**INFORMATION TECHNOLOGY**         **9626/12**

Paper 1 Theory         **October/November 2017**

MARK SCHEME

Maximum Mark: 90

**Published**

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.

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This document consists of **10** printed pages.

| Question | Answer | | Marks |
|---|---|---|---|
| 1(a) | A compiler executes a high level program one statement at a time before translating the next statement. | | **1** |
| | A compiler converts object code into source code. | | |
| | A compiler translates machine code into a high level language program. | | |
| | A compiler often produces a separate object code program. | ✓ | |

| Question | Answer | | Marks |
|---|---|---|---|
| 1(b) | A linker executes a high level program one statement at a time before translating the next statement. | | **1** |
| | A linker takes one or more source code files and combines them into a single executable file. | | |
| | A linker takes one or more object files and combines them into a single executable file. | ✓ | |
| | A linker is used in conjunction with an interpreter. | | |

| Question | Answer | | Marks |
|---|---|---|---|
| 2 | 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. | | **4** |
| | You should always attach a photograph of yourself to an email so they know who you are. | | |
| | You should only use websites recommended by teachers. | ✓ | |
| | It is acceptable to post a photograph of your school on a social media site as so many students go there. | | |
| | You should always think twice before opening an email from an unknown person as it might be spam. | ✓ | |
| | It is okay, for the first time, to meet a person you only know from the internet on your own. | | |
| | You should know how to block and report unwanted users from social media sites. | ✓ | |
| | It is acceptable, if you trust them, to give someone you have only met on the internet your name and address. | | |
| | When using instant messaging it is okay to use bad language if you are among friends. | | |
| | When playing games on the internet you should never use your real name. | ✓ | |

| Question | Answer | Marks |
|---|---|---|
| 3(a) | ***Six** from:*<br><br>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<br>She could give questionnaires to students who walk to school using other roads asking about their general health/number of days missed through illness<br>She could interview students who walk to school using that particular road asking about their general health/number of days missed through illness<br>She could interview students who walk to school using other roads asking about their general health/number of days missed through illness<br>She could observe/keep a count of traffic coming down the busy road<br>She could observe the amount of traffic/keep a count of traffic coming down the other roads<br>She could use sensors to detect the flow of traffic going down the busy road<br>She could use sensors to detect the flow of traffic going down the other roads<br>She could give questionnaires to residents who live in that particular road asking about their general health<br>She could give questionnaires to residents who live in other roads asking about their general health<br>She could interview residents who live in that particular road asking about their general health<br>She could interview residents who live in other roads asking about their general health. | 6 |
| 3(b) | ***Five** from:*<br><br>Data gathering may be expensive as other companies may have to be hired to get it<br>It may involve having to purchase equipment such as data loggers/computers/printers<br>Compared to indirect data sources using direct data sources may be very expensive in preparing and carrying out the gathering of data<br>Costs can be incurred in producing the paper for questionnaires<br>It takes longer to gather data than to acquire data from an indirect data source<br>By the time the project is complete/all the data is collected the data may be out of date<br>The sample size may be small. | 5 |

| Question | Answer | Marks |
|---|---|---|
| 3(c) | ***Four*** *from:*<br><br>In questionnaires and interviews the questions may not have been very clear and the respondents may have misunderstood them<br>The questions might have been badly phrased…<br>…so that the respondent thought they knew the answer Josefine wanted – resulting in similar answers from different respondents<br>Questions may have been open-ended allowing the respondent to produce answers which could not be quantified<br>In a multi-choice type question there may not have been a sufficient number of alternatives<br>The respondents selected for the study may not have been very representative<br>There is the possibility that Josefine may have made errors when collecting it<br>Josefine may have made errors when entering the collected data into the computer<br>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:*<br><br>Speeds up data entry<br>Accuracy of entering data is increased<br>When data has been coded it makes it easier to use validation<br>Less storage space is required<br>The smaller the size of the database, the faster it will be to search and produce results. | **3** |
| 3(e) | ***Three*** *from:*<br><br>The code B does not give a clear idea of what shade of blue<br>The approximate age of the driver is too vague/too general…<br>…and would be difficult to use in calculations/graphs<br>There may be many makes of car beginning with the same letter. | **3** |

| Question | Answer | Marks |
|----------|--------|-------|
| 4 | This question to be marked as levels of response:<br><br>**Level 3 (7–8 marks)**<br>Candidates will explain both the advantages and disadvantages of a range of different output devices using relevant and appropriate examples.<br>The information will be relevant, clear, organised and presented in a structured and coherent format.<br>There may be a reasoned conclusion/opinion.<br>Specialist terms will be used correctly and appropriately.<br><br>**Level 2 (4–6 marks)**<br>Candidates will explain the advantages and disadvantages of more than one output device.<br>Examples used will be for the most part relevant.<br>For the most part, the information will be relevant and presented in a structured and coherent format.<br>There may be a conclusion/opinion.<br>Specialist terms will be used appropriately and for the most part correctly.<br><br>**Level 1 (1–3 marks)**<br>Candidates will only address some aspects of the use of output devices.<br>Examples, if used, may lack relevance.<br>Answers may be in the form of a list.<br>There will be little or no use of specialist terms.<br><br>**Level 0 (0 marks)**<br>Response with no valid content.<br><br>Answers may include:<br><br>To print the tickets:<br>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<br>An inkjet printer would produce higher quality tickets<br>An inkjet printer may be relatively slow causing queues at the ticketing department<br>A dot matrix printer would not be as clear as a laser printer or inkjet printer<br>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<br>A dot matrix printer may be relatively slow causing queues at the ticketing department<br><br>Producing the flight lists:<br>The list may be long and it may be difficult to correlate the sheets<br>A dot matrix printer may be better as fan fold stationery could be used<br>Less risk of a dot matrix printer running out of paper<br>Flight lists would be continuous<br>More easily collated using a dot matrix printer<br>May need to change cartridges more frequently if an inkjet printer were used<br>Quality of printout would not be an issue for flight lists<br>Noise of dot matrix would not be an issue at a busy airport. | 8 |

| Question | Answer | Marks |
|---|---|---|
| 5(a) | =COUNTIFS(K3:K20,"-",L3:L20,"-")<br><br>=COUNTIFS()   2 marks<br>(=COUNTIF()   1 mark)<br>(K3:K20   1 mark<br>,"-", immediately after K20   1 mark<br>L3:L20 immediately after ,"-",   1 mark<br>,"-")   1 mark | 6 |
| 5(b) | Select data, filter   1 mark<br>Filter on column K for "-"   1 mark<br>Filter on column L for "-"   1 mark<br>Highlight column N   1 mark<br>Select PRINT and PRINT selection.   1 mark | 5 |

| Question | Answer | Marks |
|---|---|---|
| 6 | *Max six* from:<br><br>Create a query and select the fields Workers_ID, Salary and Department<br>In the criteria box under Salary, type > 35 000<br>In the criteria box under Department, type like "*rolling" – *2 marks*<br>"Hot rolling" OR "Cold rolling" – *1 mark only*<br>Deselect the Department field for showing<br>Run and save the query<br>Create the report using this query<br>In the report section, edit and format the report. | 6 |

| Question | Answer | Marks |
|---|---|---|
| 7 | ***Eight** from:* <br><br> *Advantages:* <br> 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 <br> The environment benefits from flight training in a simulator, as there is no air and noise pollution created by a flight simulator <br> Situations can be tackled in a flight simulator without putting the trainee and the flight training instructor in danger <br> If there is an accident there is no cost to replace parts unlike a real plane <br> Emergency procedures, adverse weather conditions and system failures can be <u>more easily/quickly</u> produced or recreated in a flight simulator <br> There is less time wasted on booking aircraft for flight training/scheduling flights/ waiting for the aircraft to warm up <br> Less time wasted travelling to the desired destination to undergo specific flight training instruction <br> 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 <br> The level of noise in a flight simulator is not as deafening as in an aircraft… <br> …makes the communication between the instructor and trainee much easier <br><br> *Disadvantages:* <br> The simulator response will not always be exactly the same as an actual airplane, <u>as there too many variables</u> <br> Sometimes pilots become bolder/more overconfident after training on the simulator and overreact to real flight situations… <br> …overuse of parts such as the rudder can cause damage to a real aircraft but not in the simulator <br> Amount of stress the pilot would be under in dangerous situations is less likely to be created <br> 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. <br><br> *Must have at least two from each to gain full marks.* <br> *1 mark is available for a reasoned conclusion/opinion.* | 8 |

| Question | Answer | Marks |
|---|---|---|
| 8(a)(i) | ***Two** from:* <br><br> Both tables can have only one record on either side of the relationship… <br> Student_ID in students_1 is connected to Student_ID in students_2 <br> students_2 and students_1 have the same key field <br> students_1 and students_2 could be combined without affecting the database. | 2 |

| Question | Answer | Marks |
|---|---|---|
| 8(a)(ii) | ***Two*** *from:*<br><br>The table contains individual records that each relate to many records in the related table<br>A single Student_ID in students_1 table relates to many records in the joined_subject table<br>A single subject_code in subjects table relates to many records in the joined_subject table. | **2** |
| 8(a)(iii) | ***Four*** *from:*<br><br>In relational database design, a many-to-many relationship is strictly speaking not allowed/is virtual<br>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<br>Using a third table, commonly called a "join table", in this case the joined_subject table<br>Each record in the "join table" would have the foreign key fields of the two tables it is joining together<br>The students_1 could be in a many-to-many relationship with the subjects table. | **4** |
| 8(b) | ***Four*** *from:*<br><br>Every foreign key value has a matching value in the corresponding primary key<br>Referential integrity uses these to prevent the deletion of related records<br>It can alert if the user tries to delete a record which is related to another one<br>Queries will begin to fail if the relationships do not match<br>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<br>Referential integrity can be used to ensure foreign key values are valid. | **4** |

| Question | Answer | Marks |
|---|---|---|
| 9(a) | ***Three*** *from:*<br><br>Proprietary software is software that is owned by an individual or a company (usually the one that developed it)<br>There are almost always major restrictions on its use<br>A software vendor delineates the specific terms of use in an end-user license agreement<br>Its source code is almost always kept secret<br>Usually covered by copyright which provides a legal basis for its owner to establish exclusive rights. | **3** |

| Question | Answer | Marks |
|---|---|---|
| 9(b) | ***Three*** *from:*<br><br>Can be used and implemented by anyone<br>An open source file format can be used by both proprietary and free and open source software<br>Also called free file formats if they are not covered by any copyrights/patents<br>So that anyone may use them at no monetary cost for any desired purpose. | **3** |

| Question | Answer | Marks |
|---|---|---|
| 10 | ***Four*** *from:*<br><br>Digital audio is a series of discrete bursts called samples<br>The frequency that these samples occur is so fast it sounds like a continuous sound<br>The sampling rate is the number of samples within a given period of time<br>A higher sampling rate sounds better than a lower rate<br>Each sample uses up storage space so the lower the sampling rate the less storage capacity is required. | **4** |

| Question | Answer | Marks |
|---|---|---|
| 11 | ***Eight*** *from:* <br><br> Batch processing would be used by payroll department to pay wages <br> 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 <br> Transaction file of hours worked is kept <br> Master file of workers details/rate of pay per hour <br> Transaction file is used with master file to update master file/produce payslips <br> Jobs are set up so they can be run to completion without human interaction <br> The input data are collected into batches and each batch is processed as a whole <br> Batch processing can occur when the computing resources are less busy <br> Batches can be stored up during working hours and then executed during the evening/whenever the computer is idle <br> Batch processing is particularly useful for operations that require the computer or a peripheral device for an extended period of time <br> Real-time processing would be suitable for controlling the rockets <br> Real-time processing causes a response within specified time constraints <br> Real-time responses are in the order of milliseconds, and sometimes microseconds <br> Real-time means that the inputs are processed and produce an output which in turn affects the input <br> Controlling rockets often involves the use of sensors and control systems <br> A computer system used for real-time processing is often used 24 hours a day for the same task <br> Real-time data processing gives the scientists the ability to take immediate action for those times when acting within seconds is significant <br> 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 <br> If the rocket veers off course the computer would immediately fire engines to correct it. | 8 |