UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CANDIDATE
NAME

CENTRE
NUMBER

CANDIDATE
NUMBER

COMPUTER STUDIES **0420/01**

Paper 1 **May/June 2007**

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

For
iner's

1   Explain, with examples, the following **five** computer terms:

   (a) virus

   ....

   ....

   .... [2]

   (b) verification

   ....

   ....

   .... [2]

   (c) interrupt

   ....

   ....

   .... [2]

   (d) simulation

   ....

   ....

   .... [2]

   (e) electronic scabbing.

   ....

   ....

   .... [2]

For
iner's

2 Describe, with examples, **two** types of test data which could be used to test a system.

1 ....

....

....

....

2 ....

....

....

.... [4]

3 Describe the difference between speech recognition and speech synthesis.

....

....

....

.... [2]

4 State **three** tasks done by the operating system.

1 ....

....

2 ....

....

3 ....

.... [3]

5   Use of computing and communication technologies has meant that many workers can work from home, rather than having to travel to the office.

State **one** advantage and **one** disadvantage of working from home from the point of view of:

(i) the worker

Advantage ....

....

Disadvantage ....

....

(ii) the company.

Advantage ....

....

Disadvantage ....

.... [4]

6   Describe **one** type of diagram that can be used by a systems analyst when producing system documentation.

Type of diagram ....

Description ....

....

.... [2]

For
iner's

7   A hospital has decided to computerise its administration system.

(a) Give **three** ways this could affect the hospital workers.

1 ....

....

2 ....

....

3 ....

.... [3]

The hospital will be using a database which holds confidential personal data.

(b) State **two** precautions that the hospital should take to prevent unauthorised access to the data.

1 ....

....

2 ....

.... [2]

(c) Describe how the database could be recovered if it became corrupted.

....

....

.... [1]

(d) Give **one** example, in each case, of when it would be necessary to amend data, delete data and insert data into the patient database.

Amend ....

....

Delete ....

....

Insert ....

.... [3]

8   Digital cameras do not use film. Therefore, there is no need to pay to develop the fi   produce prints.

   (a) Give **two** other advantages of using digital cameras rather than traditional cameras.
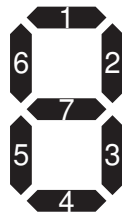
   1 ....

   ....

   ....

   2 ....

   ....

   .... [2]

   (b) On what does the quality of the pictures taken by the digital camera **mainly** depend?

   ....

   ....

   .... [1]

9 A 7-segment display is used to indicate which floor a lift is on. Each segment is nu____
   as shown:

A byte is used to hold the data needed to light the correct segments. Bit 0 is always zero.
For example, 3 is represented by

and by

1	0	0	1	1	1	1	0
7	6	5	4	3	2	1	0

Bit Number

(a) If the lift is to stop at more than one floor, the data is held in successive bytes. For
example:

FIRST BYTE:

0	0	0	0	1	1	1	0

SECOND BYTE:

1	1	0	1	1	0	1	0

Which floor numbers are stored in each byte?

First byte floor number ....

Second byte floor number .... [2]

(b) What bit pattern is used to indicate Floor 2?

[1]

(c) The lift is travelling down to stop at Floors 5, 3 and 1. When it stops at Floor 5, a
passenger gets in and presses the button for Floor 2.

How does the system ensure that the lift stops at Floors 3, 2 and 1 **in that order**?

....

....

....

....

.... [3]

10 The following spreadsheet shows the number of mice, keyboards and trackerballs or̶ by five customers. The value of each item is:

Mouse	$ 5
Keyboard	$10
Trackerball	$20

	A	B	C	D	E	F
1	Customer Number	Number of Mice	Number of Keyboards	Number of Trackerballs	Value of Order($)	Free Delivery
2	1234	10	15	11	420	
3	5678	9	20	15	545	
4	9012	8	11	7	290	
5	3456	6	20	15	530	
6	7890	5	4	15	365	
7			Total Order	Value ($):		

(a) (i) Name a cell which contains a numerical value.

....

(ii) Name a cell which contains text only.

.... [2]

(b) What formula must be placed in cell E2 to calculate the value of the order for customer 1234?

....

.... [2]

(c) How could the formula in Question 10 (b) be replicated in cells E3 to E6?

....

....

.... [2]

(d) What formula should be placed in cell E7 to add up the totals in column E?

....

.... [1]

(e) If the formula **IF (E4>400 THEN "Y" ELSE "N")** was placed in cell F4, what output would be produced in that cell?

.... [1]

11 Study the following flowchart very carefully.
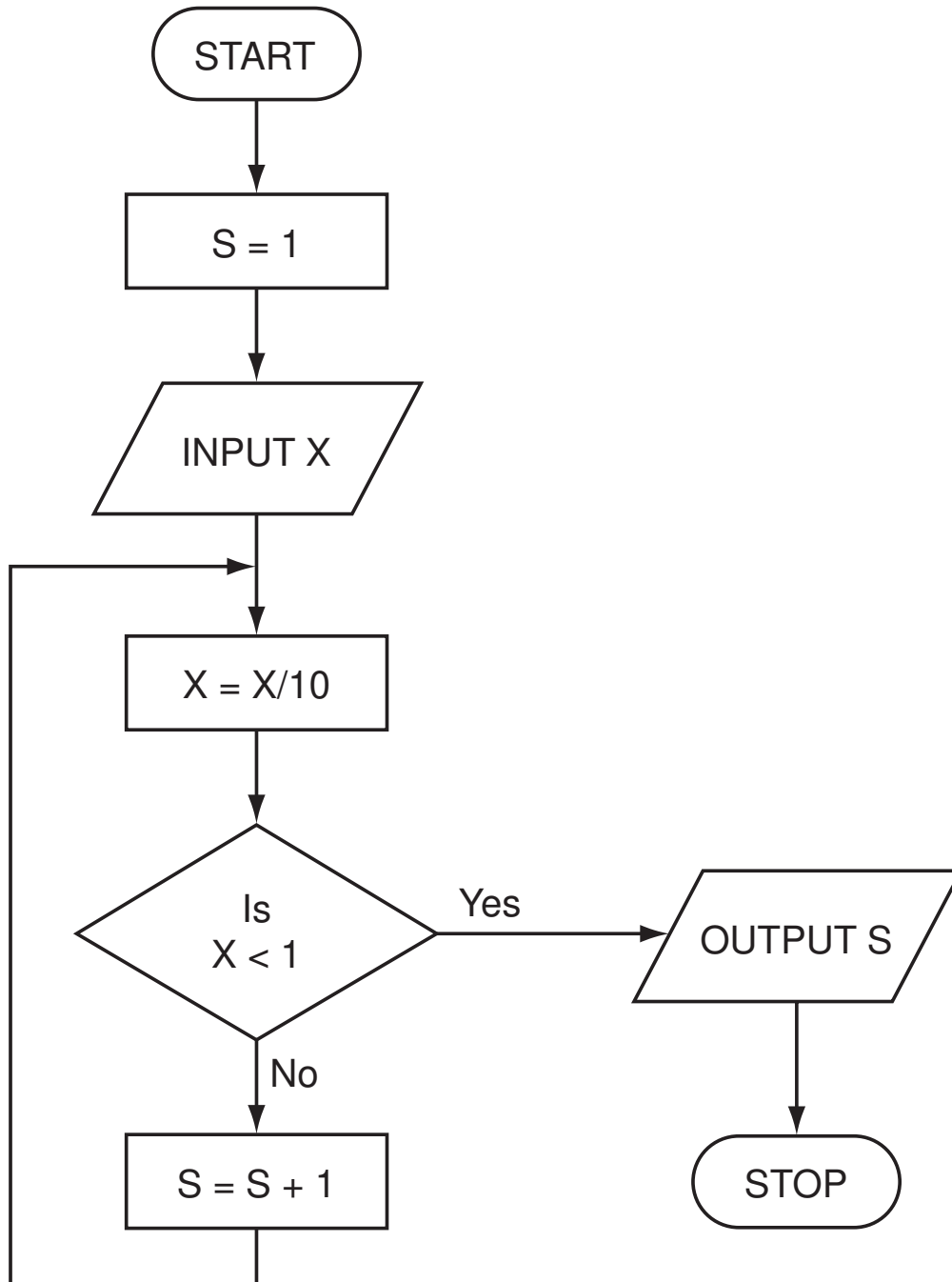
(a) Complete the following table showing the expected output from the flowchart three sets of input data:

INPUT X	OUTPUT S
48	
9170	
- 800	

[3]

(b) Input data needs to go through a validation process.

(i) Explain the term *validation*.

....

....

(ii) Describe **one** type of validation check.

....

.... [2]
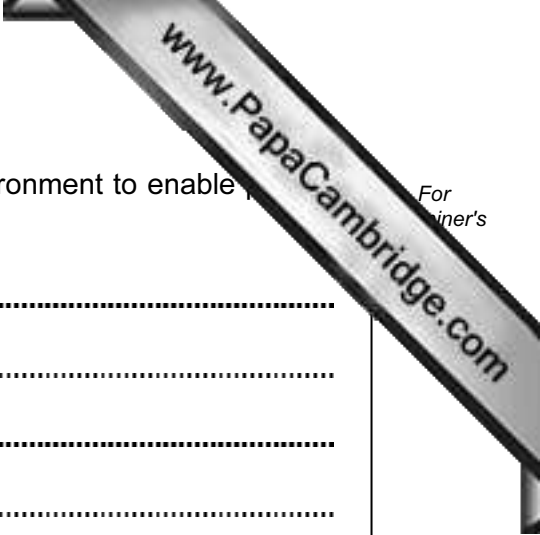
12 Describe **three** ways you could modify a typical input/output environment to enable people with disabilities to use the computer system.

1 ....

....

2 ....

....

3 ....

.... [3]

13 Items sold in supermarkets are all marked with bar codes.

(a) Customers are given an itemised bill at the checkout. Give **two** advantages to the customer.

1 ....

....

2 ....

.... [2]

(b) Give **two** ways the information on the bar code can be input at the checkout.

1 ....

....

2 ....

.... [2]

(c) Describe how bar codes are used in automatic stock control.

....

....

....

....

....

.... [3]

14 A database has been set up by a car dealer to maintain information on cars c̶ available for sale. A section of the database is shown below.

Ref No	Manufacturer	Model	Doors	0-100 kph time (sec)	Top Speed (kph)	Price (
1015	Bentley	Arnage	4	6.0	250	300 000
1023	Porsche	Boxster	2	5.5	266	55 000
1158	Fiat	Stilo	5	12.4	170	14 000
1911	Maserati	GT	2	4.8	288	105 000
2051	Lexus	GS	4	6.3	250	95 000
2081	Renault	Laguna	5	8.4	220	25 000
2516	Porsche	Cayenne	5	5.6	260	130 000
3331	VW	Golf	3	9.3	200	27 500
3456	Lotus	Elise	2	5.7	205	42 500

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

.... [1]

(b) If the following query was input

(Top Speed (kph) > 250) OR (Doors = 2)

using **Ref No** only, which items would be output?

....

....

.... [2]

(c) Write down a query which outputs cars which cost more than $60 000 and have a 0-100 kph time (sec) of less than 7.0.

....

....

.... [2]

(d) The car dealership has decided to produce a website which allows potential customers to search its database of cars on-line.

Give **two** advantages to the car dealership of doing this.

1 ....

....

....

2 ....

....

.... [2]

15 An Expert System is to be created to help diagnose faults in electronic components. diagram in Fig. 1 summarises how the knowledge base was created and how it is used help technicians. Some parts of the diagram have been left blank.
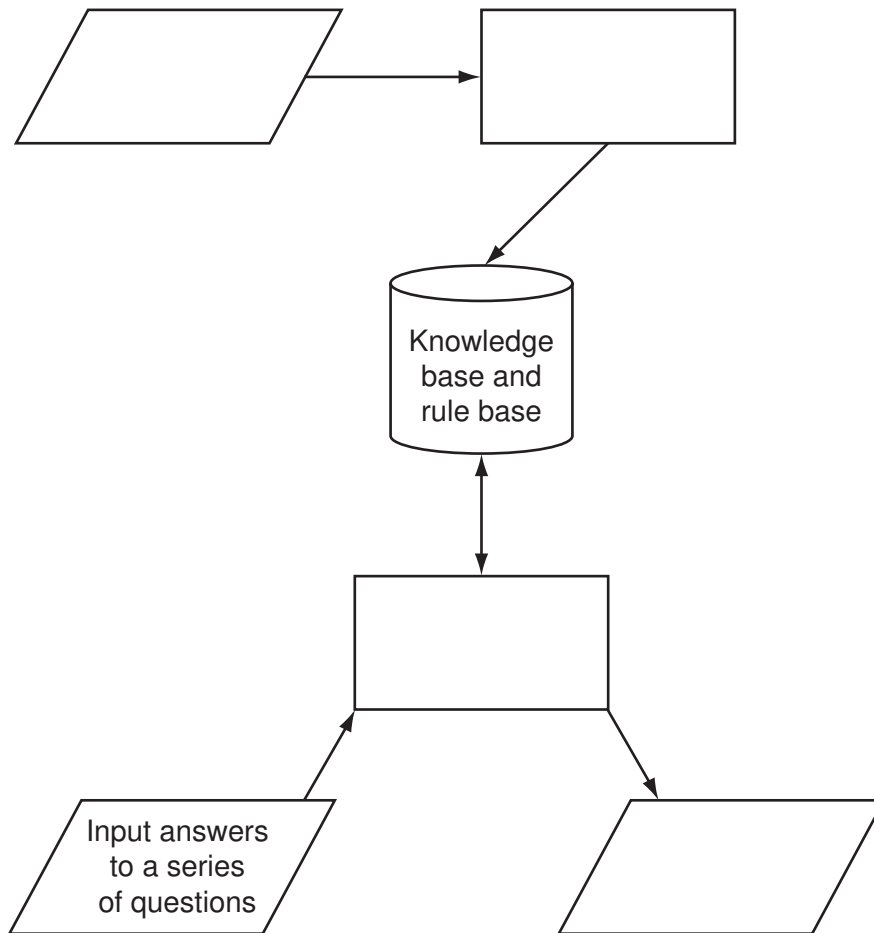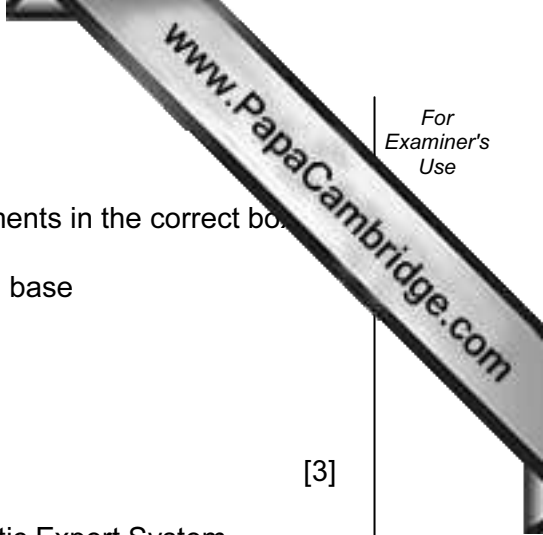
Knowledge
base and
rule base

Input answers
to a series
of questions

Fig.1

(a) Complete the diagram in Fig. 1 by putting the following statements in the correct bo...

> **1** Inference engine queries the knowledge base
> **2** Display results
> **3** Collect data from experts
> **4** Create knowledge base and rule base.

[3]

(b) Describe a typical input interface you would find on a diagnostic Expert System.

....

.... [1]

(c) Describe the output you would expect to see from this system.

....

....

.... [1]

(d) Give another example of an Expert System.

....

.... [1]

16 Modern car engines use fuel injection systems which are controlled by micropro_____ called Engine Control Units (ECUs). The fuel injection system controls the amount o_____ that goes into the engine. Sensors monitor engine conditions and feed the data back to t_____ ECUs.

```
 ┌──────────┐        ┌───────────┐           ┌──────────┐
 │          │◄───────│   Fuel    │◄─────────►│          │
 │  Engine  │        │ Injection │           │   ECU    │
 │          │  fuel  │  System   │  control  │          │
 └──────────┘        └───────────┘  signals  └──────────┘
                                                ▲  ▲  ▲
                                                │  │  │
                                                │  │  │

                                       data from the sensors
```
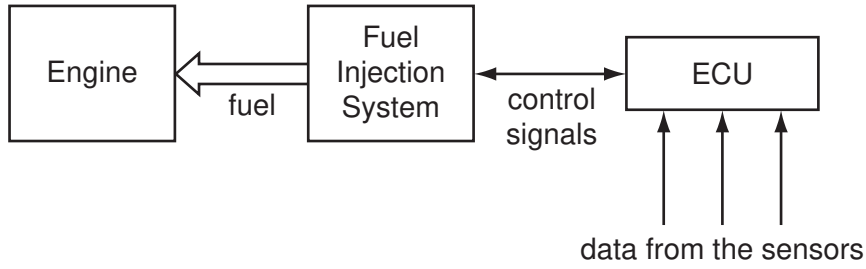
(a) Name **two** types of sensors used to monitor engine conditions.

1 ....

2 .... [2]

(b) Describe how information from the sensors is used to control the fuel injection system.

....

....

....

....

....

....

....

.... [3]

(c) Give an advantage of using automatic fuel injection systems rather than simpler mechanical fuel devices.

....

.... [1]

(d) The fuel injection system operates in real time.

Why would batch processing not be appropriate in this application?

....

....

.... [1]
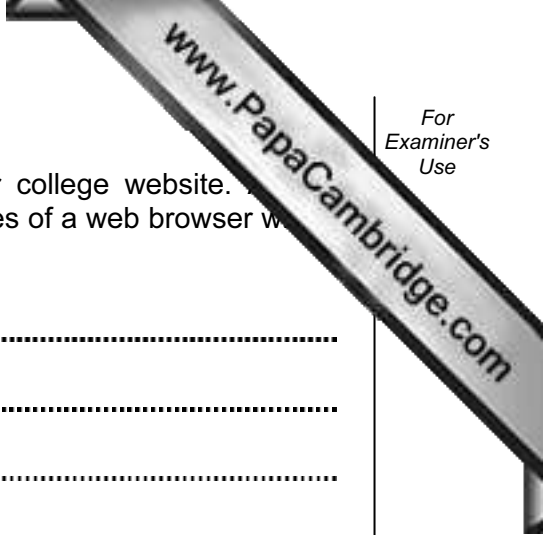
17 Geography students have access to course materials on their college website. browser is used to access these materials. Describe **three** features of a web browser would be suitable for this application.

1 ....

....

....

2 ....

....

....

3 ....

....

.... [3]

18 A company has bought laptop computers for training purposes and for information re̶ These computers will use the Internet and have multimedia capabilities.

(a) State **two** advantages and **one** disadvantage of using the Internet to search for information when compared to using CD-ROMs or paper-based systems.

Advantage 1 ....

....

....

Advantage 2 ....

....

....

Disadvantage ....

....

.... [3]

(b) The company has chosen to use broadband for Internet connections. Why was broadband chosen rather than dial-up modem connections?

....

.... [1]

(c) The laptops are linked to the network using wireless connections. Give **one** advantage and **one** disadvantage of using wireless connections.

Advantage ....

....

....

Disadvantage ....

....

.... [2]

19 A company has 5000 CDs, DVDs, videos and books in stock. Each item has a 5-digit code with the first digit identifying the type of item, i.e.

$$1 \ = \ CD$$

$$2 \ = \ DVD$$

$$3 \ = \ video$$

$$4 \ = \ book$$

For example, for the code **1**5642 the **1** identifies that it is a CD, and for the code **3**0055 the **3** identifies that it is a video.

Write an algorithm, using pseudocode or otherwise, that

- Inputs the codes for all 5000 items
- Validates the input code
- Calculates how many CDs, DVDs, videos and books are in stock
- Outputs the **four** totals.

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.... [5]

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