CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the October/November 2013 series

0420 COMPUTER STUDIES

0420/13 Paper 1; maximum raw mark 100

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

Cambridge will not enter into discussions about these mark schemes.

Cambridge is publishing the mark schemes for the October/November 2013 series for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level components and some Ordinary Level components.

1 (a) Any **three** from:

- data should be obtained/processed fairly/lawfully
- data should be obtained only for one or more specified purposes
- data should be adequate/relevant/not excessive (in relation to its purpose)
- data should be accurate/up to date
- data should be held no longer than necessary (for the purpose for which it was obtained)
- data should be processed in accordance with the rights of the data subjects
- data should be kept securely/safely (with adequate levels of protection)
- data should only be transferred to countries with an adequate level of protection (safe harbour)
- data subjects have the right to see data about them and/or have it altered/removed if incorrect [3]

(b) Personal data: any **two** from:
e.g.
- name (surname and/or forename)
- address
- telephone/mobile number
- passport/id number
- date of birth
- email address

Sensitive personal data: any **two** from:
e.g.
- racial/ethnic origin
- political opinions
- religious beliefs
- Trades Union membership
- physical/mental health
- sexual life/orientation
- criminal convictions [4]

2 (a) Any **two** from:

- user can work at their own speed
- user can learn in their own time/when/where they want
- user can re-run sections of training package whenever they wish
- user can pause the training at any point
- user gets immediate feedback/analysis (on their performance)
- there is no need to have teachers or classrooms
- less expensive for the airline/ training department [2]

(b) (i) flight simulator/simulating/simulation [1]

(ii) Any **two** from:

- can be much safer
- less expensive than building/crashing the real thing
- repetition of scenarios (e.g. potential crashes)
- different scenarios/situations available
- no need for an instructor [2]

3 (a) Any **three** from:

- satellites transmit signals (to the GPS in the car)
- the computer receives/interprets these signals
- the system depends on very accurate timing/atomic clocks
- each satellite transmits its location and time
- computer in the vehicle calculates its position based on at least 3 satellite signals
- system makes use of triangulation (to pinpoint its exact location)
- position of vehicle accurate to within 1 metre
- at least 24 satellites in operation [3]

(b) (i) **benefits** (any **one** from)

- safer because e.g. driver can keep their eyes on the road
- verbal instructions can be easier/quicker to understand by driver
- a comparative safety issue

drawbacks (any **one** from)

- can be distracting to the driver
- may not hear instructions (clearly)
- inappropriate words [2]

(ii) Any **two** from:

- maps in GPS (sat nav) may be out of date/new road
- position of the car is in error
- fault in software in device
- interference/loss of signal e.g. due to weather [2]

4 (a) Any **two** from:

- hackers only get part of the password
- can ask for <u>different</u> characters/combinations each time
- helps to “defeat” spyware [2]

(b) Any **three** from:

customer knows:
e.g.
– PIN
– Name/user name
– date last logged on
– memorable word/phrase/graphic
– memorable personal data e.g. mother's maiden name
– date of birth
– email address
– recent activities
– telephone number
– customer number
– account number

belongs to customer:

– bank card (number)

unique to customer:

– biometrics (e.g. fingerprints) [3]

5 (a) (i) Any **one** from:

– touch screen
– mouse/trackerball/touch pad
– keyboard [1]

(ii) Any **one** from:

– touch required element on screen with finger (and go to relevant web page)
– pointer moved and element selected (mouse/trackerball/touch pad)
– use arrow keys on keyboard to select required element and then press [ENTER] key OR key characters and press [ENTER] [1]

(b) Any **two** from:

– much faster/easier to access information
– more up to date (since easier to modify than books)
– more convenient than carrying around many text books
– many people can access the data at the same time
– using multi-media (possible to improve learning environment)
– easier to import information into an "essay" (for example) [2]

(c) Any **two** from:

- Accuracy issues e.g. anyone can write a web page, information is limited to author's
- health and safety risks from prolonged use of computer
- risk of finding undesirable web sites
- possibility of information overload when doing searches
- Internet access required
- Power source required [2]

6 (a) Any **three** from:

- sensors for oxygen, heart/pulse rate (etc.) send signals to computer
- converted (by ADC) into digital data
- computer compares this data with stored data/pre-set values
  sends vital signs data to monitors
- if the new information is out of range, computer sends signals
- to sound an alarm/warn doctors and nurses
- signals need to be first converted into analogue (by DAC)
- monitoring is continuous (until machine is switched off) [3]

(b) Any **two** from:

- nurse issues e.g. nurses get tired, need breaks
- can show <u>immediate</u> trends (automatically)
- <u>faster</u> response to a given set of conditions
- less expensive because e.g. leaves nurses free to do other tasks while computer monitors patients, less wages [2]

(c) Any **two** from:

- easier to see immediate trends in data using a graph
- "OK" graph and "not OK" graph may be easier to recognise at a glance
- numbers are easier to read in some cases (e.g. temperature)
- no need to interpret/understand numbers [2]

7 (a) Any **two** from:

- data sent in a compressed form
- over the Internet
- displayed to user in real time
- makes use of <u>buffering</u> [2]

(b) **true** (any **one** from)

- information sent straight to user's computer
- no need to save information first on servers' hard disk
- data is live (in real time)

on demand (any **one** from)

- files saved on servers' hard disk first
- then played back to user as required [2]

(c) **software** (any **one** from)

– media player
– decompression software
– CODEC

temporary storage

– use of buffers [2]

(d) **benefit** (any **one** from)

– no need to store the files/saves on memory space
– can be sent directly to any receiving device
– available anytime

drawback (any **one** from)

– slow due to e.g. buffering, broadband speed
– video "gaps"/jumps as data is streamed
– video withdrawn [2]

8 **(a)** **Advantages** (any **two** from)

– easier to modify the drawings
– can keep a "library of parts"
– special features available e.g. zoom, rotation
– can do automatic costings
– easier to create a model from the design
– easier to do ergonomic studies on new designs
– can automatically carry out stress/loading calculations
– direct link into CAM is possible

Disadvantages (any **two** from)

– possible need for training
– higher costs e.g. start-up, on-going [4]

(b) **(i)** **benefits** (any **two** from)

– reduced costs in countries where labour costs are lower
– reduced costs in countries where incentives are given to set up companies
– round the clock (24/7) customer support is possible
– if workers on strike in one country, can move work somewhere else [2]

(ii) **drawbacks** (any **two** from)

– language and culture problems can make it difficult for company
– possible negativity to overseas call centres (loss of customers)
– need for (expensive) training programmes
– start-up costs
– possible unreliability of infrastructure [2]

9 **(a)** 8

(b) **(i)** 1515
1801
(–1 mark for each error) [2]

(ii) – checks whether new goods have (yet) to be ordered
– to maintain stock levels [1]

(c) (**Price of item ($)** > 2) OR (**Value of stock ($)** > 300)

< - - - - 1 mark - - - - > < - - - - - - - - - - 1mark - - - - - - - - >
or

(**Value of stock ($)** > 300) OR (**Price of item ($)** > 2)

< - - - - - - 1 mark - - - - - - > < - - - - - - - - 1mark - - - - - - > [2]

10 **(a)** **(i)** – value of count starts at 1 so only 999 iterations
– value of count reaches 1000, but before 1000th input

(ii) – line 1 should read ***count = 0***
– line 5 should read ***count = 1001*** (or ***count >1000***)
– change to appropriate loop structure [2]

(b) – 1 mark for naming data type + 1 mark for example related to month

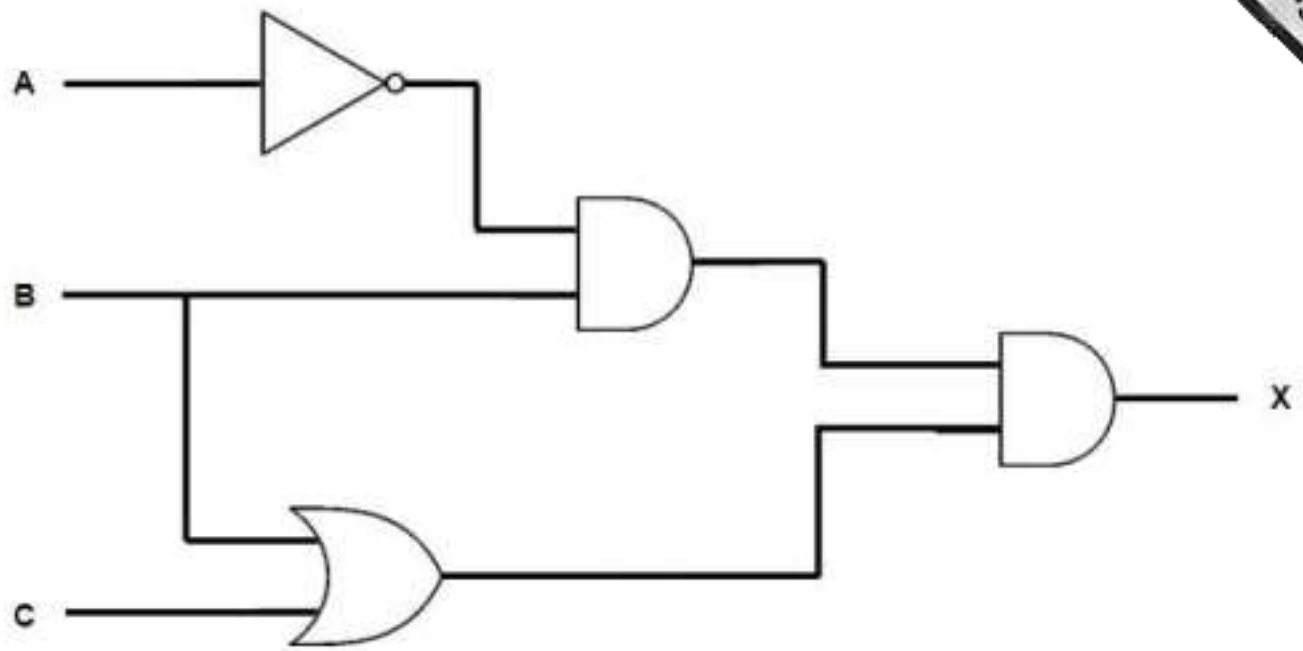
– normal/valid (test data)
– any value in given range (1 to 12) e.g. 4

– abnormal/invalid (test data)
– any value which is outside the range/any value not acceptable
– i.e. letters, negative numbers, values > 12 e.g. adfrk, -20, 36

– extreme/boundary (test data)
– data which is on the boundaries/edges of the acceptable range
– i.e. 1 or 12 for extreme; 0, 1, 12 or 13 for boundary

– Month names, instead of values, are acceptable e.g. April [6]

11 (a)



(1 mark for EACH correct logic gate) [4]

(b)

A	B	C	X	
0	*0*	*0*	0	} 1 mark
0	*0*	*1*	0	
0	*1*	*0*	1	} 1 mark
0	*1*	*1*	1	
1	*0*	*0*	0	} 1 mark
1	*0*	*1*	0	
1	*1*	*0*	0	} 1 mark
1	*1*	*1*	0	

[4]

12 (a)

	E
1	**Average ($/litre)**
2	= AVERAGE (B2:D2)
3	= AVERAGE (B3:D3)
4	= AVERAGE (B4:D4)
5	= AVERAGE (B5:D5)
6	= AVERAGE (B6:D6)
7	= AVERAGE (B7:D7)
8	= AVERAGE (B8:D8)
9	= AVERAGE (B9:D9)

–1 for each error

Working equivalents acceptable

Allow follow through

[2]

(b) MAX (D2:D9) [1]

(c) (i) Y or "Y"

(ii)

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

1 mark

1 mark

[2]

(d) (i) 5 [1]

(ii) = COUNTIF (F2:F9, "Y") [1]

13 (a) (52, 14)

1 mk 1 mk [2]

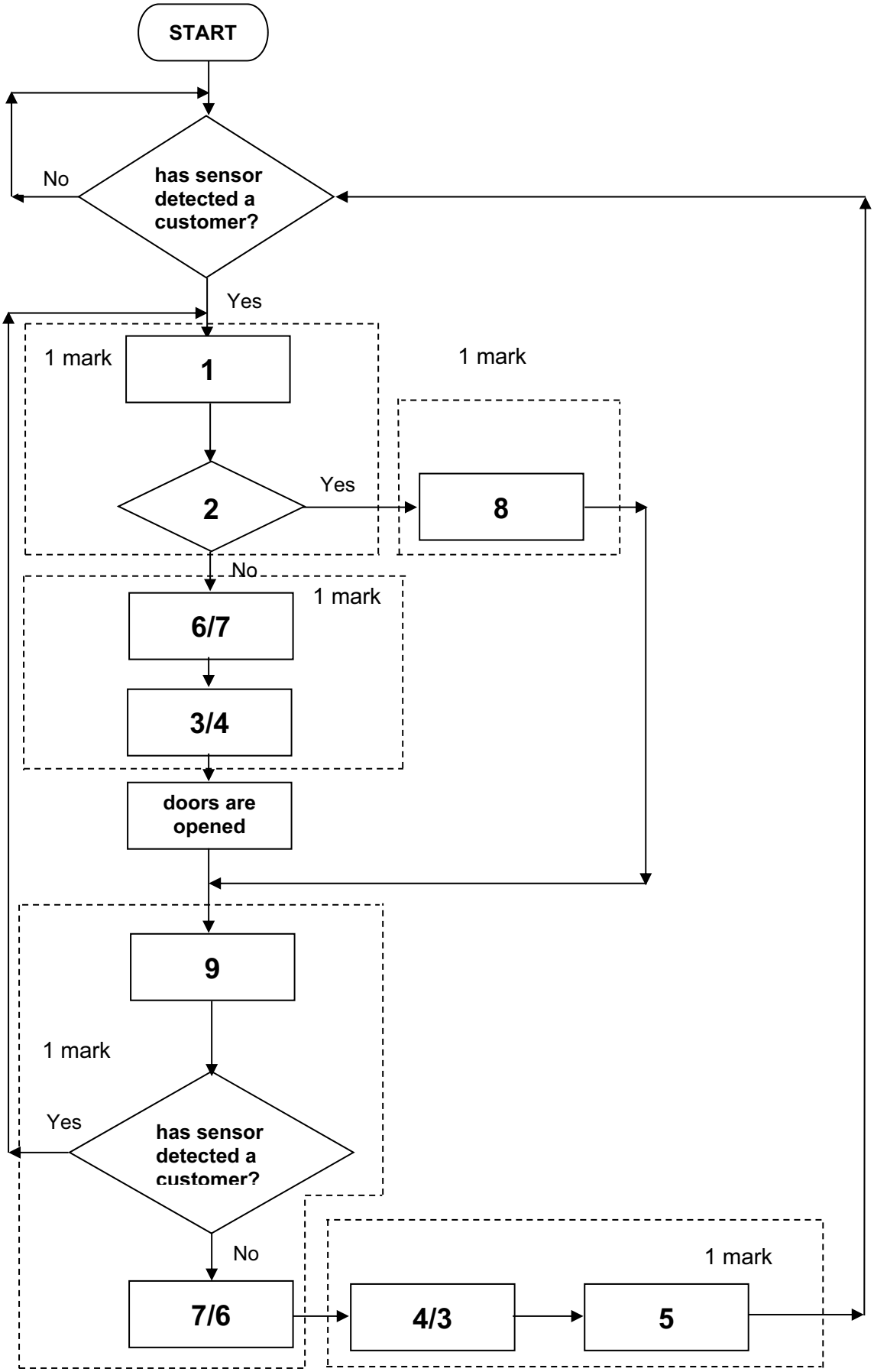
(b) B [1]

(c) (i) – smallest element that makes up a picture
– short for *picture element* [1]

(ii) 128 × 64 = 8192 bytes of memory
= **8 kilobytes**

(2 marks for correct answer, 1 mark for good attempt at calculation) [2]

14



[5]

15 marking points:

- initialisation 1 mark
- correct loop structure (1 to 5000) 1 mark
- input numbers (INSIDE a loop) 1 mark
- test for how many digits in all input numbers 1 mark
- increment all relevant totals 1 mark
- increment error total as appropriate 1 mark
- calculate % errors in input numbers 1 mark
- output ALL four totals + percent value (OUTSIDE a loop) 1 mark

sample coding:

```
single = 0: two = 0: three = 0: four = 0: error = 0                    1 mark
for x = 1 to 5000                                                      1 mark
    input number                                                       1 mark
        if number > 999 and number < 10000 then four = four + 1  }
            else if number > 99 then three = three + 1           }     2
                else if number > 9 then two = two + 1            }     marks
                    else if number > 0 then single = single + 1  }
                        else error = error + 1                         1 mark
next x
percent = error/50                                                     1 mark
print single, two, three, four, percent                                1 mark
```

[6]