**UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS**
International General Certificate of Secondary Education

CANDIDATE
NAME

CENTRE
NUMBER

CANDIDATE
NUMBER

**COMPUTER STUDIES**                                                      **0420/13**

Paper 1                                                          **May/June 2010**

                                                              **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 **19** printed pages and **1** blank page.

UNIVERSITY *of* CAMBRIDGE
International Examinations

**[Turn over**

**1** Explain, with examples where appropriate, the following **five** computer terms.

**(a)** buffer ...........................................................................................................................

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**(b)** batch processing .............................................................................................................

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**(c)** e-commerce ....................................................................................................................

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**(d)** simulation .......................................................................................................................

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**(e)** email ..............................................................................................................................

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2    A company making televisions has introduced robots to replace the human work force.

(a)  Describe **three** effects this would have on the work force.

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(b)  Give **two** advantages to the company of introducing robots.

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(c)  How could the robots be trained to assemble the televisions?

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(d)  A whole batch of televisions was produced with some of the parts missing.  How could
this error have been avoided?

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For
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3   State **four** tasks performed at the *analysis stage* in systems analysis.

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4   Give **four** features of a *Data Protection Act*.

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For
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**5** A bank is worried about computer crime.

One of their concerns is online access to customer accounts.

**(a)** How can a customer's access details be discovered by criminals?

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**(b)** Why would a customer using a credit card for online shopping be more of a security risk than a customer using the same card in a shop?

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**(c)** Describe what measures the bank can take to safeguard customer accounts.

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**6** An expert system is being developed to help engineers diagnose faults in aero engines.

**(a)** Describe the steps taken to develop this new expert system.

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**(b)** Another method used to identify and rectify faults is to train engineers using *virtual reality systems*.

**(i)** What is virtual reality?

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**(ii)** What special hardware is used to interface with virtual reality systems?

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For
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For
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**7** A screen has been developed to allow the input of data into the following fields: *name*, *sex*, *address*, *date of birth* and *examination results*.

**(a)** A first attempt at designing the screen is shown below:

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**Student Records**

Student name: …………………………….. Sex: ……………………

Student address: …………………………………………………………………

………………………………………………………………………………………..

Date of birth: ……… / ……… / ………

Exam results: Subjects and Grades

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Type in NEXT to go to next student or BACK to go to previous

student: …………………………

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This is not a very good input screen.  Give **four** ways in which it could be improved.

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**(b) (i)** What is verification?

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**(ii)** Which fields should be verified?

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8    A supermarket makes use of barcodes on all its goods as part of its automatic stock system.

(a) Describe how the price is found for each item sold.

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(b) The following are steps in the automatic stock control system.

Number the steps in the correct order.

| if stock level ≤ minimum stock level | |
|---|---|
| report printed out for the manager | |
| stock level reduced by 1 | |
| new stock value written back to file | |
| more items are ordered automatically | |

[4]

9    A factory uses a computer system to store information about customers, spare parts and general administration.

(a) Spare parts can be identified by selecting from diagrams on a computer screen.

Describe what hardware would be needed to allow the parts to be selected in this way.
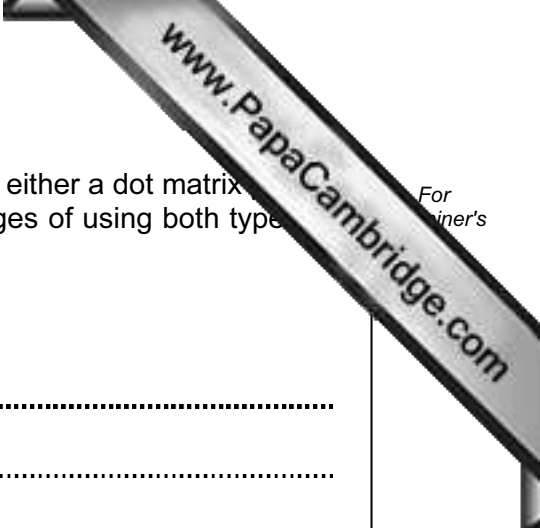
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**(b)** The factory needs to buy a new printer. It has decided to buy either a dot matrix or an inkjet printer. Discuss the advantages and disadvantages of using both types printer in this application.

**Dot matrix printer:**

Advantages ..................................................................................................................

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Disadvantages ...............................................................................................................

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**Inkjet printer:**

Advantages ..................................................................................................................

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Disadvantages ...............................................................................................................

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**10** A small company runs six cars in its fleet. They have produced a spreadsheet to c.. running costs over a five month period:

| | A | B | C | D | E |
|---|---|---|---|---|---|
| 1 | Car Identity | Total number of km | Cost per km ($) | Total cost ($) | Average cost per month ($) |
| 2 | 10001 | 30 000 | 1.00 | 30 000 | 6 000 |
| 3 | 10002 | 20 000 | 4.00 | 80 000 | 16 000 |
| 4 | 10003 | 50 000 | 1.50 | 75 000 | 15 000 |
| 5 | 10004 | 30 000 | 2.00 | 60 000 | 12 000 |
| 6 | 10005 | 20 000 | 2.50 | 50 000 | 10 000 |
| 7 | 10006 | 30 000 | 1.50 | 45 000 | 9 000 |
| 8 | | Averages: | 2.08 | 56 667 | 11 333 |

**(a)** It was decided to print out the spreadsheet formulas from D2 to E8. Using the grid below, show what formulas would be printed:

| | D | E |
|---|---|---|
| 1 | Total cost ($) | Average cost per month ($) |
| 2 | | |
| 3 | | |
| 4 | | |
| 5 | | |
| 6 | | |
| 7 | | |
| 8 | | |

[4]

**(b)** A graph of **Cost per km ($)** was drawn:

**Cost per km ($)**
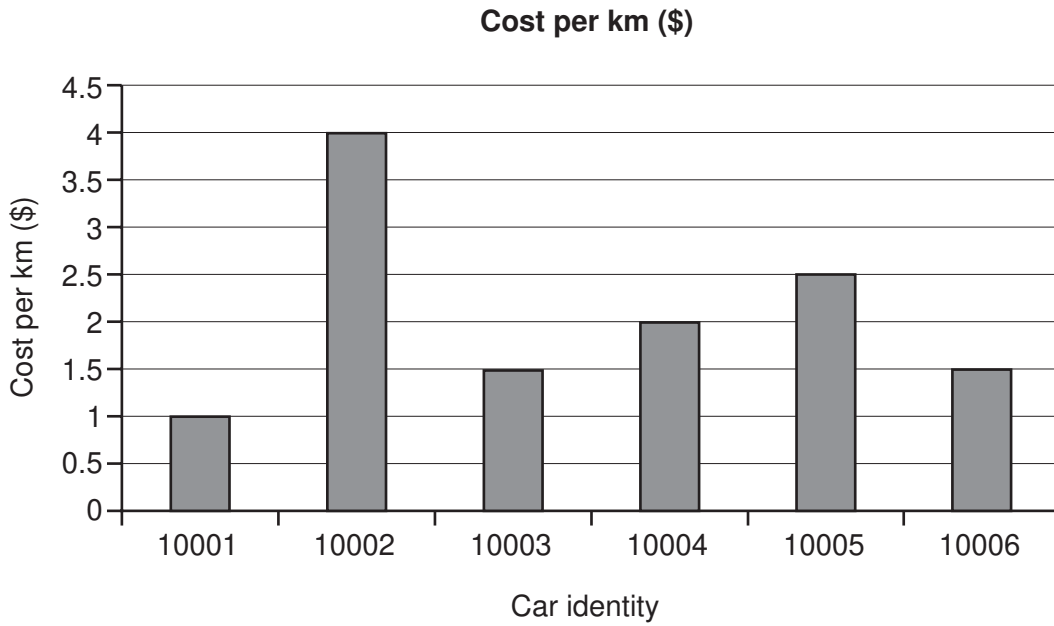


(i) Which cells were highlighted to produce this graph?

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(ii) Describe how the average value of 2.08 would be shown on the graph.

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**(c)** The data in cell C6 was changed to 3.00.
Which cells would be updated automatically?

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11  A database has been set up showing information about cars:

| Car ref | No of doors | Engine (litres) | $CO_2$ (g/km) | Fuel used (km/litre) | No of cylinders |
|---|---|---|---|---|---|
| A | 3 | 1.4 | 145 | 15.3 | 4 |
| B | 4 | 2.0 | 193 | 12.3 | 4 |
| C | 5 | 2.5 | 231 | 10.9 | 6 |
| D | 3 | 2.0 | 190 | 11.2 | 6 |
| E | 4 | 1.3 | 120 | 17.5 | 4 |
| F | 5 | 1.8 | 180 | 14.6 | 4 |
| G | 4 | 3.0 | 240 | 9.5 | 6 |
| H | 4 | 1.2 | 115 | 19.7 | 3 |

(a) Using **Car ref** only, write down which cars would be output if the following search condition was used:

(**No of doors** = 4)  **AND** (**Fuel used (km/litre)** > 15)

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(b) Write down a search condition to find out which cars have engines larger than 1.8 litres OR have $CO_2$ emissions higher than 150 g/km.

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(c) The database is sorted in *ascending order* on **Fuel used (km/litre)**.  Using **Car ref** only, write down the results of the sort.

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For
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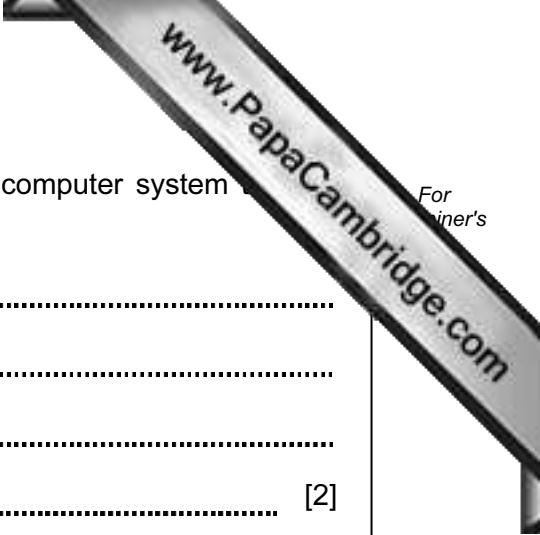
12 (a) State **two** items of hardware needed to enable a standard computer system  
part in video conferencing.

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(b) State **two** additional items of software that would be needed for the video conferencing  
to take place.

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(c) Describe **two** potential problems when using video conferencing.

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**13** Study the following flowchart very carefully:
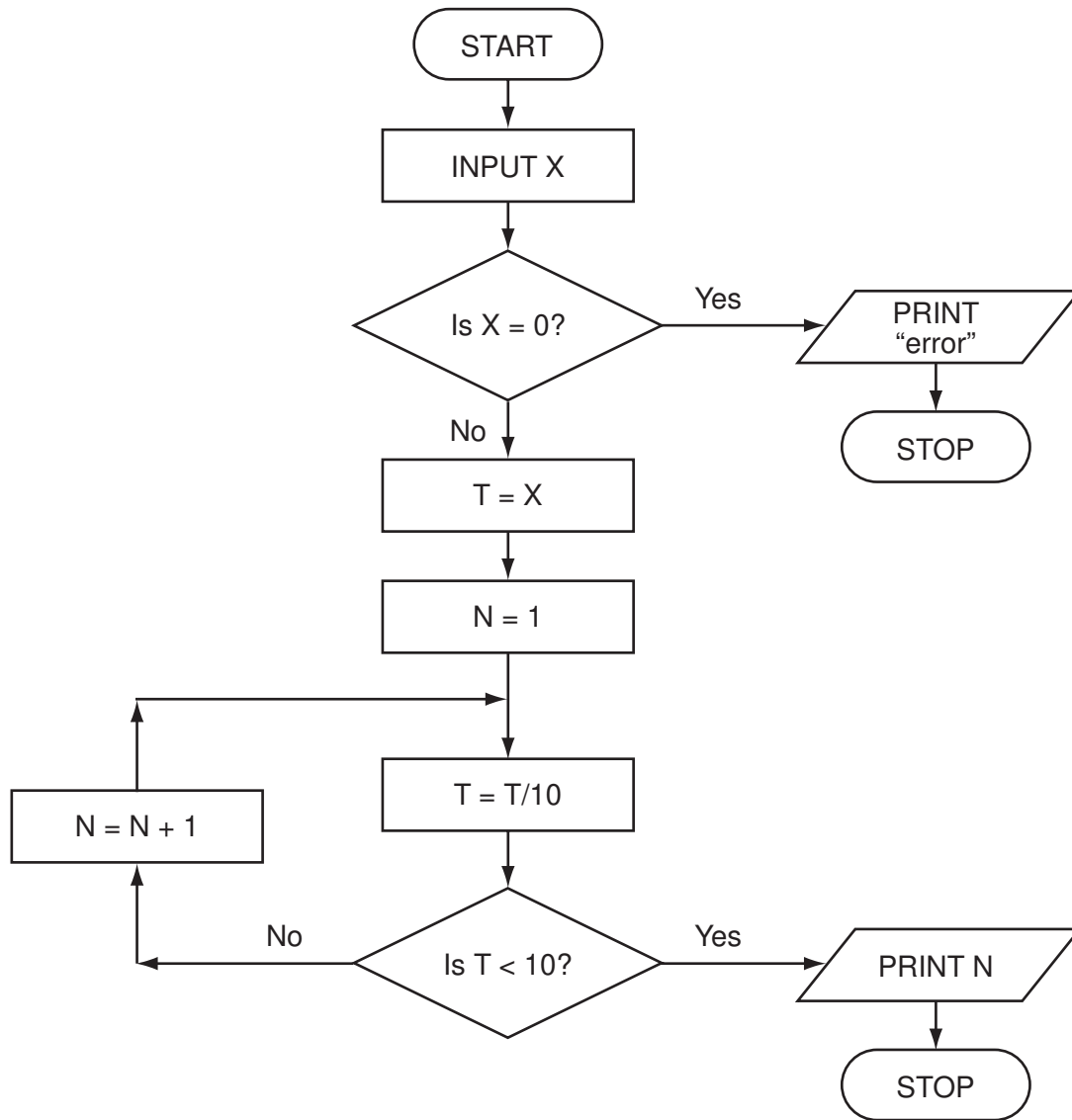
What output would you expect if the following data was input into the flowchart?

| X | OUTPUT |
|---|---|
| -150 | 1 |
| 540 | 2 |
| 0 | error |

[3]

**14** A safety system has been developed to stop vehicles getting too close to each other
road.

A                                          B
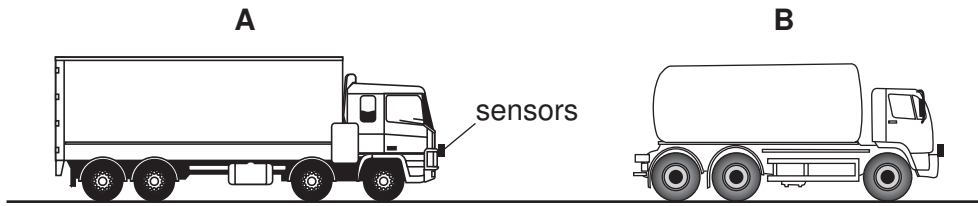


sensors

If vehicle **A** gets <u>too</u> close to vehicle **B**, the brakes are automatically applied by a computer
system in vehicle **A**.

**(a)** What type of sensors could be used on the vehicles?

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**(b)** Describe what the safety system does to constantly monitor how close the vehicle is to
the vehicles in front and decide when to take action.

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**(c)** Describe **two** potential problems with this safety system.

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**15** A floor turtle can use the following instructions:

| Instruction | Meaning |
| --- | --- |
| FORWARD *d* | Move *d* cm forward |
| BACKWARD *d* | Move *d* cm backward |
| LEFT *t* | Turn left *t* degrees |
| RIGHT *t* | Turn right *t* degrees |
| REPEAT *n* | Repeat the next set of instructions *n* times |
| ENDREPEAT | End of REPEAT loop |
| PENUP | Raise the pen |
| PENDOWN | Lower the pen |

**(In the following grid, each square is 10 cm by 10 cm.)**



Start          End
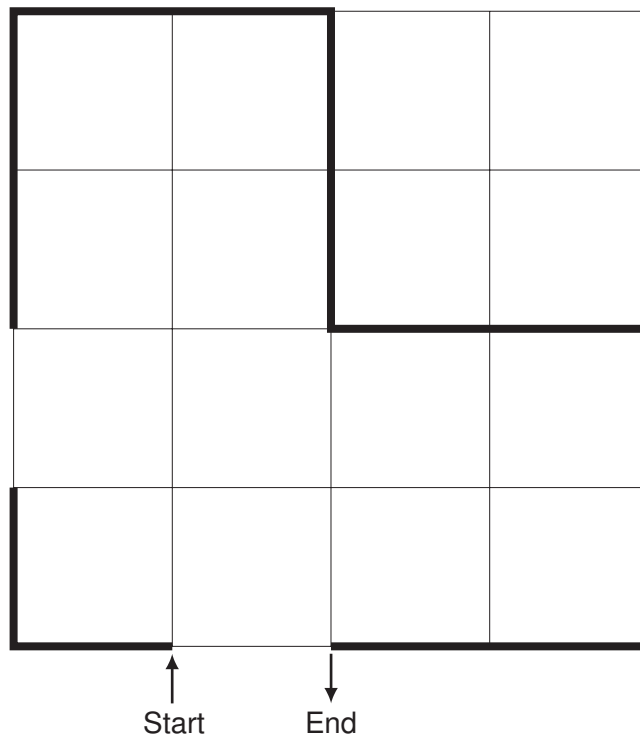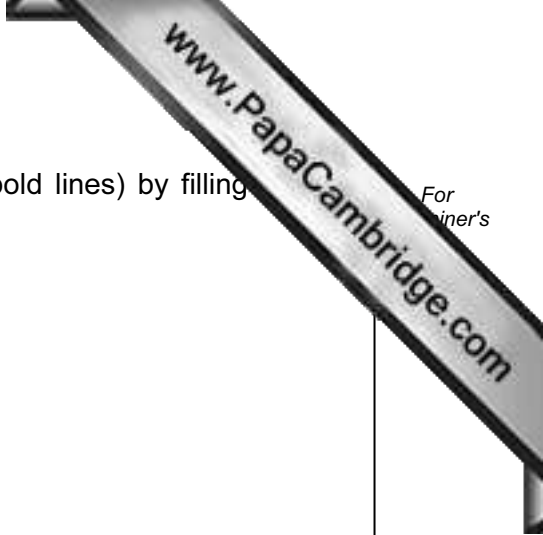
Complete the set of instructions to draw the shape (shown in bold lines) by filling blank lines.

LEFT 90

PENDOWN

FORWARD 10

RIGHT 90

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**16 (a)** Write an algorithm, using pseudocode or a flowchart, which:

- inputs 50 numbers
- outputs how many of the numbers were > 100

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**(b)** Write an algorithm, using pseudocode or a flowchart, which:

- inputs 100 numbers
- finds the average of the input numbers
- outputs the average

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