

Markscheme

November 2020

Computer science

Standard level

Paper 1

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Subject details: Computer science SL paper 1 markscheme**Mark allocation**

Section A: Candidates are required to answer **all** questions. Total 25 marks.

Section B: Candidates are required to answer **all** questions. Total 45 marks.

Maximum total = 70 marks.

General

A markscheme often has more specific points worthy of a mark than the total allows. This is intentional. Do not award more than the maximum marks allowed for that part of a question.

When deciding upon alternative answers by candidates to those given in the markscheme, consider the following points:

- Each statement worth one point has a separate line and the end is signified by means of a semi-colon (;).
- An alternative answer or wording is indicated in the markscheme by a “/”; either wording can be accepted.
- Words in (...) in the markscheme are not necessary to gain the mark.
- If the candidate’s answer has the same meaning or can be clearly interpreted as being the same as that in the markscheme then award the mark.
- Mark positively. Give candidates credit for what they have achieved and for what they have got correct, rather than penalizing them for what they have not achieved or what they have got wrong.
- Remember that many candidates are writing in a second language; be forgiving of minor linguistic slips. In this subject effective communication is more important than grammatical accuracy.
- Occasionally, a part of a question may require a calculation whose answer is required for subsequent parts. If an error is made in the first part then it should be penalized. However, if the incorrect answer is used correctly in subsequent parts then **follow through** marks should be awarded. Indicate this with “**FT**”.

General guidance

Issue	Guidance
Answering more than the quantity of responses prescribed in the questions	<ul style="list-style-type: none"> • In the case of an “identify” question, read all answers and mark positively up to the maximum marks. Disregard incorrect answers. • In the case of a “describe” question, which asks for a certain number of facts eg “describe two kinds”, mark the first two correct answers. This could include two descriptions, one description and one identification, or two identifications. • In the case of an “explain” question, which asks for a specified number of explanations eg “explain two reasons ...”, mark the first two correct answers. This could include two full explanations, one explanation, one partial explanation <i>etc.</i>

Section A

1. (a) *Award [2 max].*
Auto-correct/short sequences/codes;
can be used to represent longer phrases;
- Mail merge;
allows production of many letters by only typing the (body of a) letter once;
- Voice recognition;
allows easy entry of text;
- (b) *Award [1 max].*
Technical documentation explains how to install software;
Technical documentation describes the hardware configuration/operating system needed
(to install this software);
2. (a) (i) *Award [1 max].*
A client is a simple application or a whole system that accesses services being
provided by a (remote) computer/server;
- (ii) *Award [1 max].*
A server is a computer / software which manages access to a centralized resource or
service in a network.
A server is a computer/software that provides data to other computers/
clients in a network;
- (b) *Award [4 max].*
the central computer receives requests from the kiosks/terminals at the check-in desks/
mobile phones;
can manage several clients simultaneously (in order, each providing a different set of
services);
makes sure that the request is valid by accessing its database;
processes the request;
sends information to the kiosk;
all requests/information are sent over the network connection;

3. **Award [4 max].**
 there is no extra cost;
 for running two systems/for extra salaries (no need to increase the number of employees);
- benefits can be gained immediately;
 because new system is better than the old;
- if there is a bug in the new system;
 there is not a second system to fall back on/could be disastrous for the company;
- employees will need to be capable of using the new system immediately;
 without training/with training in advance but not on the system;

Mark as 2 and 2

4. (a) [1 mark]
 RAM;
- (b) **Award [1 max].**
 CU/Control Unit;
- (c) **Award [1 max].**
 MAR (is a register in the CPU that) stores the address of the (next) instruction/data;
 to be read from/written to RAM;

5. **Award [4 max].**
Award [1] for looping through array;
Award [1] for comparing each pair of adjacent items (in the array);
Award [1] for swapping them if they are in the wrong order;
Award [1] for repeating this until no swaps is required (which indicates that the array is sorted);

6. **Award [4 max].**
Award [1] for a truth table with all 8 inputs and up to 3 correct outputs.
Award [2] for 4 or 5 correct rows in the truth table.
Award [3] for 6 or 7 correct rows in the truth table.
Award [4] for all 8 correct rows in the truth table.

A	B	C	(A XOR B) AND NOT C
0	0	0	0
0	0	1	0
0	1	0	1
0	1	1	0
1	0	0	1
1	0	1	0
1	1	0	0
1	1	1	0

Section B

7. (a) **Award [3 max].**
controls the flow of data in the network;
inspects address of data packets;
directs to the appropriate network path/ selects a path between networks (by inspecting address of data packets);
securely transmits data packets (across that path toward the intended destination);

- (b) **Award [4 max].**
malicious software/spyware/malware / viruses;
attacking the system;

the type of connection;
valid outline for the slow down (depending on the type of connection);

Note: *There are many types of internet connection: wireless connections, wireless hotspots, mobile internet, broadband connections, fixed wireless and satellite connection, cable, DSL;*

hardware malfunction;
internet speed can considerably slow down if modem-router configuration is not correct / updated;

external factors;
during the peak hours of daytime the most visited websites encounter more network traffic than what has been anticipated;

NOTE: *Accept examples. For example, too many students try to connect to an e-learning site at the same time.*

Mark as 2 and 2

- (c) **Award [4 max].**
Preventing unauthorized access/No access without user names/passwords;
which should be regularly changed/made difficult to guess;

Data should be encrypted;
Allowing only those with decrypting code access;

Teachers/students should be trained for safe practices;
to create a risk-conscious /security-aware culture within the school;

Installation of virus checkers/spyware software;
to prevent damage to data files or the system / to prevent data being extracted from the files/system;

Mark as 2 and 2

Note: *Accept appropriate measures such as physical security measures / access control / data security / network and communication security / user awareness and education, etc.*

- (d) **Award [4 max].**
Award [1] for looping through the inventory file;
Award [1] for reading the supply data record (ID number, name, maximum quantity, minimum quantity and remaining quantity);
Award [1] for checking if the quantity remaining is less than minimum quantity;
Award [1] If so, calculate the quantity to be ordered (number to buy) / as the maximum quantity minus the quantity remaining;
Award [1] for outputting the name/ID number of the office supply and the number to buy;

Example 1:

```
while not end of inventory file
  read supply data record from file
  if remaining quantity < minimum quantity
    then
      numbertobuy = maximum quantity - remaining quantity
      output ("Reorder ", ID, name, numbertobuy)
    end if
  end loop
```

Example 2:

```
for each item in the inventory loop
  with item do
    if remaining quantity < minimum quantity then
      output "Reorder ", ID, name, (maximum quantity - remaining quantity)
    end if
  end do
end loop
```

8. (a) **Award [2 max].**
complexity / simplicity / amount of effort to get a result / number of errors with the time taken to move past them;
readability / comprehensibility / reading or writing speed;
learnability / time to accomplish tasks on the first use;
effectiveness (user performance);
efficiency (time needed to complete a task);
- (b) **Award [2 max].**
Award marks for the reason/accessibility issue arising from visual / hearing impairments / cognitive disabilities, and not only for users with disabilities but also for those using mobile devices (alternative browsing devices such as TVs, watches, etc), or those with slow network connections.
Visual display design is not logical;
workflows are not simple, and do not require as few interactions as possible to complete;
- Visual display design is not consistent;
navigation, header, footer, and main content are not always in the same places;
- Visual display design is not usable as possible;
tools are not easy to use, processes are not broken down into logical steps;
- People with poor eye-sight/color blind can have difficulties to distinguish;
because of the way graphics, words and directions are used / combinations of some colours (eg, red and green);
- (c) (i) **Award [1 max].**
RAM/primary memory;
It's held by the process/thread handling the customer access, which may be in RAM or in other storage if the process is swapped out while handling the access;
- (ii) **Award [4 max].**
OS (memory management function) allocates / deallocates memory to each process/customer task, and guarantee each customer task the resources it needs to run correctly;
moves processes back and forth between main memory and secondary memory during execution to prevent overwriting / accidental interchange;
OS (hardware memory protection- part of an OS) isolates/protects customer's data/applications;
and control access rights to the specified memory area (for example, prevents write access to the memory which is not allocated to the process/ customer task);
and protects data / applications when in memory / RAM from malicious code (prevents attempts to execute the contents of the partition/ allocated memory);
- (d) **Award [6 max].**
privacy of customer/ person data;
company needs to gain permission from customer;
customer would need to be able to view all data details;
customer must be informed about all uses that will be made of data;
customer must be informed to whom data will be disclosed.
legal issues to do with unauthorized disclosure of customer data;

9. (a) **Award [1 max].**

Because the array SNAMEs is not sorted/ordered;

(b) **Award [4 max].**

Award [1] for initializing and returning/outputting flag;

Award [1] for a while loop;

Award [1] for correct comparison and updating flag;

Award [1] for the correct use of collection methods (`resetNext()`, `hasNext()` and `getNext()`);

Example 1:

```
isIn(X, COL)
  PRESENT=False
  COL.resetNext()
  loop while COL.hasNext() and not PRESENT
    Y= COL.getNext()
    if X==Y
      then PRESENT=True
    end if
  end loop
  return PRESENT
end isIn
```

Example 2:

```
isIn(X, COL)
  P=0
  COL.resetNext()
  loop while COL.hasNext()
    if X== COL.getNext()
      then P=1
    end if
  end loop
  if P==1
    then return True // NOTE: instead of if statement only
  else return False // the statement : return P==1
  // may be written
end if
end isIn
```

(c) Award **[3 max]**.

Award [1] for initializing, updating and returning/outputting COUNT;

Award [1] for a while loop;

Award [1] for calling method `isIn()`;

Award [1] for correct use of collection methods (`resetNext()`, `hasNext()` and `getNext()`);

Example 1 (loop through collection FOOTBALL):

```
COUNT=0
FOOTBALL.resetNext()
loop while FOOTBALL.hasNext()
  X== FOOTBALL.getNext()
  if isIn(X,TENNIS)
    then COUNT=COUNT+1
  end if
end loop
output COUNT
```

Example 2 (loop through collection TENNIS):

```
COUNT=0
TENNIS.resetNext()
loop while TENNIS.hasNext()
  if isIn(TENNIS.getNext(),FOOTBALL)
    then COUNT=COUNT+1
  end if
end loop
output COUNT
```

(d) Award [7 max].

Award [1] for the use of flag;

Award [1] for looping through the array SID;

Award [2] for correct use of logical operators not/and/or in if statement, 1 mark for minor error;

Award [1] for the correct call of method `isIn()`;

Award [1] for outputting the name from the array SNAMEs within the loop;

Award [1] for outputting message(if needed) after the loop;

Example 1:

```
FLAG=True
loop for K=0 to 99
  if not( isIn(SID[K], FOOTBALL) or isIn(SID[K], BASKETBALL) or isIn(SID[K], TENNIS))
    then
      output SNAME[K]
      FLAG=False
    end if
end loop
if FLAG
  output 'Each of the students is on at least one of the three teams'
end if
```

Note: the condition in if statement could be written as

not(isIn(SID[K], FOOTBALL)) and not(isIn(SID[K], BASKETBALL)) and not(isIn(SID[K], TENNIS))

Example 2:

Award [1] for the use of flag

Award [1] for looping through the array SID

Award [1] for nested if statements

Award [1] for correct logical expressions in each of these ifs

Award [1] for the correct call of method `isIn()`

Award [1] for outputting the name from the array SNAMEs within the loop

Award [1] for outputting message(if needed) after the loop

```
X=1
loop for K=0 to 99
  if not( isIn(SID[K], FOOTBALL))
    then if not( isIn(SID[K], BASKETBALL))
      then if not( isIn(SID[K], TENNIS))
        then
          output SNAME[K]
          X=0
        end if
      end if
    end if
end loop
if X==1
  output 'Every student has chosen a sport'
end if
```