

## Section A

1. *Award up to [2 marks max].*

*Award [1 mark] for communication with user – email/ pop up etc.*

*Award [1 mark] for method of installation of update – automatic/ link/ in list for user to install etc.*

When the software is installed and registered (a cookie is placed on the machine);

This communicates with the software developer automatically on start up;

Messages about updates are sent back to the machine and alerts are given;

**OR**

Send an email;

With a link to the update;

**[2]**

2. *Award [1 mark] for each correct pair of rows.*

A	B	C	(A or B) and (not C or B)
0	0	0	0
0	0	1	0
0	1	0	1
0	1	1	1
1	0	0	1
1	0	1	0
1	1	0	1
1	1	1	1

**[4]**

3. *Award [1 mark] for a relevant example and [2 marks] for an elaboration.*

**Example 1:**

A business can let employees work at home / employees who travel a lot/external

(non-employee) users;

Accessing the data and services (at the office);

Via secure login;

**Example 2:**

Using VPN, address is masked;

The location of the user is not known;

May be essential in delicate situations such as political protest groups working from their own country;

**Note:** Accept any legitimate reason for needing to be unknown.

**[3]**

4. Award **[4 marks]** as follows.

Award **[1 mark]** for going 3 times through the loop (with COUNT from 1 to 3).

Award **[1 mark]** for incrementing correctly SUM (when  $N \bmod \text{COUNT} = 0$ ).

Award **[1 mark]** for the correct output (“perfect”).

Award **[1 mark]** for showing all working in a trace table with at least three columns (eg COUNT, SUM, OUTPUT).

Award **the first 3 marks** for an evident trace but working not shown in a trace table.

**Example answer 1:**

COUNT	$N \bmod \text{COUNT}=0$	SUM	SUM=N	output
1	TRUE	1		
2	TRUE	3		
3	TRUE	6		
			TRUE	perfect

**Example answer 2:**

COUNT	$N \bmod \text{COUNT}$	SUM	output
		0	
1	0	1	
2	0	3	
3	0	6	perfect

[4]

5. Award marks as follows up to **[3 marks max]**.

Award **[2 marks max]** for the first three passes correct,

(**[1 mark]** for at least one of passes 1, 2 and 3 correct).

Award **[1 mark]** for correct passes 4 and 5 with no change on pass 4.

Pass	12	52	16	42	88	86
1	88	52	16	42	12	86
2	88	86	16	42	12	52
3	88	86	52	42	12	16
4	88	86	52	42	12	16
5	88	86	52	42	16	12

[3]

6. Award up to **[3 marks max]**.

GPS works by communication with satellites;

By knowing the position of the satellite (sent to GPS device);

And calculating the time difference between satellites;

The position of the device can be calculated;

[3]

7. Award **[1 mark]** for an appropriate use for the user, **[2 marks]** for an elaboration.

For example:

Icon showing images on the user’s desktop;

Connects to (part of) the server/printer;

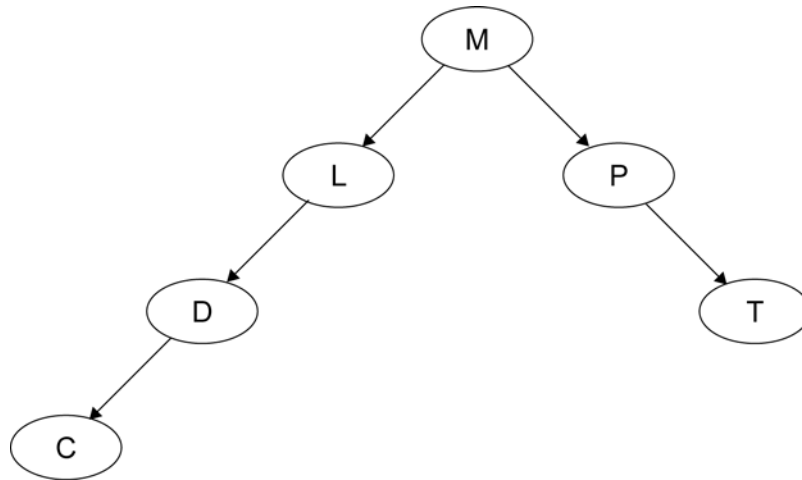
Operating system runs this access in the background (device drivers);

[3]

8. (a) CDLHTPM

[1]

(b)



[2]

## Section B

9. (a) *Award marks as follows, up to [6 marks max].*  
*Award [1 mark] for looping through the database and accessing all records.*  
*Award [1 mark] for correct calculation of date difference (eg = today – paymentDate*  
*OR paymentDate – today).*  
*Award [1 mark] for each list correctly compiled, x3 (correct conditional statements according*  
*to date difference used).*  
**Note:** *Accept date difference not calculated/stated but assumed as “today – paymentDate”*  
*OR “paymentDate – today”.*  
*Award [1 mark] for successive if/else but wrong conditions.*  
*Award [1 mark] for flagging correct records for deletion (do not accept deleting the records).*

*Example:*

```
set CURRDATE to current date (as a day number)
set LIST1, LIST2 and LIST3 to empty
loop through all CUSTREC in DATABASE
    DUEPERIOD = CURRDATE - CUSTREC.PAYMENTDATE
    if DUEPERIOD > 30 then
        add CUSTREC to LIST3
        flag CUSTREC to delete
    else if DUEPERIOD > 14 then
        add CUSTREC to LIST2
    else if DUEPERIOD > - 30 then
        add CUSTREC to LIST1
    end if
end loop
```

**[6]**

**Note:** *If candidates give their answer in flowchart form then credit them using the same marking points.*

- (b) *Award up to [4 marks max].*  
*(Using a mail merge facility);*  
*Template for each type of reminder created in the word processor;*  
*Lists created with customer ID;*  
*Linked to customer details in database;*  
*Appropriate details merged/inserted into template;* **[4]**
- (c) *Award [1 mark] for a consequence of data loss to customers and [1 mark] for a consequence of data loss to the insurance company.*

*Example answer:*

Customers would not be reminded when they needed to pay and some may overlook payment, hence not be insured;  
 The company could lose customers/ruin reputation;

**[2]**

- (d) *Award marks as follows up to [3 marks max].  
Award [1 mark] for a suitable measure and [2 marks] for a description related to the insurance company.*

*Example answers:*

Mirror system;

All changes to the records made on two systems;

If one fails then the other holds all current data;

Off site backup;

Snapshots/backups made on a regular basis;

In the case of failure a dated/time stamped copy exists and the state up until then can be used to restore customer records;

[3]

10. (a) The OSI is a standardized system/model for network connection;  
Consists of (7) layers;  
Each dealing with specific parts of network communication;  
For example, the physical layer which defines the physical connection;

[3]

**Note:** *Award [1 mark] for the purpose of any of the 7 layers.*

*If candidate lists all 7 layers with no specific example award [2 marks] and a further [1 mark] if the purpose of at least one layer is given.*

- (b) *Award up to [3 marks max].*

Protocols are a set of rules;

To facilitate a process being carried out correctly;

(Used in each layer to ensure communication;)

For example (in the physical layer) the protocols could define the methods for opening and closing communication;

[3]

**Note:** *Do not accept examples which are not related to networks.*

- (c) *Award up to [2 marks max].*

Name/ID;

Whether or not they are already a client;

If not a client, further details needed as input;

[2]

- (d) Two dimensional array;  
With one column for each lawyer;  
And one row per time slot;

[3]

**Note:** *Accept column or row for lawyer and vice versa for time slot.*

- (e) *Award up to [5 marks max]. Accept answers given as an algorithm.*

Loading 'today' page (and from now onwards or accept "start with tomorrow");

If existing client, search appropriate lawyer/column only;

If not existing client, search time/row then lawyer/column;

Then allocate space if available;

If no space allocated, load next page and repeat until space found;

Then add client details to space;

[5]

11. (a) Award **[1 mark]** for data, **[1 mark]** for pointers, **[1 mark]** for order.

*Example:*

Each node would hold the data for one plane (ID, place, time due, time expected, landed);

Head pointer points to the first in the list;

Each subsequent pointer points to the next in the list and last node has null pointer;

**[3]**

- (b) Award **[1 mark]** for calculating hours.  
Award **[1 mark]** for calculating minutes.  
Award **[1 mark]** for input and output/return.

**Example 1:**

```
input CTIME // time held in the collection in minutes
    HOURS = CTIME div 60
    MINUTES = CTIME mod 60
output HOURS, MINUTES // time to be displayed on the screen
```

**Example 2:**

```
input CTIME // time held in the collection in minutes
HOURS = 0
MINUTES = CTIME
WHILE MINUTES>59
    MINUTES=MINUTES-60
    HOURS=HOURS+1
ENDWHILE
output HOURS, MINUTES // time to be displayed on the screen
```

**Example 3:**

```
Format24 (CTIME)
// method accepts time held in the collection in minutes
    HOURS = CTIME div 60
    MINUTES = CTIME mod 60
    return HOURS + ":" + MINUTES
// returns time to be displayed on the screen
end Format24
```

**[3]**

- (c) Award marks as follows, up to **[4 marks max]**.  
 Award **[1 mark]** for a diagram and explanation showing access to each plane via pointers;  
 Award **[1 mark]** for comparison of current time with time arrived;  
 Award **[1 mark]** for correct change of pointer from plane deleted;  
 Award **[1 mark]** for correct change of pointer to next plane;

**Note:** The plane to be deleted could be at the beginning of the list **OR** at the end of the list **OR** in the middle of the list; award third and fourth mark (change of pointers) depending on the position of the node shown in the candidates' diagram/explanation.

For example:

PLANES accessed sequentially via pointers;  
 PLANE.ARRIVED checked against current time;

if > 30 minutes;

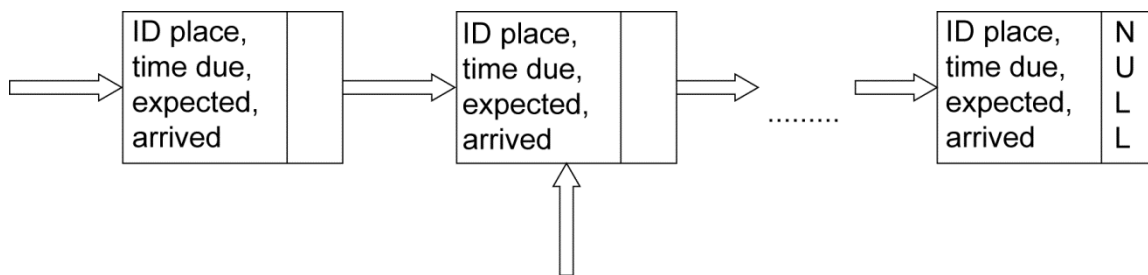
if pointer is head pointer;

move head pointer to point to next PLANE;

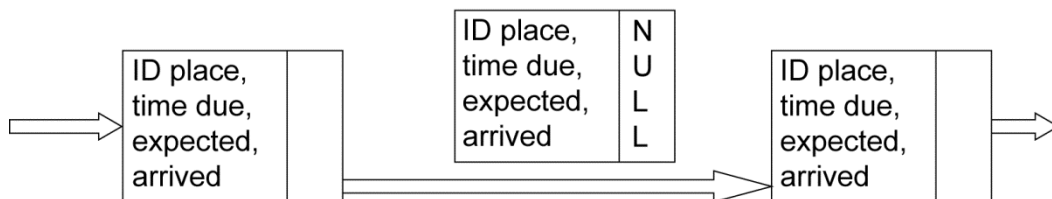
else if plane is last in list previous pointer points to NULL;

else previous pointer changed to subsequent plane;

pointer of deleted plane null;



Current time - Time arrived > 30



**[4]**

- (d) Award up to **[5 marks max]**.  
 A queue would hold the elements in order of arrival;  
 And enqueue correctly to the end as required;

Dequeue would take planes from the top of the screen;  
 Which is not wanted as they arrive at different times;

Elements in a linked list could be removed from any position in the list;  
 Hence a linked list is better;

Searching for ID to amend will be equivalent;

**[5]**

12. (a) Sensors will be used to detect the approach of a vehicle from the minor road;  
Likely to be touch/weight sensor embedded in the road;  
Sensor input is converted from analog to digital;  
To be processed and;  
Signal sent to switch traffic lights; [4]

- (b) *Award up to [3 marks max].*  
Continual feedback from sensor to processor;  
A calculation based on number of vehicles/speed/etc or time taken for a vehicle to pass;  
(Timer) resets if another vehicle is detected;  
Once no input for a certain time traffic lights changed back; [3]

- (c) *Award [2 marks] for advantages, [2 marks] for disadvantages and [1 mark] for weighing up.*

**Disadvantages:**

Central computer would have to cope with inputs from many places;  
With differing priorities which could take time;  
Connection failure possible from a particular point;  
Computer failure puts all lights in the area out;  
Cost of communication system/central control system;

**Advantages:**

More control over traffic flow at these points;  
Lights can be adapted from distance to avoid traffic blocks;  
Any problem appearing at one point is known immediately and can be dealt with;  
Cheaper as no need for communication software/hardware/control centre;  
Can react/change rules to changing levels of traffic flow;

Overall, it would be better to ... (*appropriate conclusion*); [5]

- (d) *Award [1 mark] for an advantage outlined, [1 mark] for a disadvantage outlined and [1 mark] for discussing.*

*For example:*

Controlling the movement of vehicles and identifying people who speed should help to reduce accidents (as motorists know that they will be caught if driving dangerously);  
This could also save lives;

Individual displacement is tracked;  
Which can be seen as an infringement on personal liberty/a breach of privacy;  
In some cases the information could be used unjustly against the individual (eg in times of political unrest);

It comes down to physical safety on the road against privacy/personal liberty; [3]



13. (a) Because items/moves are needed in reverse order;  
To the order input;

**OR**

Because it is a LIFO (Last In First Out) data structure;  
The items/moves pushed/placed onto the stack;  
Will be popped off/taken from it in reverse order (to the order input);

**[2]**

- (b) *Award marks as follows, up to [5 marks max].*  
*Award [1 mark] for checking for empty.*  
*Award [1 mark] for popping STEP and TURN from stack.*  
*Award [1 mark] for an output (STEP).*  
*Award [1 mark] for correct if statement (checking popped TURN).*  
*Award [1 mark] for an output (TURN).*

*For example:*

```
(let STK be the stack)
while NOT STK.isEmpty() do
  STEP = STK.pop()
  output "Take " + STEP + " steps"
  TURN = STK.pop()
  if TURN = 0 then
    output "Turn left"
  else
    output "Turn right"
  end if
end while
```

**[5]**

- (c) (18, 5)

**[1]**

- (d) *Award marks as follows up to [6 marks max].*  
*Award [1 mark] for each correct pair X and Y (coordinates), x3.*  
*Award [1 mark] for each correct change of direction facing (correct E and N), x3.*

Move		Coordinates		Direction facing	
TURN	STEP	X	Y	N	E
		0	0	1	0
0	10	10	0	0	1
1	5	10	5	1	0
0	8	18	5	0	1
0	2	18	3	-1	0
1	3	21	3	0	1
0	0				

**[6]**