THE UNIVERSITY OF AUCKLAND

SECOND SEMESTER, 2009
Campus: City

COMPUTER SCIENCE

Mastering Cyberspace: An Introduction to Practical Computing

(Time Allowed: TWO hours)

NOTE:
You must answer **all** questions in this exam.
No calculators are permitted
Answer Section A (Multiple choice questions) on the Teleform answer sheet provided.
Answer Section B in the space provided in this booklet.
There is space at the back for answers that overflow the allotted space.

Surname	*Sample*
Forenames	*Solutions*
Student ID	
Login (UPI)	

	Question	Mark	Out Of
1 - 16	Multiple Choice		32
17	Programming using Python		12
18	XHTML and CSS		10
19	Spreadsheets		12
20	Digital Images & Graphics		6
21	LaTeX		12
22	Artificial Intelligence		6
23	History and Social Issues		10
	TOTAL		100

SECTION A

MULTIPLE CHOICE QUESTIONS

Each question in this section is worth **2 marks**. There is only **one** correct answer for each question. Select your preferred alternative on the Teleform answer sheet provided by shading in the appropriate box.

Question 1
What decimal number has the binary representation 1110?
> (a) 9
> (b) 11
> **(c) 14**
> (d) 13
> (e) 110

Question 2
How many bits per pixel are necessary to encode 16 different colours?
> **(a) 4**
> (b) 1
> (c) 2
> (d) 3
> (e) 5

Question 3
What does the TCP protocol do?
> (a) It routes packets from one computer to another.
> (b) It counts the messages that are sent between two computers.
> (c) It connects email clients with each other so that emails can be exchanged.
> **(d) It makes sure that all packets of a message arrive at the recipient.**
> (e) It gives addresses to all the computers on the Internet.

Question 4
Which of the following is *not* a function of an operating system?
> (a) Allowing a user to start applications
> (b) Managing system resources
> (c) Controlling hardware using device drivers
> (d) Providing a default user interface when no application is running
> **(e) Word processing**

Question 5
What is the difference between a command line interface and a GUI?
> (a) Command line interfaces are a lot slower than GUIs.
> (b) A command line interface can be used to give commands to the computer, but a GUI cannot.
> **(c) A GUI offers various visual elements whereas a command line interface supports only text.**
> (d) GUIs never contain any text, but command line interfaces do.
> (e) GUIs are only for word processing applications.

Question 6

How do instant messengers communicate with each other?
- (a) Instant messengers send their messages to all other instant messengers on the Internet, so the user's friends will get all the messages.
- **(b) An instant messenger gets the IP addresses of the user's friends from a central server, and then the messengers can communicate directly.**
- (c) An instant messenger gets the address of a central server, and then all communication is done through that central server.
- (d) An instant messenger gets the IP addresses of the user's friends from the Internet service provider, and then the provider can send all the messages.
- (e) The friends of a user send their IP addresses directly to the instant messenger, so they can communicate.

Question 7

Why is the Internet more robust than traditional telephone networks?
- (a) Traditional telephone networks divide messages into packets, which can get lost.
- **(b) If a node of the Internet is broken, then other nodes will be used instead.**
- (c) The Internet is centralized, so it is harder to bring down all the nodes.
- (d) The Internet supports circuit switching, which is more reliable.
- (e) Traditional telephone networks cannot transfer data in real time, but the Internet can.

Question 8

What is a URL?
- (a) It is the name of an email account.
- **(b) It is an address for a web resource.**
- (c) It is a server used for instant messaging.
- (d) It is a computer that sits between a client and a server.
- (e) It is a method for transferring multimedia data through email.

Question 9

What is ASCII?
- (a) It is a code used for encoding the letters of any language.
- (b) It is a style used for word processing.
- **(c) It is a code to represent English and some other characters as numbers.**
- (d) It is a protocol for interchanging information through the World Wide Web.
- (e) It is a format for multimedia documents.

Question 10

How does a typical printer compare with a typical computer screen?
- (a) Printers can produce much more realistic colours than screens.
- (b) Screens can only represent vector images.
- (c) Printers can only represent vector images.
- (d) The spatial resolutions of a screen and a printer are about the same.
- **(e) The spatial resolution of the printer is much higher.**

Note: Questions 11 to 16 refer to the following Microsoft Access tables and relationship diagram:

Customers				
CustomerID	**FirstName**	**Surname**	**Address**	**City**
HSIMP001	Homer	Simpson	742 Evergreen Terrace	Springfield
PFRY001	Philip	Fry	Planet Express Office	New York
PGRIF001	Peter	Griffin	31 Spooner Street	Quahog

Orders				
OrderID	**CustomerID**	**OrderedDate**	**Price**	**Description**
1	HSIMP001	8/09/2009	$166.00	Canon Pixma iP4600 Printer
2	HSIMP001	8/09/2009	$123.75	HP Photosmart D7260 Colour Inkjet Printer
3	HSIMP001	12/09/2009	$127.00	Epson Stylus C110 Inkjet Printer
4	PFRY001	19/09/2009	$120.75	HP Deskjet D4368 Printer
5	HSIMP001	20/09/2009	$289.00	Epson Stylus Photo R390 Colour Printer
6	HSIMP001	18/09/2009	$94.50	Hitachi 250GB HDD
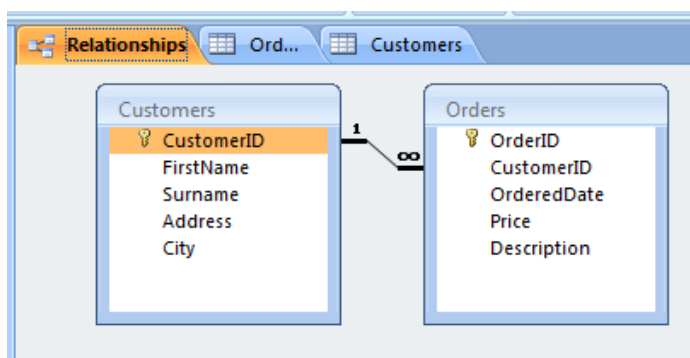
Question 11

What is the primary key of the `Customers` table?

 (a) City
 (b) Address
 (c) FirstName
 (d) CustomerID
 (e) Surname

Question 12

What is the foreign key of the `Orders` table?

 (a) Description
 (b) Price
 (c) CustomerID
 (d) OrderedDate
 (e) OrderID

Question 13

What type of relationship exists between the `Customers` table and the `Orders` table?
    (a) One-to-infinity
    (b) One-to-one
    (c) Many-to-one
    (d) Many-to-many
    (e) One-to-many

Question 14

What is the SQL statement to display all orders from the `Orders` table sorted by the `OrderedDate`?
    (a) SELECT ALL FROM Orders ORDER BY OrderedDate;
    (b) SELECT * FROM Orders ARRANGE BY OrderedDate;
    (c) SELECT ALL FROM Orders SORT BY OrderedDate;
    (d) SELECT * FROM Orders ORDER BY OrderedDate;
    (e) SELECT * FROM Orders SORT BY OrderedDate;

Question 15

What is the SQL statement to display the `CustomerID` and `OrderedDate` of all orders over $150?
    (a) SELECT CustomerID, OrderedDate, Price FROM Orders WHERE Price >= 150;
    (b) SELECT CustomerID, OrderedDate FROM Orders WHERE Price > 150;
    (c) SELECT CustomerID, OrderedDate FROM Orders WHERE Price >= 150;
    (d) SELECT CustomerID, OrderedDate, Price FROM Orders WHERE Price > 150;
    (e) SELECT CustomerID and OrderedDate FROM Orders WHERE Price > 150;

Question 16

What is the SQL statement to display the total price of all orders for each customer?
Examples are given below:
```
HSIMP001  $800.25
PFRY001   $120.75
```
    (a) SELECT CustomerID, Sum(Price) FROM Orders GROUP BY Price;
    (b) SELECT CustomerID, Sum(Price) FROM Orders TOTAL Price;
    (c) SELECT CustomerID, Price FROM Orders SUM Price;
    (d) SELECT CustomerID, Price FROM Orders TOTAL Price;
    (e) SELECT CustomerID, Sum(Price) FROM Orders GROUP BY CustomerID;

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SECTION B

Answer all questions in this section in the space provided. If you run out of space then please use the Overflow Sheet and indicate in the allotted space that you have used the Overflow Sheet.

17. Programming Using Python (12 marks)

(a) Write the output produced by the following Python program.

```python
print "Line one"
print "Line", 2
today = "Thursday"
if today == "Thursday":
    print "Today is Thursday"
else:
    print "Today is not Thursday"
```

<div style="border:1px solid black">

Line one
Line 2
Today is Thursday

</div>

(3 marks)

(b) Write a program that asks the user to enter a number of hours. The program should then print out the corresponding number of seconds as in the example given below.

There are 3600 seconds in an hour.

If the number of seconds is greater than 10,000 the program should print the message "That is a lot of seconds."

For example, if the user enters 3 at the prompt, the output that is expected from your program is shown below:

```
Enter the number of hours: 3
That is 10800 seconds.
That is a lot of seconds.
```

```
hours = input("Enter the number of hours: ")
secondsInAnHour = 3600
seconds = hours * secondsInAnHour
print "That is", seconds, "seconds."
if seconds > 10000:
    print "That is a lot of seconds."
```

(5 marks)

(c) Complete the output produced by the following program when the user enters **3** at the prompt.

```
power = input("Enter the power of two: ")
answer = 1
counter = power
while counter > 0:
    print answer,"so far"
    answer = answer * 2
    counter = counter - 1
print "2 to the power of", power, "is", answer
```

```
Enter the power of two: 3
1 so far
2 so far
4 so far
2 to the power of 3 is 8
```

(4 marks)

CONTINUED

18. XHTML and CSS (10 marks)

The following screenshot shows a web page created using XHTML 1.0 strict and
Cascading Style Sheets:
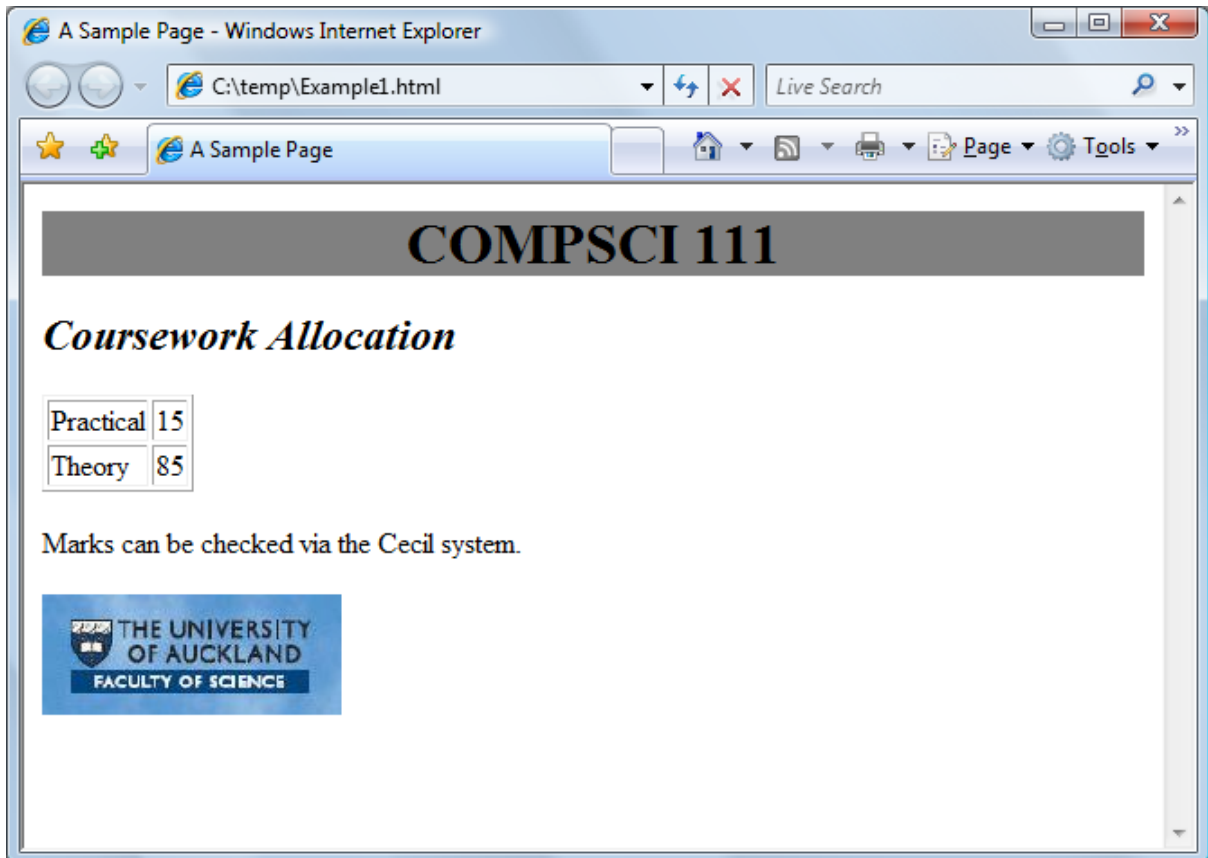
Complete the XHTML code below so that it produces the output shown above. You
must use the styles defined in the internal style sheet in the head section below, and
must not define any new styles. You can assume that the image file (**logo.jpg**) is
stored in the same folder as the HTML file.

```
<?xml version="1.0" encoding="utf-8"?>
<!DOCTYPE html PUBLIC
"-//W3C//DTD XHTML 1.0 Strict//EN"
"http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">

<html xmlns="http://www.w3.org/1999/xhtml" xml:lang="en"
 lang="en">

<head>
<title>A Sample Page </title>
<style type="text/css">
   h1 { background-color: gray; }
   h2 { font-style: italic; }
   .quote { text-align: center; }
</style>
</head>
```

CONTINUED

```html
<body>
<!--Headings, 3 marks -->

<h1 class = "quote">COMPSCI 111</h1>
<h2>Coursework Allocation</h2>

<!--Table, 3 marks -->

<table border = "2px">
    <tr>
        <td>Practical</td>
        <td>15</td>
    </tr>
    <tr>
       <td>Theory</td>
       <td>85</td>
    </tr>
</table>

<!--A paragraph, 1 mark -->

<p>Marks can be checked via the Cecil system.</p>

<!--An image, 3 marks -->
<p>

<img src="Logo.jpg" alt = "Logo"></img>

</p>
</body>
</html>
```

(10 marks)

19. Spreadsheets (12 marks)

The following Microsoft Excel Spreadsheet is used to calculate the total mark and exam performance for each student in the course. The table in the last 3 columns is to be used to obtain a student's name based on their ID from Column A.

	A	B	C	D	E	F	G	H	I	J	K
1	ID	Name	TestMark	ExamMark	Total	Passed Exam?			ID	FirstName	Surname
2	812069	Andrew	54	68	122	PASSED			199444	Jacob	Smith
3	887268	Daniel	87	79	166	PASSED			303114	Michael	King
4	952348	William	27	35	62	FAILED			465336	Joshua	Chu
5	769866	Matthew	78	51	129	PASSED			769866	Matthew	Mehta
6	303114	Michael	96	86	182	PASSED			800526	Ethan	Ramos
7		Average	68.4	63.8					812069	Andrew	Sun
8									887268	Daniel	Zhou
9									952348	William	Park
10									973748	Joseph	Xie
11									997073	Christopher	Kumar

(a) What is the best formula to use in Cell E2? Your formula should calculate the total of the student's test mark and exam mark. Note: You must ensure that your formula is able to be filled down.

```
= C2 + D2
```

(2 marks)

(b) What is the best formula to use in Cell C7? Your formula should calculate the average term test mark.

```
= AVERAGE(C2:C6)
```

(2 marks)

(c) What is the best formula to use in Cell F2? Your formula should check if a student has passed the exam, and display "PASSED" if the student has passed, and "FAILED" if the student has failed. To pass the exam the student must obtain at least 50. Note: You must ensure that your formula is able to be filled down.

```
= IF(D2 >= 50, "PASSED", "FAILED")
```

(4 marks)

CONTINUED

(d) Next, we would like to look up the first name for each student. Examples are given below:

	A	B
1	ID	Name
2	812069	Andrew
3	887268	Daniel
4	952348	William
5	769866	Matthew
6	303114	Michael

The syntax of the VLOOKUP function to search the first column of a table, and then return a value from any cell on the same row of the table is given below:

```
VLOOKUP(lookup_value, table_array, col_index_num,[range_lookup])
```

The table to search for the first name is given below:

	I	J	K
1	ID	FirstName	Surname
2	199444	Jacob	Smith
3	303114	Michael	King
4	465336	Joshua	Chu
5	769866	Matthew	Mehta
6	800526	Ethan	Ramos
7	812069	Andrew	Sun
8	887268	Daniel	Zhou
9	952348	William	Park
10	973748	Joseph	Xie
11	997073	Christopher	Kumar

What is the best formula to use in Cell B2? Your formula needs to use the ID from Column A to look up the first name for the student in the table above.   Note: You must ensure that your formula is able to be filled down.

=VLOOKUP(A2, $I$2:$J$11, 2, FALSE)

(4 marks)

CONTINUED

20. Digital Images and Graphics (6 marks)

(a) What is motion capturing?

Motion capturing is recording the motion of an actor (or other real object) for the animation of virtual objects.

(2 marks)

(b) What are the advantages and disadvantages of ray tracing?

(i) Advantage(s) of ray tracing:

Produces high quality pictures.

(ii) Disadvantage(s) of ray tracing:

Slow.

(2 marks)

(c) How many **bytes** are required for a 4 colour image, 4 pixels wide and 8 pixels high? Show all your working.

Pixels = 4 x 8
= 32

4 colours so 2 bits per pixel required to store the image

Therefore number of bits required = 32 x 2
= 64

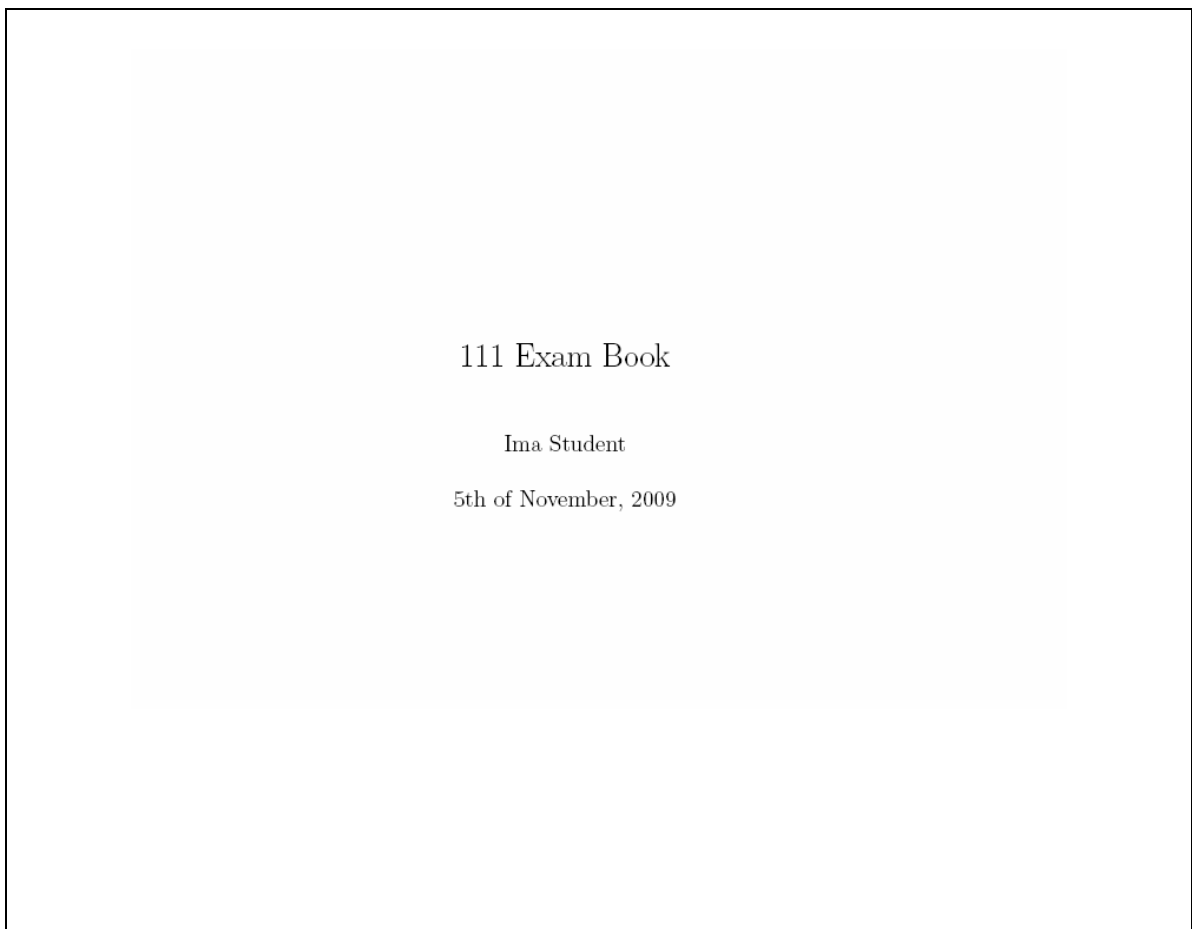*Number of bytes required = 64 / 8*
= 8 bytes

(2 marks)

CONTINUED

21. LaTeX (12 marks)

(a) Draw the title page which would be generated by the following LaTeX code.

```
\documentclass[a4paper]{book}

\begin{document}
\title{111 Exam Book}
\author{Ima Student}
\date{5th of November, 2009}
\maketitle

\end{document}
```

<div style="border:1px solid black; text-align:center; padding:120px 0;">

111 Exam Book

Ima Student

5th of November, 2009

</div>

(2 marks)

(b) Write the LaTeX code that will produce the following output:

---

1   Introduction

In mathematics a parabola is a conic section; the intersection of a cone with a plane.

1.1   Formula

The general formula for a parabola is:

$$(Ax + By)^2 + Cx + Dy + E = 0 \qquad (1)$$

1.2   Quote

Artists see things differently. Here is a quote from Michael Nesmith:

> As an artist, you don't think about the *parabola* or the arc you're describing or where you're going to ultimately end up, you're just kind of crawling around, seeing what's out there.

The following LaTeX commands have been included as a reference. You will not need to use all of these commands. Note that the basic document structure has been completed for you.

Normal commands	Environments	Math mode commands
\emph{}	itemize	\sum_{}^{}
\section{}	enumerate	\frac{}{}
\subsection{}	verbatim	\sqrt{}
\large	flushright	\geq
\textbf{}	center	\pi
\title{}	quote	\ldots
\author{}	displaymath	
\date{}	equation	^
\maketitle	quotation	
		_

CONTINUED

```
\documentclass[a4paper]{article}
\begin{document}

\section{Introduction}
In mathematics a parabola is a conic secion; the
intersection of a cone with a plane.
\subsection{Formula}
The general formula for a parabola is:
\begin{equation}
(Ax + By)^2 + Cx + Dy + E = 0
\end{equation}
\section{Quote}
Artists see things differently.  Here is a quote
from Michael Nesmith:
\begin{quotation}
As an artist, you don't think about the
\emph{parabola} or the arc you're describing or
where you're going to ultimately end up, you're
just kind of crawling around, seeing what's out
there.
\end{quotation}




\end{document}
```

(10 marks)

22. Artificial Intelligence (6 marks)

(a) What was the Chinese room and how was it used to argue against Strong AI?

The Chinese room is a thought experiment. Imagine a room with books describing what Chinese symbols to output given some input Chinese symbols. John Searle is in the room carrying out the specified list of instructions. From the outside it looks as though Searle (or the room) can understand and communicate with Chinese symbols. The argument is that even though Searle appears to understand Chinese, he actually doesn't, just like a computer program appearing to be intelligent but actually isn't.

(4 marks)

(b) Briefly describe the Turing Test for Artificial Intelligence.

The Turing Test has a human judge conversing with a human and a computer. If the judge can't tell them apart then the computer is intelligent.

(2 marks)

23. History and Social Issues (10 marks)

(a) What is a Trojan Horse program? Why is it called a Trojan Horse?

A Trojan Horse is a program which looks as though it does something good or useful but also does something bad.

It is called a Trojan Horse from the story of the Trojan Horse being used by the Greeks to break into the city of Troy during the Trojan War.

(3 marks)

(b) List 2 ways you can help prevent your computer from getting infected by a computer virus.

Any two of:

Use a virus checker.
Don't download programs from unsafe sites.
Don't have macros turned on in Word.
Don't open email attachments, etc.

(4 marks)

CONTINUED

(c) Assign the following events to the decade (e.g. 1970s) they occurred.

Event	Decade
Development of the first electronic stored program computers.	**1940s**
The University of Auckland's first computer.	**1960s**
The release of the IBM Personal Computer.	**1980s**

(3 marks)

- Overflow Sheet 1 -
Write the question number and letter next to your answer. You must ALSO indicate in the allotted space that you have used the overflow sheet.

- Overflow Sheet 2 -
Write the question number and letter next to your answer. You must ALSO indicate in the allotted space that you have used the overflow sheet.

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Rough Working – This page will not be marked