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 International will not enter into discussions about these mark schemes.

Cambridge International is publishing the mark schemes for the October/November 2017 series for most Cambridge IGCSE®, Cambridge International A and AS Level components and some Cambridge O Level components.
<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
<th>Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1(a)</strong></td>
<td>A compiler executes a high level program one statement at a time before translating the next statement.</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>A compiler converts object code into source code.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>A compiler translates machine code into a high level language program.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>A compiler often produces a separate object code program.</td>
<td>✓</td>
</tr>
<tr>
<td><strong>1(b)</strong></td>
<td>A linker executes a high level program one statement at a time before translating the next statement.</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>A linker takes one or more source code files and combines them into a single executable file.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>A linker takes one or more object files and combines them into a single executable file.</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>A linker is used in conjunction with an interpreter.</td>
<td></td>
</tr>
<tr>
<td><strong>2</strong></td>
<td>It is okay to send an email to a person you do not know as it does not matter if they find out your email address.</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>You should always attach a photograph of yourself to an email so they know who you are.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>You should only use websites recommended by teachers.</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>It is acceptable to post a photograph of your school on a social media site as so many students go there.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>You should always think twice before opening an email from an unknown person as it might be spam.</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>It is okay, for the first time, to meet a person you only know from the internet on your own.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>You should know how to block and report unwanted users from social media sites.</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>It is acceptable, if you trust them, to give someone you have only met on the internet your name and address.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>When using instant messaging it is okay to use bad language if you are among friends.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>When playing games on the internet you should never use your real name.</td>
<td>✓</td>
</tr>
<tr>
<td>Question</td>
<td>Answer</td>
<td>Marks</td>
</tr>
<tr>
<td>----------</td>
<td>--------</td>
<td>-------</td>
</tr>
</tbody>
</table>
| 3(a)     | **Six from:**  
  She could give questionnaires to students who walk to school using that particular road asking about their general health/number of days missed through illness  
  She could give questionnaires to students who walk to school using other roads asking about their general health/number of days missed through illness  
  She could interview students who walk to school using that particular road asking about their general health/number of days missed through illness  
  She could interview students who walk to school using other roads asking about their general health/number of days missed through illness  
  She could observe/keep a count of traffic coming down the busy road  
  She could observe the amount of traffic/keep a count of traffic coming down the other roads  
  She could use sensors to detect the flow of traffic going down the busy road  
  She could use sensors to detect the flow of traffic going down the other roads  
  She could give questionnaires to residents who live in that particular road asking about their general health  
  She could give questionnaires to residents who live in other roads asking about their general health  
  She could interview residents who live in that particular road asking about their general health  
  She could interview residents who live in other roads asking about their general health. | 6 |
| 3(b)     | **Five from:**  
  Data gathering may be expensive as other companies may have to be hired to get it  
  It may involve having to purchase equipment such as data loggers/computers/printers  
  Compared to indirect data sources using direct data sources may be very expensive in preparing and carrying out the gathering of data  
  Costs can be incurred in producing the paper for questionnaires  
  It takes longer to gather data than to acquire data from an indirect data source  
  By the time the project is complete/all the data is collected the data may be out of date  
  The sample size may be small. | 5 |
<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
<th>Marks</th>
</tr>
</thead>
</table>
| 3(c)     | *Four from:*  
In questionnaires and interviews the questions may not have been very clear and the respondents may have misunderstood them  
The questions might have been badly phrased...  
...so that the respondent thought they knew the answer Josefine wanted – resulting in similar answers from different respondents  
Questions may have been open-ended allowing the respondent to produce answers which could not be quantified  
In a multi-choice type question there may not have been a sufficient number of alternatives  
The respondents selected for the study may not have been very representative  
There is the possibility that Josefine may have made errors when collecting it  
Josefine may have made errors when entering the collected data into the computer  
If the data was collected automatically by sensors the computer/microprocessor may not have been set up properly to accurately interpret the readings. | 4 |
| 3(d)     | *Three from:*  
Speeds up data entry  
Accuracy of entering data is increased  
When data has been coded it makes it easier to use validation  
Less storage space is required  
The smaller the size of the database, the faster it will be to search and produce results. | 3 |
| 3(e)     | *Three from:*  
The code B does not give a clear idea of what shade of blue  
The approximate age of the driver is too vague/too general...  
...and would be difficult to use in calculations/graphs  
There may be many makes of car beginning with the same letter. | 3 |
<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
<th>Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>This question to be marked as levels of response:</td>
<td>8</td>
</tr>
</tbody>
</table>

**Level 3 (7–8 marks)**
Candidates will explain both the advantages and disadvantages of a range of different output devices using relevant and appropriate examples. The information will be relevant, clear, organised and presented in a structured and coherent format. There may be a reasoned conclusion/opinion. Specialist terms will be used correctly and appropriately.

**Level 2 (4–6 marks)**
Candidates will explain the advantages and disadvantages of more than one output device. Examples used will be for the most part relevant. For the most part, the information will be relevant and presented in a structured and coherent format. There may be a conclusion/opinion. Specialist terms will be used appropriately and for the most part correctly.

**Level 1 (1–3 marks)**
Candidates will only address some aspects of the use of output devices. Examples, if used, may lack relevance. Answers may be in the form of a list. There will be little or no use of specialist terms.

**Level 0 (0 marks)**
Response with no valid content.

Answers may include:

To print the tickets:
The advantage of a laser printer is that the quality of print will be good enabling passengers to see their flight number and seat number clearly An inkjet printer would produce higher quality tickets An inkjet printer may be relatively slow causing queues at the ticketing department A dot matrix printer would not be as clear as a laser printer or inkjet printer A laser printer might not be good for this as it takes some time to produce a first copy and there wouldn’t be more than one copy A dot matrix printer may be relatively slow causing queues at the ticketing department

Producing the flight lists:
The list may be long and it may be difficult to correlate the sheets A dot matrix printer may be better as fan fold stationery could be used Less risk of a dot matrix printer running out of paper Flight lists would be continuous More easily collated using a dot matrix printer May need to change cartridges more frequently if an inkjet printer were used Quality of printout would not be an issue for flight lists Noise of dot matrix would not be an issue at a busy airport.
<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
<th>Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>5(a)</td>
<td>=COUNTIFS(K3:K20,&quot;-&quot;,L3:L20,&quot;-&quot;)</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>=COUNTIFS()</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>(=COUNTIF())</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>(K3:K20</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>&quot;,-&quot; , immediately after K20</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>L3:L20 immediately after &quot;,-&quot;</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>&quot;,-&quot; )</td>
<td>1</td>
</tr>
<tr>
<td>5(b)</td>
<td>Select data, filter</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Filter on column K for &quot;-&quot;</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Filter on column L for &quot;-&quot;</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Highlight column N</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Select PRINT and PRINT selection.</td>
<td>1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
<th>Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td><strong>Max six from:</strong></td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Create a query and select the fields Workers_ID, Salary and Department</td>
<td></td>
</tr>
<tr>
<td></td>
<td>In the criteria box under Salary, type &gt; 35 000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>In the criteria box under Department, type like &quot;*rolling&quot; – 2 marks</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&quot;Hot rolling&quot; OR &quot;Cold rolling&quot; – 1 mark only</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Deselect the Department field for showing</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Run and save the query</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Create the report using this query</td>
<td></td>
</tr>
<tr>
<td></td>
<td>In the report section, edit and format the report.</td>
<td></td>
</tr>
</tbody>
</table>
Question 7

Eight from:

Advantages:
The costs of fuel, aircraft maintenance and insurance of a regular aircraft are far greater than the running and maintenance costs of a flight simulator.
The environment benefits from flight training in a simulator, as there is no air and noise pollution created by a flight simulator.
Situations can be tackled in a flight simulator without putting the trainee and the flight training instructor in danger.
If there is an accident there is no cost to replace parts unlike a real plane.
Emergency procedures, adverse weather conditions and system failures can be more easily/quickly produced or recreated in a flight simulator.
There is less time wasted on booking aircraft for flight training/scheduling flights/waiting for the aircraft to warm up.
Less time wasted travelling to the desired destination to undergo specific flight training instruction.
The environmental conditions in a simulator are far more comfortable than flight training in a real aircraft as the temperature and humidity are controlled in a flight simulator.
The level of noise in a flight simulator is not as deafening as in an aircraft… …makes the communication between the instructor and trainee much easier.

Disadvantages:
The simulator response will not always be exactly the same as an actual airplane, as there too many variables.
Sometimes pilots become bolder/more overconfident after training on the simulator and overreact to real flight situations… …overuse of parts such as the rudder can cause damage to a real aircraft but not in the simulator.
Amount of stress the pilot would be under in dangerous situations is less likely to be created.
Length of training session is more likely to be shorter than a realistic flight making it difficult to recreate boredom/fatigue of a real flight.

Must have at least two from each to gain full marks.
1 mark is available for a reasoned conclusion/opinion.

Question 8(a)(i)

Two from:

Both tables can have only one record on either side of the relationship…
Student_ID in students_1 is connected to Student_ID in students_2.
students_2 and students_1 have the same key field.
students_1 and students_2 could be combined without affecting the database.
<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
<th>Marks</th>
</tr>
</thead>
</table>
| 8(a)(ii) | **Two from:**  
The table contains individual records that each relate to many records in the related table  
A single Student_ID in students_1 table relates to many records in the joined_subject table  
A single subject_code in subjects table relates to many records in the joined_subject table. | 2 |
| 8(a)(iii) | **Four from:**  
In relational database design, a many-to-many relationship is strictly speaking not allowed/is virtual  
To get around the problem of having a many-to-many relationship the many-to-many relationship needs to be broken down into two one-to-many relationships  
Using a third table, commonly called a “join table”, in this case the joined_subject table  
Each record in the “join table” would have the foreign key fields of the two tables it is joining together  
The students_1 could be in a many-to-many relationship with the subjects table. | 4 |
| 8(b) | **Four from:**  
Every foreign key value has a matching value in the corresponding primary key  
Referential integrity uses these to prevent the deletion of related records  
It can alert if the user tries to delete a record which is related to another one  
Queries will begin to fail if the relationships do not match  
If a table is relying on the keys in another table, then relationships between the two can be lost if bad data is entered into one location  
Referential integrity can be used to ensure foreign key values are valid. | 4 |
| 9(a) | **Three from:**  
Proprietary software is software that is owned by an individual or a company (usually the one that developed it)  
There are almost always major restrictions on its use  
A software vendor delineates the specific terms of use in an end-user license agreement  
Its source code is almost always kept secret  
Usually covered by copyright which provides a legal basis for its owner to establish exclusive rights. | 3 |
<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
<th>Marks</th>
</tr>
</thead>
</table>
| 9(b)     | Three from:  
Can be used and implemented by anyone  
An open source file format can be used by both proprietary and free and open source software  
Also called free file formats if they are not covered by any copyrights/patents  
So that anyone may use them at no monetary cost for any desired purpose. | 3 |
| 10       | Four from:  
Digital audio is a series of discrete bursts called samples  
The frequency that these samples occur is so fast it sounds like a continuous sound  
The sampling rate is the number of samples within a given period of time  
A higher sampling rate sounds better than a lower rate  
Each sample uses up storage space so the lower the sampling rate the less storage capacity is required. | 4 |
<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
<th>Marks</th>
</tr>
</thead>
</table>
| 11       | *Eight from:*  
Batch processing would be used by payroll department to pay wages  
Batch processing would be used if the scientists had collected a very large amount of data offline and need to now process it all in one go  
Transaction file of hours worked is kept  
Master file of workers details/rate of pay per hour  
Transaction file is used with master file to update master file/produce payslips  
Jobs are set up so they can be run to completion without human interaction  
The input data are collected into batches and each batch is processed as a whole  
Batch processing can occur when the computing resources are less busy  
Batches can be stored up during working hours and then executed during the evening/whenever the computer is idle  
Batch processing is particularly useful for operations that require the computer or a peripheral device for an extended period of time  
Real-time processing would be suitable for controlling the rockets  
Real-time processing causes a response within specified time constraints  
Real-time responses are in the order of milliseconds, and sometimes microseconds  
Real-time means that the inputs are processed and produce an output which in turn affects the input  
Controlling rockets often involves the use of sensors and control systems  
A computer system used for real-time processing is often used 24 hours a day for the same task  
Real-time data processing gives the scientists the ability to take immediate action for those times when acting within seconds is significant  
If a rocket is off course for just a short period of time its speed is such it would be off course by a large distance  
If the rocket veers off course the computer would immediately fire engines to correct it. | 8     |