Read each question carefully.

Attempt all questions.

Write your answers in the space provided on the question paper.

Write as neatly as possible.

Use blue or black ink.

Answer in sentences wherever possible.

Before leaving the examination room you must give this book to the Invigilator. If you do not, you may lose all the marks for this paper.
1. Lochview High School is a large community school that uses a computer system to monitor and control access to its many facilities.

(a) The computer system operates smoothly thanks to the work of the network manager and engineer. Describe the role of each person in the smooth running of the system.

Network Manager

Engineer

(b) Staff and pupils have a smartcard which is used to pay for food, gain access to teaching areas and record attendance.

State two features of a smartcard that would be useful in this situation.

1

2

(c) Doors to the teaching areas remain locked until the computer receives a signal that access is needed. When staff and pupils hold their smartcards against the door’s scanner, the card is verified, access is permitted and the doors automatically unlock.

(i) State what is meant by verification.

(ii) State the type of processing involved.
1. (c) (continued)

(iii) Describe one other software method of security that could be used to restrict access to certain areas.

.................................................................................................................................................................................................
.................................................................................................................................................................................................
.................................................................................................................................................................................................

(d) When pupils first join the school, their information is entered into the computer system. This user data is stored in a database that can be accessed by staff throughout the building at the same time.

State the term used to describe such a database.

.................................................................................................................................................................................................

(e) Data about the pupils is used in a range of different processes from registration to keeping a record of what they have purchased in the school canteen.

State the term used to describe this data.

.................................................................................................................................................................................................

(f) The Data Protection Act requires that the data controller ensures that data is kept secure.

(i) State two other responsibilities that the data controller has under this Act.

1 .................................................................................................................................................................................................

.................................................................................................................................................................................................

2 .................................................................................................................................................................................................

.................................................................................................................................................................................................

(ii) Identify the data controller in this situation. Circle the correct answer.

Teacher    Head Teacher    Technician

[Turn over
2. Mr Asimov keeps a record of his pupils' homework marks. Part of the spreadsheet is shown below.

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Homework Record</td>
<td>Target Mark</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Forename</td>
<td>Surname</td>
<td>HW1</td>
<td>HW2</td>
<td>HW3</td>
<td>HW4</td>
<td>Total Mark</td>
<td>Letter Home?</td>
</tr>
<tr>
<td>4</td>
<td>Charles</td>
<td>Babbage</td>
<td>5</td>
<td>10</td>
<td>3</td>
<td>7</td>
<td>25</td>
<td>YES</td>
</tr>
<tr>
<td>5</td>
<td>Daisy</td>
<td>Cameron</td>
<td>18</td>
<td>10</td>
<td>11</td>
<td>20</td>
<td>59</td>
<td>YES</td>
</tr>
<tr>
<td>6</td>
<td>Duncan</td>
<td>Cameron</td>
<td>13</td>
<td>12</td>
<td>14</td>
<td>15</td>
<td>54</td>
<td>YES</td>
</tr>
<tr>
<td>7</td>
<td>Lillian</td>
<td>Edwards</td>
<td>11</td>
<td>8</td>
<td>13</td>
<td>12</td>
<td>44</td>
<td>YES</td>
</tr>
<tr>
<td>8</td>
<td>Rian</td>
<td>Shah</td>
<td>14</td>
<td>15</td>
<td>16</td>
<td>11</td>
<td>56</td>
<td>YES</td>
</tr>
<tr>
<td>9</td>
<td>Holli</td>
<td>Chung</td>
<td>15</td>
<td>17</td>
<td>18</td>
<td>19</td>
<td>69</td>
<td>NO</td>
</tr>
<tr>
<td>10</td>
<td>Angus</td>
<td>Russell</td>
<td>19</td>
<td>18</td>
<td>20</td>
<td>13</td>
<td>70</td>
<td>NO</td>
</tr>
</tbody>
</table>

(a) Cell G4 automatically calculates the total homework mark. Complete the formula that was entered in cell G4.

= ___________ (C4 : ___________ )

(b) The Total Mark is compared to the Target Mark in H1 to see whether a letter should be sent home informing parents of concerns with homework. Concerns are raised if the Total Mark is less than the Target Mark. Cell H4 contains the formula that carries out this comparison.

(i) Complete the formula that was entered into cell H4.

= IF ( ___________ < H$1, ___________ , ___________ )

(ii) The above formula contains a $ sign. Explain fully why this is needed.

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
2. (continued)

(c) Mr Asimov has sorted the spreadsheet so that all those pupils receiving letters are at the top of the list. Pupils have then been sorted alphabetically by surname.

State the order of columns in which this complex sort was carried out.
Indicate whether the sort is ascending or descending.
The last entry has been done for you.

<table>
<thead>
<tr>
<th>Column</th>
<th>ASCENDING</th>
<th>DESCENDING</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Column</td>
<td>ASCENDING</td>
<td>DESCENDING</td>
</tr>
<tr>
<td>2 Column</td>
<td>ASCENDING</td>
<td>DESCENDING</td>
</tr>
<tr>
<td>3 Column A</td>
<td>ASCENDING</td>
<td>DESCENDING</td>
</tr>
</tbody>
</table>

(d) The letters to be sent home will contain information taken from the spreadsheet.

(i) State the process that Mr Asimov will use to allow him to produce personal letters without creating each one individually.

(ii) A sample of one of the letters is shown below.

```
Lochview High School
Dervaig
PA65 6NU
01688 767543

Dear Mr & Mrs Babbage

Charles has achieved 25 for the total homework mark so far this year. I wish to talk to you about this performance at the S4 Parents’ Evening. I look forward to seeing you there.

Yours sincerely

Mr I Asimov
PT Computing Science
```

It contains three placeholders. Identify each one and state a suitable field name for each. The first one has already been done for you.

<table>
<thead>
<tr>
<th>Placeholder</th>
<th>Data</th>
<th>Field Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Babbage</td>
<td>Surname</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
2. (continued)

(e) Mr Asimov decides to take an electronic copy of the letters home so that he can check them. Unfortunately, he is unable to open them using his word processing software.

(i) State a reason why this may have happened.

________________________________________________________________________

________________________________________________________________________

(ii) Describe a solution to this problem.

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
3. Finlay has just bought a new cleaning gadget for his home, the Vac Bot.

(a) It is an *embedded system* that travels around each room, avoiding all obstacles, detecting the type of flooring (hard flooring or carpeted) and altering its brush level to suit.

(i) Describe an embedded system.

( )

(ii) State a storage medium used by an embedded system.

( )

(iii) As well as this storage medium, it also contains *analogue to digital converters*.

Explain why the Vac Bot must contain analogue to digital converters.

( )

(b) Advertising for the Vac Bot describes it as being “the first *intelligent robot* for your home”.

Describe **two** features that a robot should possess in order to be termed “intelligent”.

1

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

2

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
4. Juliette has recently become a member of a world-wide social networking site.

(a) Her personal details are now stored in a database on the site’s mainframe computer.

State two reasons why it is necessary for large organisations to use a mainframe computer system.

1


2

(b) The mainframe has both sequential and random access backing storage devices.

Compare these devices in terms of their use.


(c) Juliette wants to get in touch with friends from her schooldays. She attended St Ninian’s High School in Aberdeen, leaving in the year 2004.

She enters a complex search into the networking site’s search engine.

Write down what Juliette entered to get a list of old school friends.


4. (continued)

(d) Juliette has added a photograph to her user profile. The file size is 52 kilobytes.

How many bits are in 52 kilobytes?

Show all your working.

(e) Using her ISP and desktop computer, Juliette is able to check the social networking site on a daily basis.

(i) Apart from accessing the Internet, state one other facility that an ISP could provide.

(ii) State a hardware device that a desktop computer must have to enable connection to the Internet.

(f) Mobile phones also give access to the Internet. State one advantage and one disadvantage that users may experience when using mobile Internet technologies.

Advantage

Disadvantage
5. Alex is a programmer and is currently developing a new integrated package.

(a) Alex uses two types of translator for this project. State the type of translator that would be used for each stage of the project. Give a reason for your choice.

(i) Translator used **during** the development stage:

   Reason

(ii) Translator used **at the end of** the development stage:

   Reason

(b) Alex wants to include dynamic linkage and keyboard shortcuts in the integrated package. Explain why each feature would be desirable to users of integrated packages.

   Dynamic Linkage

   Reason

   Reason

   Reason

   Keyboard Shortcuts

   Reason

   Reason

   Reason
5. (continued)

(c) The computer Alex uses has the latest microprocessor technology. Like all processors, it has an ALU and registers. State the function of each component.

**ALU**

**Registers**

(d) Each time Alex saves the program, the computer’s operating system is involved.

Draw lines to show the correct relationships in the diagram below.

- File Management
- Memory Management
- Error Reporting
- Managing Inputs/Outputs

**Message appears — “disk full”**

**Operating System manages the files on the computer**

**User chooses File, then Save as . . .**

**Operating System allocates suitable storage locations**
6. Fourth year Computing Studies pupils have been asked to re-design the school’s website.

(a) They consider using HTML to create the website.

(i) State what the initials HTML stand for.

(ii) State one advantage and one disadvantage of using HTML to create a website.

<table>
<thead>
<tr>
<th>Advantage</th>
<th>Disadvantage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(b) One of the girls has brought in a shareware application, “Web Genie”, on her USB flash drive.

State what is meant by the term shareware.

(c) They decide to use Web Genie, accessing the package’s wizard as a first step to creating their website.

Explain why using a wizard is useful in this situation.
6. (continued)

(d) A table is added to one of the web pages. It contains information on school events and will include photographs, text and hotspots.

(i) State what is meant by a hotspot.

(ii) State one advantage of using a table, apart from keeping the layout of the web page organised.

(e) The pupils are asked to include a photograph from a magazine. The photograph is of a famous ex-pupil.

(i) State how they can include this photograph in the website.

(ii) Explain why the pupils might be breaking the law by using this photograph.

(iii) Explain how this photograph could be included without breaking any laws.
6. (e) (continued)

(iv) When the photograph is inserted into the table, it is apparent that it is too big. The neat table layout is ruined as the table adjusts to suit the graphic.

State **two** different methods that the pupils could use to adjust the graphic to suit the size of the table.

1  
2

[END OF QUESTION PAPER]
ACKNOWLEDGEMENTS

Question 3—Photograph of Vac Bot Roomba 560. Reproduced by kind permission of iRobot. ©iRobot® 8 Crosby Drive Bedford, MA 01730.