HIGHER PRELIM REVISION

Carter's Carriage is a transport company which operates a fleet of vans carrying goods between 25 depots throughout the country. Every trip follows one of a number of set routes between an origin depot and a destination depot. Refuelling, if necessary on longer routes, is only permitted at a particular town on the route.

A relational database has been created to help the company. The structure of the data model is as follows:

Driver	**Trip**	**Van**	**Route**
Driver number	Driver number*	Registration number	Route number
Driver name	Registration number	Capacity	Origin
Mobile number	Date	Date purchased	Destination
	Route number*		Refuel town

Draw an entity relationship diagram to represent this data model.

The owners of holiday properties in the Laguna Lake apartment complex rent their apartments to holidaymakers throughout the year.

- Owners may own a number of apartments
- Holidaymakers may make several bookings in a year

A relational database has been set up to record these bookings. The entities and attributes are as follows:

OWNER (OwnerID, OwnerName, OwnerAddress1, OwnerAddress2)

BOOKING (CustomerID*, ApartmentNo*, Date, NumberOfNights)

CUSTOMER (CustomerID, Forename, Surname, Address1, Address2, TelephoneNo)

APARTMENT (ApartmentNo, Bedrooms, Floor, Price, OwnerID*)

Draw an entity-relationship diagram to represent this data model

HIGHER PRELIM REVISION

This image of Ben Nevis is stored using 65536 colours. Explain how this image would be stored as a bit mapped graphic.

Subjects	Teachers	Pupil Info
Subject Name	Teacher Name	Pupil ID
Subject ID	Teacher ID	Pupil Name
Room No	Age	Grade
	University	Effort
	Registration Number	Behaviour
	Subject ID*	Subject ID*

1. Describe how a school would use the database software to produce this report.

Pupil Name: John Smith				
Subject Name	**Teacher Name**	**Room No**	**Grade**	**Effort**
Maths	Mr. Jones	1.3	A	Very Good
English	Mrs. MacDonald	G7	A	Good
Modern Studies	Mr. Rodger	2.1	C	Poor

2. Describe how a school would use the database software to produce this report.

Subject Name: Computing Science				
Teacher Name	**Pupil Name**	**Pupil ID**	**Effort**	**Grade**
Mr Stewart	John Smith	254	Good	A
Mr Stewart	Joe MacDonald	162	Poor	A
Mr Stewart	Ella Munro	187	Very Good	B

HIGHER PRELIM REVISION

Describe 2 advantages of using a 1-D array?

Why are logic errors hard to spot?

Why are wireframes used?

Contemporary developments booklet.

Intelligent system –

Online system –

Software Development Languages and Environments -

A programming language uses 32 bits to represent real numbers such as the negative value -0.000000016. Explain how the 32 bits could be allocated to store such numbers.

Describe two features of agile methodologies.

Summarise RAD in your own words.

Why is RAD a good methodology to use when bidding for a contract?

HIGHER PRELIM REVISION

State the 5 standard algorithms and give a brief description of each.

Explain the difference between ASCII and Unicode.

Calculate the file size of an audio file with a sampling rate of 20 KHz. It is a stereo file that is 4 minutes long and has a sampling depth of 16 bits.

Calculate the file size of a mono audio file that is 5 minutes long and has a sampling depth of 16 bits. This file has a sampling rate of 96 KHz.

Calculate the file size of a 10 second video file with a frame rate of 16. The video has a resolution of 540 x 340 and a bit depth of 18.

A 30-second long video was filmed at 45 FPS at a resolution of 600 x 500. It had a bit depth of 18.

Video at 1 minute long was filmed at 20 FPS. It has a bit depth of 8 and a resolution of 700 x 300.

HIGHER PRELIM REVISION

2. CheckTax have developed a function to return the taxcode (A, B, C or D) that should be used for an employee's pay. The function is to be used for employees that have income from two different sources. For example:

Combined income	Taxcode
Less than 9000	A
9000 and over (but less than 43000)	B
43000 and over (but less than 60000)	C
60000 and over	D

The inputs and output of this function are show in the diagram below.

The function was developed using the following algorithm to determine a taxcode for any value of total income.

```
line
1     SET taxcode TO "Z"
2     SET salary TO (income1 + income2)
3     IF salary < 9000 THEN
4               SET taxcode TO "A"
5     END IF
6     IF salary > 9000 AND salary < 43000 THEN
7               SET taxcode TO "B"
8     END IF
9     IF salary > 43000 AND salary < 60000 THEN
10              SET taxcode TO "C"
11    END IF
12    IF salary > 60000 THEN
13              SET taxcode TO "D"
14    END IF
15    RETURN taxcode
```

2. (continued)

(a) Explain why this algorithm would return an incorrect taxcode if income1 is 30000 and income2 is 30000. **2**

(b) The lead programmer comments that the use of a series of IF statements is inefficient.

Using pseudocode or a language with which you are familiar, rewrite the algorithm to correct the logic error and make the code more efficient. **3**

(c) Jeanette works for a bank and has downloaded the corrected function, `taxcode`, from CheckTax's online library. Bank employees receive an annual salary and bonus pay and Jeanette's program stores these values in variables `salary` and `bonus`. It also stores the employee's tax code in a variable called `code`.

Using pseudocode or a language with which you are familiar, write an algorithm for a subroutine that will:

- Ask the user for the values for variables `salary` and `bonus`
- Use the function to assign the variable `code`
- Display `code` on screen **3**

HIGHER PRELIM REVISION

```
line
1     SET source TO [71,76,66,67,89,72]
2     SET position TO 1
3     FOR counter FROM 2 TO 6
4          IF source[counter]>source[position] THEN
5               SET counter TO position
6          END IF
7     END FOR
```

(b) A trace table is being used to record the changes to variables when stepping through the code.

(Line 4 does not change a variable's value and so is not included.)

Line	Source	Position	Counter
1	[71,76,66,67,89,72]		
2			
3			
5			

HIGHER PRELIM REVISION

Work out the file size of the following images…

Calculate the backing storage required for a 8-bit colour image 500 pixels by 400 pixels. Give your answer in Kilobytes

Calculate the backing storage required for a 16-bit colour image 1200 pixels by 800 pixels. Give your answer in Megabytes

Calculate the backing storage required for an image 3 inches by 4 inches at 400dpi with 512 colours available Give your answer in Megabytes

Convert the following numbers to binary

88

162

77

Convert the following numbers to binary using twos compliment.

-66

-122

HIGHER PRELIM REVISION

```
<body>
<script src="http://youtube.com/js/jquery.js"></script>
<script src="http:// youtube.com/js/jquery.once.js"></script>
<script src="http:// youtube.com/js/drupal.js"></script>
<script <src="http:// youtube.com/js/panels.js"></script>
<style>
.center_div
{
border:1px blue;
margin-left:auto;
margin-right:auto;
width:80%;
background-color:#d0f0f6;
text-align: right;
padding:8px;
}
</style>
<img src="cat1.gif" alt="Big Cat">
<img src="logo.gif" alt="logo">
<img src="cat2.gif" alt="Big Cat2">
<img src="welcome.gif" alt="Welcome Message">
</body>
```

State two optimisations that could be made to the code on the right for faster load times.

Text	Font	Size	Colour	Style
Headings <h1>	Georgia	25	Blue	Bold
Sub Headings <h3>	Arial	16	Black	Regular
Body Text <body>	Verdana	10	Green	Bold
Sub Headings <h5>	Times New Roman	13	Red	Regular

Create a CSS rule for each of the above headings and text.

```
h1 {
font-family : Ariel;
font-size : 30px;
color : green;
font-weight : bold
}
```

3. The weather statistics are recorded for each day of the 30 days of November. For each day, the statistics recorded include the rainfall in millimetres and the lowest temperature. Some of the data is shown below.

Day		Rainfall		Lowest temperature
1		12		8
2		5		4
3		0		-3
4		5		1
5		0		-4
. . .		. . .		. . .
30		21		6

(a) The rainfall figures are held in an array called `rainfall` and the lowest temperatures in an array called `lowtemp`. Using pseudocode or a language with which you are familiar, write an algorithm to count the number of dry days below freezing and write this number of days to a text file called `drydays`. **5**

HIGHER PRELIM REVISION

LochaberHeating plan to launch an app that will allow customers with Internet access to turn their heating system on using a mobile device. Describe how LochaberHeating could ensure that all customers could use the software regardless of the operating system on their device.

Customers sign into their heating account online to view bills. Explain how their details are kept secure when transmitted.

Describe the hybrid cloud in your own words.

Describe two advantages of using a hybrid cloud.

Teachers can access all files on the network. Pupils can only access a restricted view of files. Describe how the operating system allows these restrictions to be set up.

Describe one environmental advantage of upgrading a computer system.

Describe one environmental advantage of buying new computers.

HIGHER PRELIM REVISION

Explain how cache memory can improve system performance.

State what is meant by the term compound key

Describe how quad-core processors can be used to improve load times for web apps containing client-side scripts or multimedia.

A hardware company uses a relational database with the four tables shown below.

Customer	Item	Order	Sale
Customer ID	*Item ID*	*Order no*	*Order no **
Customer name	*Description*	*Customer ID **	*Item ID **
Customer address	*Cost*	*Date*	*Quantity*
Customer email	*Image*		

Draw an entity-relationship diagram to illustrate the relationships between the four tables.

Identify a suitable primary key for the Sale table

HIGHER PRELIM REVISION

Explain the difference between passing a parameter by reference and passing a parameter by value.

Explain the difference between *function* and a *procedure*.

Describe one form of useability testing.

Describe the difference between open source and proprietary (closed source) software.

LHS is developing a website that will work on all devices such as smartphones, tablets and desktops. Describe how can this be achieved using CSS?

Explain two advantages of using a public cloud.

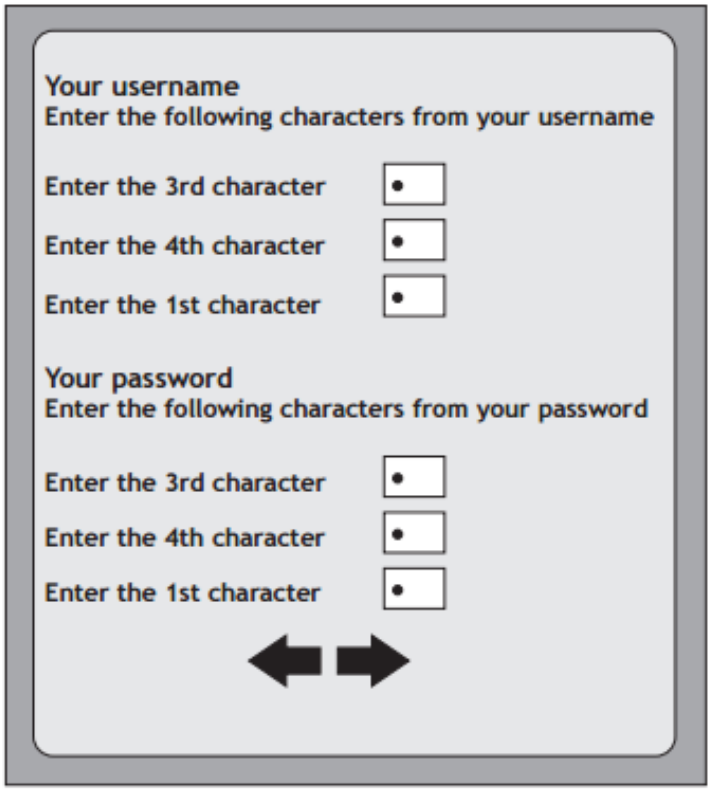
HIGHER PRELIM REVISION

Student No	123211
Student Name	Stephen
Address	14 High Street
Email	Stephen@lochaberhigh.org.uk
Gender	Male
House	Nevis

Describe onw way to improve the usability of this form.

Describe what can be done to a website to make it more optimised for web search.

When signing in to their account customers have to enter details from their username and password as shown below.



Explain why customers are asked to enter their details in a random order each time. 1

(b) Chris calculates the average mark for each pupil and stores the average marks in an array. He writes the following pseudocode to count the number of grade A passes of 70 or more:

```
Line 1    SET list TO [74.33, 57.67, 73.33, 82.33]
Line 2    SET amount TO 0
Line 3    FOR counter FROM 0 TO 2 DO
Line 4        IF list[counter] >= 70 THEN
Line 5            SET amount TO amount + 1
Line 6        END IF
Line 7    END FOR
Line 8    SEND amount TO DISPLAY
```

When Chris tests the program, it outputs the wrong number of A passes.

(i) State the output from the code above. **1**

_____

(ii) State the name of this type of error. **1**

_____

(iii) Identify and correct the line of the algorithm which contains the error. **2**

HIGHER PRELIM REVISION

Explain the difference between RAM and ROM.

Describe what cache memory is.

Name and describe two functions of the control bus.

Descrube what a buffer is.

Describe what spooling is?

Whhat are the differences between a buffer and spooling?

Describe why impage sprites are used in websites.

Why is RIPA becoming harder to implement?

HIGHER PRELIM REVISION

Joseph is using an external style sheet named "masterstyle". Complete the HTML code that will successfully link to this stylesheet. **2**

<link rel = _____ type= "text/css" href= _____>

Describe the difference between client side and server side scripting.

Explain the difference between lossy and lossless compression.