UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CANDIDATE
NAME

CENTRE
NUMBER

CANDIDATE
NUMBER

COMPUTER STUDIES **0420/13**

Paper 1 **October/November 2013**

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 **20** printed pages.

UNIVERSITY *of* CAMBRIDGE
International Examinations

[Turn over

1 **(a)** Name **three** features of a typical data protection act.

1 ....

....

2 ....

....

3 ....

.... [3]

(b) Data being held is often referred to as *Personal* or *Sensitive Personal* data.

Give **two** examples of **each** type of data.

Personal Data

1 ....

....

2 ....

....

Sensitive Personal Data

1 ....

....

2 ....

.... [4]

*For
iner's*

2 **(a)** The training department of an international airline has introduced computer
training (CBT) to teach foreign languages to its cabin crew.

Give **two** advantages of using CBT.

1 ....

....

....

2 ....

....

.... [2]

(b) The airline also trains its pilots.

(i) What type of training is most appropriate to train pilots to manage dangerous
situations?

.... [1]

(ii) Give **two** benefits of using this type of training.

1 ....

....

2 ....

.... [2]

3 Dmitry's car is fitted with a Global Positioning System (GPS) navigation system.

(a) Explain how the GPS system knows the exact location of Dmitry's car.

....

....

....

....

....

.... [3]

(b) Dmitry's GPS system gives out verbal instructions.

(i) Give **one** benefit and **one** drawback of doing this.

benefit ....

....

....

drawback ....

....

.... [2]

(ii) Dmitry turns his car onto a main road. His GPS system tells him that he is not on a road.

Give a possible explanation.

....

....

....

.... [2]

4   A customer logs on to a bank website so that she can access her account.

   (a) The first thing she was asked to do was to give the 3rd, 4th and 7th character of her password. This was done using drop-down boxes:

   Give **two** reasons why the customer was asked to supply only 3 characters from her password.

   1 ....

   ....

   ....

   2 ....

   ....

   .... [2]

   (b) *Authentication* is a technique used in bank security to check that the customer is who they say they are. This involves three pieces of information, other than the password, all related to the customer.

   Give **three** examples of suitable information:

   1 ....

   ....

   ....

   2 ....

   ....

   ....

   3 ....

   ....

   .... [3]

[Turn over

For
iner's

5   A website has been set up allowing users to access the Periodic Table. Part of the shown below.

H																	He
Li	Be											B	C	N	O	F	Ne
Na	Mg											Al	Si	P	S	Cl	Ar
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr

A user selects an element from the table and is then directed to another web page where details of the chosen element can be found.

(a) (i)   What would be the most suitable input device for this application?

.... [1]

(ii)   Describe how your chosen input device would interact with the table.

....

.... [1]

(b)   Give **two** advantages of this system when compared to finding the same information from books.

1 ....

....

....

2 ....

....

.... [2]

(c)   Apart from security issues, give **two** disadvantages of this system compared to using books.

1 ....

....

....

2 ....

....

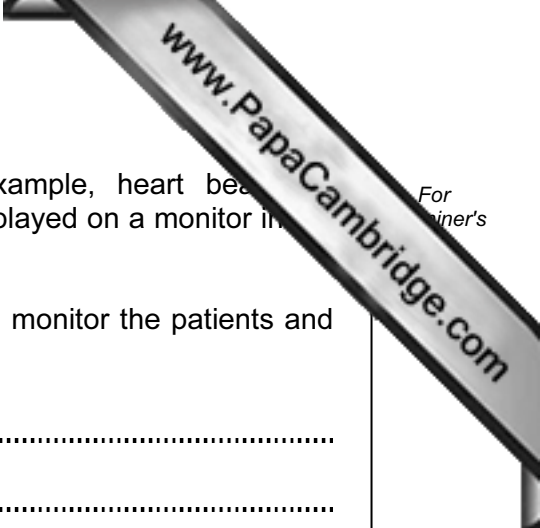.. [2]

6 Patients in a hospital are monitored for vital signs (for example, heart beat, temperature) by sensors and a computer system. Results are displayed on a monitor in the form of numbers and graphs.

(a) Describe how the sensors and computer system are used to monitor the patients and to alert doctors and nurses of a possible problem.

....

....

....

....

....

....

....

....

.... [3]

(b) Give **two** advantages of using this system rather than 24 hour monitoring by nurses.

1 ....

....

....

2 ....

....

.... [2]

(c) Why is the output shown in both graphical and numerical form?

....

....

.... [2]

[Turn over

7   (a) Describe what is meant by *streaming* when watching a video on a computer screen.

....

....

....

....

....

.... [2]

     (b) What is the difference between *true* (real time) streaming and *on demand* streaming?

     true ....

     ....

     ....

     on demand ....

     ....

     .... [2]

     (c) To allow high quality video playback during streaming, computers need special
          software and a way of temporarily saving the data.

          Describe **one** piece of software needed and also how the data can be stored
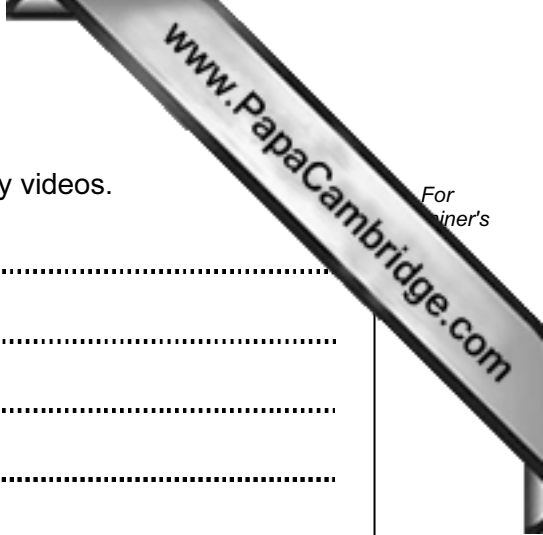   temporarily.

     software ....

     ....

     ....

     temporary storage ....

     ....

     .... [2]

© UCLES 2013

(d) Give **one** benefit and **one** drawback of using streaming to play videos.

benefit ....

....

....

drawback ....

....

.... [2]

[Turn over

8 A company decides to offer a computer aided design (CAD) service.

(a) Give **two** advantages and **two** disadvantages to the designer of using CAD rather than using manual, paper-based systems.

Advantages:

1 ....

....

2 ....

....

Disadvantages:

1 ....

....

2 ....

.... [4]

(b) The company sets up call centres overseas to help give customers advice.

(i) Give **two** benefits to the company.

1 ....

....

2 ....

.... [2]

(ii) Give **two** drawbacks to the company.

1 ....

....

2 ....

.... [2]

For
iner's

9 A database was set up to keep track of goods in a shop. A section of the database is below.

Item code	Number in stock	Re-order level	Price of item ($)	Value of stock ($)	Items ordered
1113	155	200	1.50	232.50	Yes
1124	84	50	2.50	210.00	No
1200	30	60	5.00	150.00	Yes
1422	600	500	1.00	600.00	No
1515	90	100	2.00	180.00	No
1668	58	50	4.00	232.00	No
1801	60	100	8.00	480.00	No
1844	195	200	1.50	292.50	Yes

(a) How many records are shown in this section of database?

.... [1]

(b) (i) Using **Item code** only, what would be output if the following search was carried out:

(**Number in stock** < **Re-order level**) AND (**Items ordered** = "No")

....

.... [2]

(ii) What useful information does this search produce?

.... [1]

(c) Write a search condition to locate items costing more than $2.00 or have a stock value exceeding $300.00.

....

....

.... [2]

[Turn over

For
iner's

10 (a) The following pseudocode was written to input 1000 dates.

```
1   count = 1
2   repeat
3       input day, month, year
4       count = count + 1
5   until count = 1000
```

   (i) Describe why the loop only inputs 999 dates instead of 1000.

   ....

   ....

   .... [1]

   (ii) What needs to be changed or added to the above code to make sure 1000 dates
         are input?

   ....

   ....

   .... [1]

   (b) Errors in code can be found using test data.

        Name **three** different types of test data. Using `month` from the pseudocode above, give
        an example of each type of test data.

        test data type 1 ....

        ....

        example ....

        ....

        test data type 2 ....

        ....

        example ....

        ....

        test data type 3 ....

        ....

        example ....

        .... [6]

11 **(a)** Draw the logic circuit for the following logic statement:

X = 1 if [A is NOT 1 AND B is 1] AND [B is 1 OR C is 1]

A ————

B ———————————— X

C ————
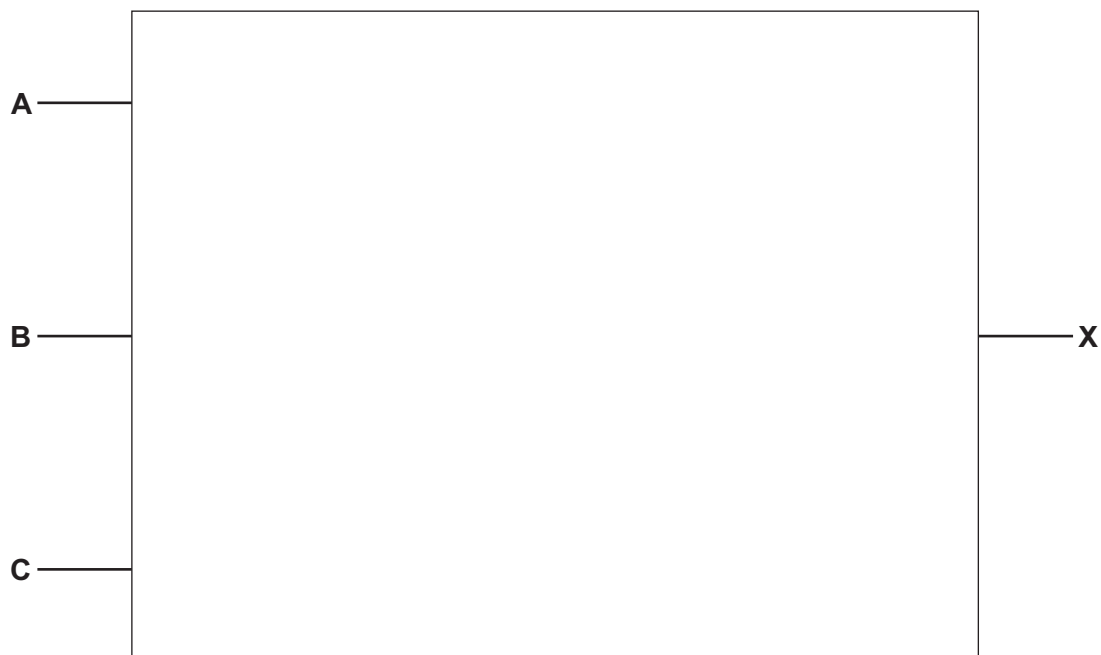
[4]

(b) Complete the truth table for the above logic circuit.

A	B	C	Working space	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]

[Turn over

12 A spreadsheet was set up to compare fuel prices in dollars per litre over three years. Part of the spreadsheet is shown below.

	A	B	C	D	E	F
1		Year 1 ($/litre)	Year 2 ($/litre)	Year 3 ($/litre)	Average ($/litre)	Above world average in year 3?
2	country 1	2.00	2.40	2.75	2.38	
3	country 2	2.50	2.70	2.90	2.70	
4	country 3	2.00	2.10	2.30	2.13	
5	country 4	1.00	1.25	1.40	1.22	
6	country 5	2.00	2.20	2.50	2.23	
7	country 6	2.20	2.80	3.00	2.67	
8	country 7	2.15	2.45	2.80	2.47	
9	country 8	1.50	1.70	2.00	1.73	
10			Max value:	3.00		

(a) What formulas must be in column E to calculate the average values for years 1 to 3?

	E
1	Average ($/litre)
2	=
3	=
4	=
5	=
6	=
7	=
8	=
9	=

[2]

(b) What formula must be in cell D10 to find the highest fuel value in $/litre for year 3?

= .... [1]

(c) (i) If the following formula was typed into cell F2, what would be output?

= IF (D2 > 2.20, "Y", "N")

.... [1]
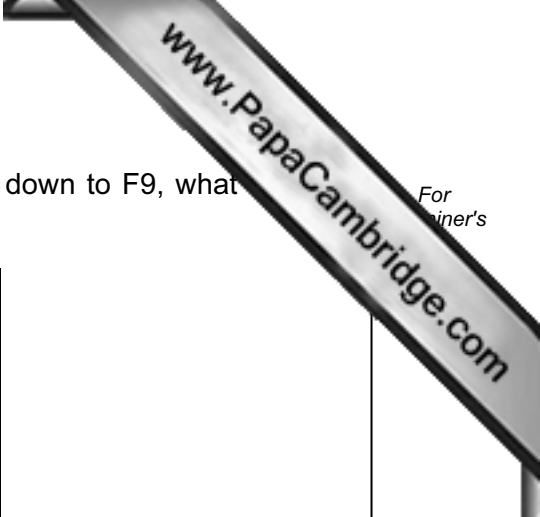
(ii) If the formula from part **(c)(i)** was replicated all the way down to F9, what would be shown in cells F2 to F9?

	F
1	**Above world average in year 3?**
2	
3	
4	
5	
6	
7	
8	
9	

[2]

(d) (i) If the following formula was typed into cell E10, what would be output?

= COUNTIF (E2:E9, "> 2.20")

.... [1]

(ii) What formula would need to be in cell F10 to count the number of "Y" entries in column F?

= .... [1]

13 A touch screen is divided up into a number of locations:

x values

y values
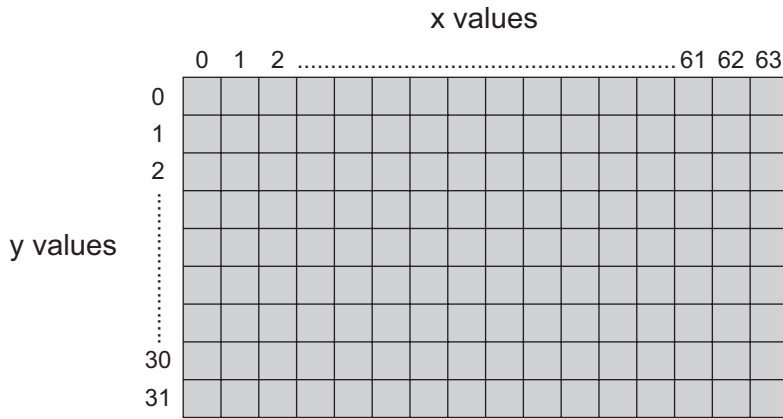
Each x-position is shown in a 6-bit register:
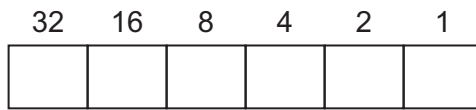
32	16	8	4	2	1

and each y-position is shown in a 5-bit register:

16	8	4	2	1

Thus,

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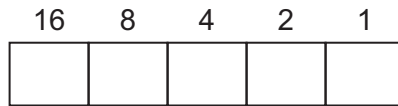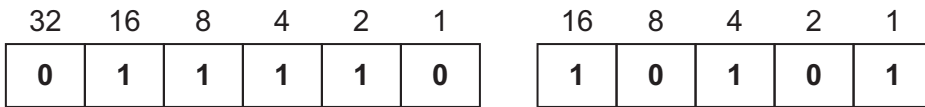
16	8	4	2	1
1	0	1	0	1

refers to screen position: **(30, 21)**

(a) Give the screen position referred to if the two registers contain:

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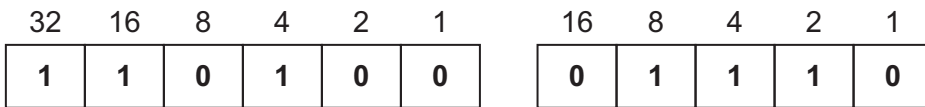
16	8	4	2	1
0	1	1	1	0

(.. , ...)   [2]

(b) Three options (A, B, C) are shown on the touch screen below:

	position (20, 11)		position (40, 11)	
A				B

	position (30, 25)
C	
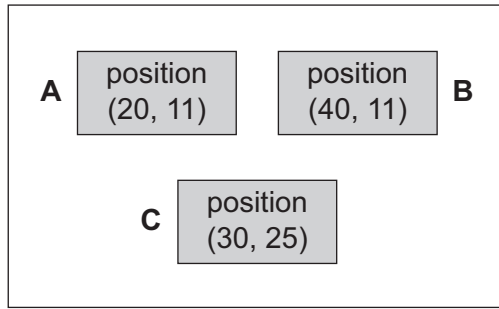
If the two registers contain:

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

16	8	4	2	1
0	1	0	1	1

what option (A, B or C) has been chosen?

.... [1]

(c) Each box A, B, C is made up of 128 x 64 **pixels**.

(i) What is meant by the term *pixel*?

....

....

.... [1]

(ii) The value of each pixel is stored in 1 byte of memory.

How much memory is needed to store one of these boxes?

Give your answer in kilobytes.

....

....

....

....

.... [2]

[Turn over

14 A microprocessor controls the opening and closing of automatic doors to a supermarket.

Customers are detected using pressure sensors.

The flowchart on the next page shows how the sensors and microprocessor interact to control the opening and closing of the doors. However, several of the stages in the process have been missed out.

Using **item number only**, complete the flowchart using items from the following list:

Item number	Item description
1	ADC changes analogue signal into digital signal
2	are the doors already open?
3	DAC changes digital signal into analogue signal
4	DAC changes digital signal into analogue signal
5	doors are closed
6	microprocessor sends signal
7	microprocessor sends signal
8	no action is required
9	wait for 10 seconds

```
                    ( START )
                        |
                        v
          +-------------------------+
   No     |   has sensor detected   |
  <-------|      a customer?        |
          +-------------------------+
                        | Yes
                        v
                +---------------+
                |               |
                +---------------+
                        |
                        v
                  < diamond >  Yes    +---------------+
                  <         >-------->|               |------+
                  < No      >         +---------------+      |
                        |                                    |
                        v                                    |
                +---------------+                            |
                |               |                            |
                +---------------+                            |
                        |                                    |
                        v                                    |
                +---------------+                            |
                |               |                            |
                +---------------+                            |
                        |                                    |
                        v                                    |
                +---------------+                            |
                |  doors are    |                            |
                |  opened       |                            |
                +---------------+                            |
                        |   <--------------------------------+
                        v
                +---------------+
                |               |
                +---------------+
                        |
                        v
          +-------------------------+
   Yes    |   has sensor detected   |
  <-------|      a customer?        |
          +-------------------------+
                        | No
                        v
                +---------------+
                |               |
                +---------------+
                        |
                        v
                +---------------+      +---------------+
                |               |----->|               |-----+
                +---------------+      +---------------+      |
```

[5]

[Turn over

15 5000 numbers are being input which should have either 1 digit (e.g. 5), 2 digits (e.g. digits (e.g. 149) or 4 digits (e.g. 8567).

Write an algorithm, using pseudocode or flowchart only, which

- inputs 5000 numbers
- outputs how many numbers had 1 digit, 2 digits, 3 digits and 4 digits
- outputs the % of numbers input which were outside the range

....

....

....

....

....

....

....

....

....

....

....

....

....

....

....

....

....

.... [6]