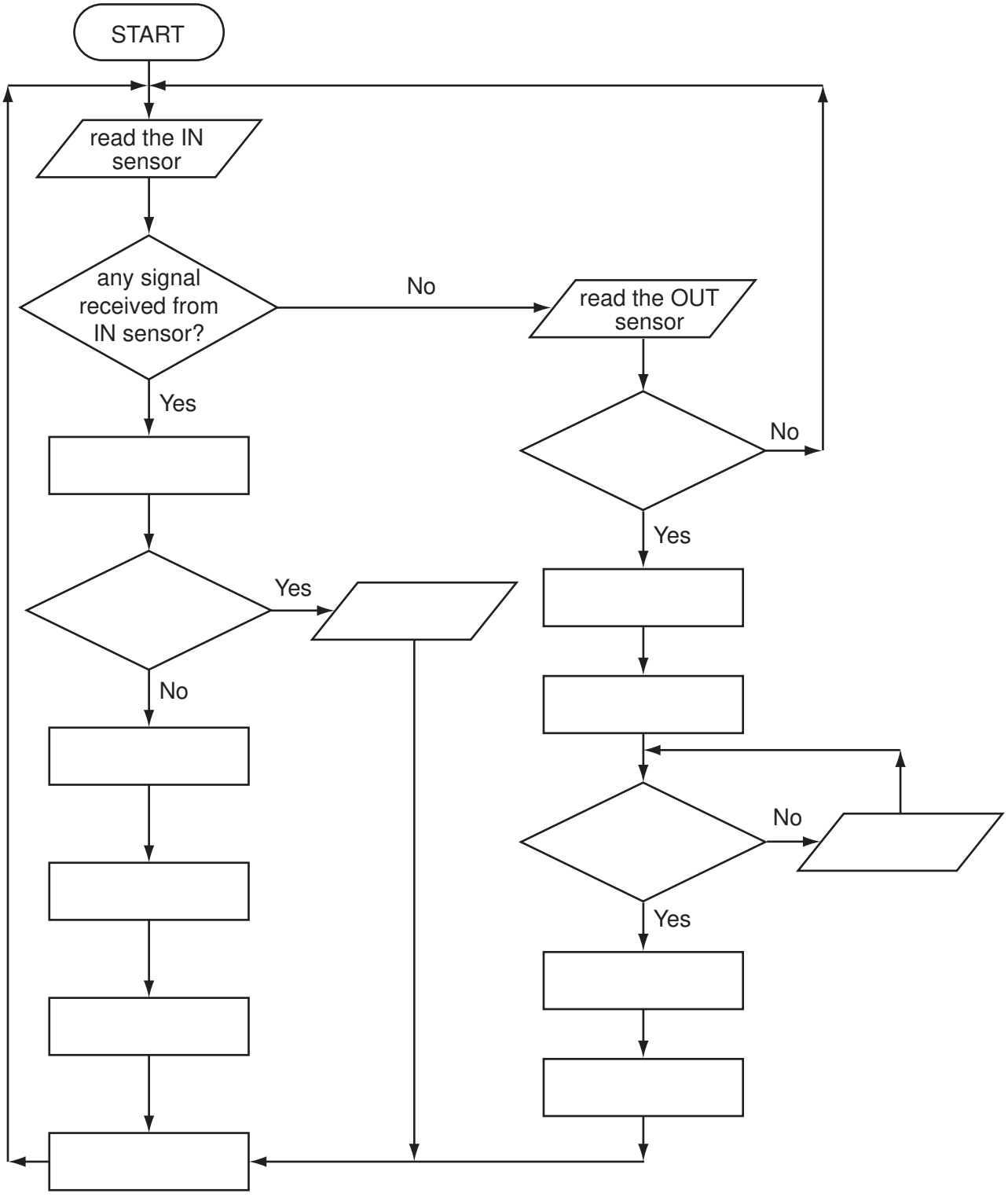
.....

..... [1]

16 A car park uses sensors and a microprocessor to monitor cars leaving and entering. The car park is open 24 hours every day. The parking fee is $10 per day.

The following flowchart shows how the IN and OUT barriers are controlled. Some of the statements are missing.

Using item numbers only, insert the correct item numbers into the flowchart from the item list.



List of statements

Item Number	Description
1	activate motor to raise IN barrier
2	activate motor to raise OUT barrier
3	any signal received from OUT sensor?
4	decrease number of cars in car park by 1
5	increase number of cars in car park by 1
6	is car park full?
7	is the car park fee paid?
8	OUTPUT “car park full”
9	OUTPUT “please pay car park fee at pay machine”
10	use ADC to convert IN sensor signal to digital
11	use ADC to convert OUT sensor signal to digital
12	use DAC to convert computer signal to analogue signal to operate IN barrier
13	use DAC to convert computer signal to analogue signal to operate OUT barrier
14	wait 30 seconds and then close barrier

[6]

17 Write an algorithm, using pseudocode or a program flowchart only, which:

- inputs the population and land area for 500 countries,
- calculates the population density (i.e. population/land area) for every country,
- outputs the largest and smallest population density,
- outputs the average population for all 500 countries.

[6]

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