

C206/SQP223

Computing
Intermediate 2

NATIONAL
QUALIFICATIONS

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Course Assessment Specification

Computing Intermediate 2

The purpose of this document is to provide:

- ◆ Details of the structure of the Question Paper for this Course
- ◆ Details of the structure of the Practical Coursework task that contributes to this Course
- ◆ Guidance to centres on how to use information gathered from the Question Paper and the Practical Coursework task in this Course to estimate candidate performance.

Part 1

This part of the Course Assessment Specification details the structure of the Question Paper for this Course

The Question Paper

- ◆ consists of 3 sections
- ◆ has a mark allocation of 70 marks
- ◆ has a time allocation of 1 hour 30 minutes.

Section I - 15 marks

- ◆ consists of objective and short response questions
- ◆ samples across the content statements of the two mandatory units (Software Development and Computer Systems)
- ◆ approximately 10 marks will be for knowledge and understanding
- ◆ approximately 5 marks will be for problem solving
- ◆ the problem solving will be based in familiar contexts and be of a fairly straightforward nature
- ◆ candidates will be expected to tackle all questions in the section.

Section II - 30 marks

- ◆ consists of questions requiring extended responses demonstrating structuring and reasoning
- ◆ questions have varying mark allocation and therefore do not have to be of the same length. Most questions will be subdivided into a number of connected parts with the marks for each part clearly indicated.
- ◆ questions will involve both knowledge and understanding and problem solving, and will be set in less familiar and more complex contexts than those in Section I
- ◆ approximately 10 marks will be for knowledge and understanding
- ◆ approximately 20 marks will be for problem solving
- ◆ questions will sample across the content statements associated with the mandatory units (Software Development and Computer Systems)

- ◆ some questions, or parts of questions, will require integration of knowledge from the two mandatory units
- ◆ candidates will be expected to tackle all questions in the section.

Section III - 25 marks

- ◆ this section has three sub-sections, one for each of the optional units (Artificial Intelligence, Computer Networking and Multimedia Technology)
- ◆ candidates will be expected to tackle all the questions within **one** sub-section
- ◆ each sub-section consists of questions requiring extended responses demonstrating structuring and reasoning
- ◆ questions have varying mark allocation and therefore do not have to be of the same length. Most questions will be subdivided into a number of connected parts with the marks for each part clearly indicated.
- ◆ questions will involve both knowledge and understanding and problem solving, and will be set in less familiar and more complex contexts than those in Section I
- ◆ approximately 8 marks will be for knowledge and understanding
- ◆ approximately 17 marks will be for problem solving
- ◆ questions in each sub-section will sample across the content statements associated with the appropriate optional unit
- ◆ some questions, or parts of questions, will require integration of knowledge from the mandatory units.

Part 2

This part of the Course Assessment Specification details the structure of the Practical Coursework Task in this Course.

- ◆ The Practical Coursework Task has a mark allocation of 30 marks
- ◆ There is no set time allocation, but the task has been designed to be completed by a typical candidate in 8-10 hours

- ◆ The task provides the candidate with the opportunity to demonstrate and integrate practical skills and knowledge they have developed within the mandatory units (Computer Systems and Software Development) in a more complex and less familiar context than is possible within the units

- ◆ A new practical coursework task will be provided by SQA in Autumn each year.
- ◆ The task is only valid for the session in which it is issued

- ◆ The task may be undertaken in “open book” conditions, but under supervision of the teacher / lecturer, to ensure that the work presented is the candidate’s own work
- ◆ The task will be marked by the teacher / lecturer, using a marking scheme provided by SQA, but be subject to moderation
- ◆ The marking scheme will provide a mark out of 30, which will be submitted directly to SQA without scaling
- ◆ The teacher or lecturer may give the candidate hints and/or help if requested. Any such help should be reflected in the marks awarded
- ◆ Once the task has been completed and marked, it should **not** be returned to the candidate for further work.

Part 3

This part of the Course Assessment Specification provides guidance on how to use assessment information gathered from the Question Paper and the Practical Coursework task to estimate candidate performance

Component	Mark Range
Question Paper	0-70
Practical Coursework	0-30
Total Marks	0-100

The mark range for each component takes account of the weighting of each component.

In National Qualifications cut-off scores should be set at approximately 70% for grade A and 50% for grade C with grade B falling midway.

For a total mark range of 0-100, the following gives an indication of the cut-off scores based on the candidate's **total** score.

Grade	Band	Mark Range
A	1	85-100
A	2	70-84
B	3	65-69
B	4	60-64
C	5	55-59
C	6	50-54
D	7	45-49
NA	8	40-44
NA	9	0-39

These cut-off scores may be lowered if question paper component turns out to be more demanding or raised if less demanding.

Worked example

- ◆ In a centre's own prelim, a candidate scores 44/70, and the candidate scores 18/30 in the practical coursework
- ◆ The two marks are added together, giving a total of 62/100
- ◆ The centre's view is that their own prelim is slightly less demanding than SQA examination.
- ◆ Using the mark range, a realistic estimate may be **band 5** rather than band 4.

[C206/SQP223]

Computing
Intermediate 2
Specimen Question Paper

Time: 1 hour 30 minutes

NATIONAL
QUALIFICATIONS

Attempt Section I and Section II and **one** Part of Section III.

Section I – Attempt all questions.

Section II – Attempt all questions.

Section III – This section has three parts:

Part A – Artificial Intelligence

Part B – Computer Networking

Part C – Multimedia Technology

Choose **one** part and answer **all** of the questions in that part.

Read each question carefully.

Write your answers in the answer book provided. **Do not** write on the question paper.

Write as neatly as possible.

Answer in sentences wherever possible.

SECTION I

Marks

Attempt ALL questions in this section.

1. Data is stored in memory using bits.
What is the largest positive number that can be stored using 4 bits? 2

 2. All computers have an operating system.
Explain the difference between an operating system and an application program. 2

 3. The design of a program can be represented by *pseudocode*, or by a graphical design notation.
Name and describe **one** graphical design notation with which you are familiar. 2

 4. Explain why a macro would save time for an application user. 1

 5. Give **one** reason why an interface is needed between a CPU and a peripheral device such as a printer. 1

 6. Software is evaluated in terms of *fitness for purpose, readability* and *user interface*.
 - (a) Explain the term “fitness for purpose”. 1
 - (b) Describe how “readability” would help a programmer during the testing stage. 1

 7. Colin finds information about the “Ancient Romans” on the World Wide Web using a search engine.
What is a search engine? 1

 8. The Arithmetic and Logic Unit (ALU) is part of the processor.
Name the other **two** parts of the processor. 2

 9. Computer programmers make use of *pre-defined functions*.
 - (a) What is a “pre-defined function”? 1
 - (b) Give **one** example of a standard “pre-defined function”. 1
- (15)**

[END OF SECTION I]

SECTION II

Marks

Attempt ALL questions in this section.

10. Charles has been asked to create a program that will add up 5 numbers and then display the total. The numbers are typed in by the user and must be in the range 1–100. The design for the program can be represented in pseudocode as follows:

```
1. take in and add up 5 numbers
2. show total

Refinement of step 1
1.1 set total to zero
1.2 loop 5 times
1.3 get number from user
1.4 add number to total
1.5 end loop
```

- (a) In the design shown above, step 1.2 and step 1.5 represent the beginning and end of a loop.

Name this type of loop.

1

- (b) Step 1.3 needs to be further refined. Which **one** of the following standard algorithms would Charles need to use?

- Find minimum
- Count occurrences
- Input validation
- Find maximum
- Linear search

1

- (c) After completing the design, Charles used an *editor*.

State **two** features of an “editor”.

2

- (d) Two of the numbers Charles used to test *normal data* were 17 and 94.

(i) Suggest **two** numbers Charles should use to test *extreme data*.

1

(ii) Suggest **two** numbers Charles should use to test *exceptional data*.

1

- (e) Charles has poor eyesight. When evaluating his program he found the numbers on the monitor difficult to read.

Describe **two** methods Charles could use to improve the user interface.

2

- (f) Charles compiles his program.

Describe how a compiler translates a program into machine code.

1



- (g) The program has to be altered to allow the numbers entered to be stored as a list.

What data structure would you use to store the list of numbers?

1

(10)

11. Below is an advert showing two different types of computer for sale.

System A	System B
	
2.4 Gigahertz processor 512 Megabytes RAM 80 Gigabytes hard drive DVD-ROM drive Magnetic Tape Drive 17 inch monitor Keyboard & Mouse Graphical User Interface	1.8 Gigahertz processor 256 Kilobytes RAM 60 Gigabytes hard drive CD-ROM drive 15 inch monitor Keyboard & Trackball Graphical User Interface Anti-Virus Software Installed

- (a) The advert shown above was created in a graphics package.
 From the advert, identify **one** object and **one** operation that may have been carried out on that object. 2
- (b) What is the clock speed of System A? 1
- (c) System A has a DVD-ROM drive, hard drive and magnetic tape drive.
 Using **two** suitable characteristics, compare a hard drive with a magnetic tape drive. 2
- (d) System B has anti-virus software.
 (i) Describe how a computer virus operates. 1
 (ii) System A has no anti-virus software.
 Describe **one** common symptom of computer virus infection. 1
- (e) A technical error has made one of the features of System B unsuitable for a modern computer system.
 Identify the technical error and explain your choice. 2
- (f) Explain why a mouse might not be a suitable input device for system B. 1
- (10)**

12. Mrs McNeil’s computing class is working on a programming task.

(a) When writing their programs, pupils often make use of *nested loops* and *logical operators*.

(i) Explain what is meant by the term “nested loop”.

1

(ii) Give **one** example of a “logical operator”.

1

(b) The class is writing a program that will calculate the wages of a worker.

The table below shows the variables used in a program.

<i>Variable Name</i>	<i>Purpose</i>
hours	stores the number of hours worked
rate	stores the hourly rate of pay
wage	stores the wage earned

The wages are calculated by multiplying the number of hours worked by the hourly rate paid.

(i) Using a high level language with which you are familiar, write **one** line of code that will calculate how much a worker earns and assign it to the variable wage.

1

(ii) The program calculates the wage of one worker as £314·36.

Describe how a number like 314·36 is stored in the computer.

2

(iii) When typing the program into the computer, where is the program stored before it is saved to backing storage?

1

(c) The classroom has 20 computers linked in a network.

(i) Describe **one** economic factor that has led to the development of computer networks.

1

(ii) Mrs McNeil wishes to send the task electronically to a pupil who is ill at home.

What information does Mrs McNeil need so that she can send the task electronically?

1

(iii) Mrs McNeil has a different type of computer at home from that used in the school. She saved her program in school as both a high level language file and a machine code file.

Explain why Mrs McNeil was unable to use the machine code file at home but could use the high level language file.

2

(10)

[END OF SECTION II]

SECTION III

Part A—Artificial Intelligence

Marks

Attempt ALL questions in the Artificial Intelligence section.

- 13.** *Eliza* and *chatbots* simulate conversation between humans and machines.
- (a) Give **two** reasons why “Eliza” shows only limited intelligence. **2**
- (b) Describe **one** commercial application of “chatbots”. **1**
- (c) Robots that respond to our spoken commands are being developed.
A busy office introduces a robotic tea trolley that moves around the office and responds to spoken commands like STOP, TEA, COFFEE.
- (i) What area of artificial intelligence is the robot using to understand the commands? **1**
- (ii) Suggest **two** factors that may make communication with the robot unreliable. **2**
- (iii) The robotic tea trolley is fitted with sensors so that it can move around the office without bumping into the furniture.
Suggest **two** sensors that would help the robot detect the furniture. **2**
- (iv) Give **two** advantages of an *intelligent robot* compared to a robot with no intelligence. **2**
- (10)**

SECTION III

Marks

Part A—Artificial Intelligence (continued)

14. The Bank of Caledonia has hired a software company to create an *expert system* that can give financial advice. William, the senior financial adviser, has been asked to work with the software company and help create the “expert system”.
- (a) Suggest **two** reasons why the bank believes it needs an “expert system”, rather than relying on human experts. 2
 - (b) Describe William’s role during the analysis stage of the development of the “expert system”. 1
 - (c) Suggest **one** reason why William may have concerns over the possible use of the “expert system”. 1
 - (d) The bank asks the staff in its Stirling branch to use the “expert system” for a trial period.
Suggest **one** implication for staff using the “expert system” during the trial period. 1
 - (e) “Expert systems” were first developed in the 1970s. Today’s “expert systems” hold many more facts and rules.
State **one** hardware development that has made this possible. 1
 - (f) Give **one** example of an application of an Artificial Neural System that could be used in a bank. 1
- (7)**

SECTION III

Marks

Part A—Artificial Intelligence (continued)

15. A tourist board has a program written in a declarative language that uses depth first search. The knowledge base holds facts about places in the UK and is used to recommend places to visit.

1 location(blackpool,england). *Means Blackpool's location is England*
2 location(caernarvon,wales).
3 location(edinburgh,scotland).
4 location(stirling,scotland).
5 location(linlithgow,scotland).

6 has(blackpool,tower). *Means Blackpool has a tower*
7 has(caernarvon,castle).
8 has(edinburgh,castle).
9 has(stirling,castle).
10 has(linlithgow,palace).

11 american_visit(X) if *Americans will visit X if*
location(X,scotland) and *location of X is Scotland and*
has(X,castle). *X has a castle*

- (a) (i) What would be the result of the following query?
location(glasgow,scotland). 1
- (ii) What output will result from the query?
has(linlithgow,X). 1
- (b) (i) What are **all** the solutions which will be found from the query?
american_visit(X). 2
- (ii) Using the numbering system to help you, trace how the system evaluates the query american_visit(X) as far as the **first** solution. 2

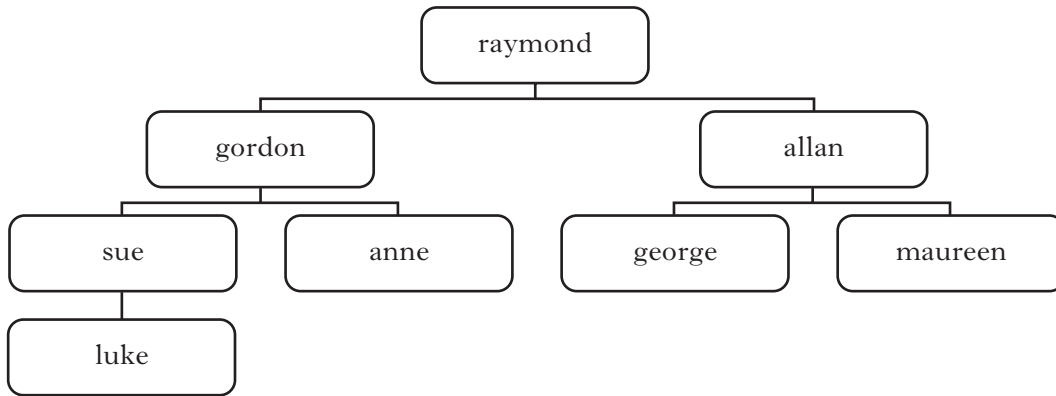
SECTION III

Marks

Part A—Artificial Intelligence (continued)

15. (continued)

(c) The diagram below shows a search tree based on a knowledge base of people working in a factory.



By listing the nodes in the order in which they are visited, describe the search path taken

- (i) using a breadth first search for allan
- (ii) using a depth first search for allan.

1
1
(8)

[END OF SECTION III—PART A—ARTIFICIAL INTELLIGENCE]

SECTION III

Part B—Computer Networking

Marks

Attempt ALL questions in the Computer Networking section.

16. A school library has eight networked computers.

- (a) The library would like to give all eight computers access to the Internet.
What type of Internet connection would be most suitable for the library?
Give **one** reason for your answer. 2
- (b) Before using the Internet, library users must agree to a code of conduct.
Suggest **two** rules that may be contained in this code of conduct. 2
- (c) The library will need an *internet service provider* (ISP).
Describe the purpose of an ISP. 1
- (d) The library has set up software security measures to stop unauthorised access to the Internet.
Describe **one** example of software security measures. 1
- (e) The library has purchased a Web browser.
State **two** features you would expect a Web browser to contain. 2
- (f) The following URL was entered:

`http://www.intelligent-games.co.uk`

A few seconds later, the home page of Intelligent Games was displayed on the monitor.

- (i) Which service of the Internet is being used? 1
- (ii) What type of software is required to change the URL into an Internet Protocol address (IP address)? 1

(10)

SECTION III

Marks

Part B—Computer Networking (continued)

17. The QAR bank uses a *leased line* from the public telephone system to transfer customer account details between banks.
- (a) Justify why the bank has gone to the expense of using a “leased line”. **1**
- (b) Information is transmitted between banks using *asynchronous data transmission*.
Explain how information is sent using “asynchronous data transmission”. **2**
- (c) The bank wishes to intercept and read all messages between banks to ensure the network is being used for authorised purposes only.
- (i) State whether the bank is allowed to intercept and read messages between banks. Give **one** reason for your answer. **1**
- (ii) Name **one** method of ensuring that the information would be unreadable if it was intercepted. **1**
- (d) A fire has completely destroyed the QAR bank computer and all the data it contained. Within six hours, bank customers were able to access all their account details again.
How was the bank able to be working again in such a short time? **2**
- (7)**

SECTION III

Marks

Part B—Computer Networking (continued)

18. Roxtel is a small company developing *converging technologies* for the household market.
- (a) Explain what is meant by the term “converging technologies”? 1
- (b) Roxtel intend to create and host a Web page.
Suggest **two** economic implications for Roxtel of using the Internet for business. 2
- (c) Each employee has a laptop computer for working at home.
- (i) The software for the laptop came with a *technical guide*.
Name **two** contents of a “technical guide”. 2
- (ii) When an employee takes their laptop into the workplace they do **not** need to attach any cables to access the company network.
Name **one** piece of hardware that the laptop requires to allow access to the network. 1
- (d) Data may be transmitted around the network using *unicast*, *broadcast* or *multicast*.
What is meant by the term “unicast”? 1
- (e) One employee used the network to access on-line gambling.
Describe **one** method of preventing access to this type of website. 1
- (8)**

[END OF SECTION III—PART B—COMPUTER NETWORKING]

SECTION III

Part C—Multimedia Technology

Marks

Attempt ALL questions in the Multimedia Technology section.

19. Rachel is a singer with a band. She is creating a multimedia website which will allow fans to listen to the band’s music, view photographs and read about the band.

(a) State **two** ways of capturing a photograph of the band. 2

(b) Once Rachel has the photographs stored on her computer, she decides to edit it to show only a “head and shoulders” photo.

Name the feature of image editing software that she should use to do this. 1

(c) Rachel converts the original bit-mapped files into JPEG format.

What effect will this will have on the size of the file? 1

(d) Rachel records audio clips of the band’s music. The software allows her to change the *sampling frequency* and the *sampling depth*.

Select settings:	
<u>Sampling frequency</u>	<u>Sampling depth</u>
<input type="radio"/> 22 kHz	<input type="radio"/> 8 bits
<input type="radio"/> 44 kHz	<input type="radio"/> 16 bits
<input type="button" value="Continue"/>	

(i) In order to have the best sound quality what settings should she select for *sampling frequency* and *sampling depth*? 1

(ii) What effect will recording the sound at best quality have on the size of the sound file? 1

(e) Rachel wants to add *hyperlinks* to her website.

Describe **two** methods of adding a “hyperlink”. 2

(f) Rachel has completed the implementation stage of creating the website.

(i) What is the next stage of the development process? 1

(ii) Describe what Rachel should do at this stage. 1

(10)

SECTION III

Marks

Part C—Multimedia Technology (continued)

20. Jonathan works for DynamicMedia a company that specialises in the latest technology. They are developing an interactive multimedia presentation to promote the latest *Pocket PC*.
- (a) While viewing the presentation, customers are able to listen to audio clips giving reviews and advantages of the “Pocket PCs”.
- (i) Name **two** items of hardware that will be needed to **capture** audio. 2
- (ii) Name **two** file types that can be used to store audio. 2
- (b) The presentation includes a video clip of people using the “Pocket PC”. The video is high quality but the file size is too large. To reduce the file size Jonathan can alter the following properties
- *colour depth*
 - *resolution*
 - *frame rate*
 - *video time.*
- (i) Select the **two** properties that you think he should change and give a reason to support your recommendation in each case. 2
- (ii) Name **two** items of hardware that a desktop computer will require to display video. 2
- (8)**

SECTION III

Marks

Part C—Multimedia Technology (continued)

21. Andrew is creating a multimedia game called Survival. He is using 3-Dimensional (3D) graphics software to create the world where the game is set.
- (a) Andrew defines *textures* for objects. One of the objects he creates is an aeroplane.
Suggest a suitable “texture” that can be applied to an object like an aeroplane. **1**
- (b) After creating the graphic of an aeroplane, Andrew uses copy and paste to get a second identical aeroplane. He wants it partly hidden behind the first plane. What feature of vector graphics will allow him to do this? **1**
- (c) Andrew creates the 3D world using vector graphics.
Name **two** file types used to store graphics in vector format. **2**
- (d) Music stored as MIDI files is used in the game.
Suggest **two** attributes of the sound that could be changed as the game gets more exciting. **2**
- (e) Below is the screen that is shown at the end of the game.



- What standard algorithm was used to identify “Today’s Top Scorer”? **1**
(7)

[END OF SECTION III—PART C—MULTIMEDIA TECHNOLOGY]

[END OF SPECIMEN QUESTION PAPER]

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[C206/SQP223]

Computing
Intermediate 2
Specimen Marking Instructions

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SECTION I		MARKING GUIDELINES
1.	<p>Data is stored in memory using bits.</p> <p>What is the largest positive number that can be stored using 4 bits?</p>	<p>15 or $2^4 - 1$ 2 marks 16 or 2^4 1 mark</p> <p>CS(data rep) – PS</p>
2.	<p>All computers have an operating system.</p> <p>Explain the difference between an operating system and an application program.</p>	<p>Operating systems control the running of the computer and peripheral devices. Application software is used to carry out specific tasks such as word processing, spreadsheets etc.</p> <p>1 mark each 2 marks max CS(comp soft) – KU</p>
3.	<p>The design of a program can be represented by <i>pseudocode</i>, or by a graphical design notation.</p> <p>Name and describe one graphical design notation with which you are familiar.</p>	<p>Must be name (structure diagram, flow charts, data flow diagram, any other valid answer) and suitable description</p> <p>1 mark each 2 marks max SD(SDP) – KU</p>
4.	<p>Explain why a macro would save time for an application user.</p>	<p>Series of steps carried out in only one keystroke so much quicker to carry out an operation</p> <p>1 mark SD(lang & env) – PS</p>

5.	Give one reason why an interface is needed between a CPU and a peripheral device such as a printer.	<p>Compensate for different speeds Conversion from analogue to digital Temporary data storage</p> <p><i>1 mark</i> CS(periph) – KU</p>
6.	Software is evaluated in terms of <i>fitness for purpose, readability and user interface</i> .	
	(a) Explain the term “fitness for purpose”.	<p>Does the program meet the specification. Any other valid answer.</p> <p><i>1 mark</i> SD(SDP) – PS</p>
	(b) Describe how “readability” would help a programmer during the testing stage.	<p>Help programmer understand section of code that needs to be changed.</p> <p><i>1 mark</i> SD(SDP) – PS</p>
7.	Colin finds information about the “Ancient Romans” on the World Wide Web using a search engine. What is a search engine?	<p>A feature that will search the WWW for particular web pages that contain the word or words entered by the user. Any other valid answer. Do not accept proprietary names eg Google</p> <p><i>1 mark</i> CS (network) – KU</p>

8.	<p>The Arithmetic and Logic Unit (ALU) is part of the processor. Name the other two parts of the processor.</p>	<p>Control Unit Registers (only accept these answers) <i>1 mark each 2 marks max</i> <i>CS(Comp Struct) – KU</i></p>
9.	<p>Computer programmers make use of <i>pre-defined functions</i>.</p>	
(a)	<p>What is a “pre-defined function”?</p>	<p>In-built piece of coding that will perform some sort of calculation <i>1 mark</i> <i>SD(lang const) – KU</i></p>
(b)	<p>Give one example of a standard “pre-defined function”.</p>	<p>RND, INT, COUNT Any other valid answer <i>1 mark</i> <i>SD(lang const) – PS</i></p>

END OF SECTION I

SECTION II	MARKING GUIDELINES
<p>10. Charles has been asked to create a program that will add up 5 numbers and then display the total. The numbers are typed in by the user and must be in the range 1–100. The design for the program can be represented in pseudocode as follows:</p> <ol style="list-style-type: none"> 1. take in and add up 5 numbers 2. show total <p>refinement of step 1</p> <ol style="list-style-type: none"> 1.1 set total to zero 1.2 loop 5 times 1.3 get number from user 1.4 add number to total 1.5 end loop 	
<p>(a) In the design shown above, step 1.2 and step 1.5 represent the beginning and end of a loop.</p> <p>Name this type of loop.</p>	<p>Fixed loop Unconditional loop (only acceptable answers)</p> <p><i>I mark</i> <i>SD(Lang Const – PS)</i></p>
<p>(b) Step 1.3 needs to be further refined. Which one of the following standard algorithms would Charles need to use?</p> <ul style="list-style-type: none"> • Find minimum • Count occurrences • Input validation • Find maximum • Linear search 	<p>Input validation</p> <p><i>I mark</i> <i>SD(Stand Alg) – PS</i></p>

	<p>(c) After completing the design, Charles used an <i>editor</i>. State two features of an “editor”.</p>	<p>Ability to enter and edit program code Search & replace Indentation of structures Formatting of command words <i>1 mark each 2 marks max</i> <i>SD(Lang & Envir) – KU</i></p>
	<p>(d) Two of the numbers Charles used to test <i>normal data</i> were 17 and 94. (i) Suggest two numbers Charles should use to test <i>extreme data</i>. (ii) Suggest two numbers Charles should use to test <i>exceptional data</i>.</p>	<p>1 and 100 <i>1 mark</i> <i>SD(soft Dev Process) – PS</i> Any two numbers outside the given range of 1 – 100 eg – 5, 101 or any other exceptional data eg text <i>1 mark</i> <i>SD(soft Dev Process) – PS</i></p>
	<p>(e) Charles has poor eyesight. When evaluating his program he found the numbers on the monitor difficult to read. Describe two methods Charles could use to improve the user interface.</p>	<p>Increase the size of the text Use voice output Use contrasting colours <i>1 mark each 2 marks max</i> <i>SD(soft Dev Process) – PS</i></p>
	<p>(f) Charles compiles his program. Describe how a compiler translates a program into machine code.</p>	<p>Translates the entire program at the one time <i>1 mark</i> <i>SD(Lang & Envir) – KU</i></p>

	<p>(g) The program has to be altered to allow the numbers entered to be stored as a list.</p> <p>What data structure would you use to store the list of numbers?</p>	<p>Array</p> <p><i>1 mark</i> <i>SD(Lang & Constructs) – PS</i></p>
11.	<p>Below is an advert showing two different types of computer for sale (see paper for diagram).</p>	
	<p>(a) The advert shown above was created in a graphics package. From the advert, identify one object and one operation that may have been carried out on that object.</p>	<p><i>1 mark for any correct object and possible corresponding operation eg</i> picture of computer – scaled Heading System A – font size increased</p> <p><i>1 mark each max 2 marks</i> <i>CS(Comp Soft) – PS</i></p>
	<p>(b) What is the clock speed of System A?</p>	<p>2.4 Gigahertz</p> <p><i>1 mark</i> <i>CS(Comp Structure) – PS</i></p>
	<p>(c) System A has a DVD-ROM drive, hard drive and magnetic tape drive.</p> <p>Using two suitable characteristics, compare a hard drive with a magnetic tape drive.</p>	<p>Access type – HD – random/direct MT – serial/sequential Speed of data transfer – HD has a faster data transfer rate than MT</p> <p>Do not accept capacity or cost</p> <p><i>1 mark each max 2 marks</i> <i>CS(Peripherals) – PS</i></p>

	<p>(d) System B has anti-virus software.</p> <p>(i) Describe how a computer virus operates.</p> <p>(ii) System A has no anti-virus software. Describe one common symptom of computer virus infection.</p>	<p>A virus attaches itself to a file/program then spreads to other files.</p> <p><i>1 mark</i> <i>CS(Comp Software) – KU</i></p> <p>Displaying unwanted messages Unusual sound/visual effects Computer rebooting unexpectedly Unwanted generation of e-mails</p> <p><i>1 mark</i> <i>CS(Comp Software) – KU</i></p>
	<p>(e) A technical error has made one of the features of System B unsuitable for a modern computer system. Identify the technical error and explain your choice.</p>	<p>The error is 256 Kilobytes RAM</p> <p><i>1 mark</i></p> <p>No modern computer could operate with this amount of memory/or it should be MB</p> <p><i>1 mark</i> <i>CS(Data Rep) – PS</i></p>
	<p>(f) Explain why a mouse might not be a suitable input device for system B.</p>	<p>Might not have a flat surface to use the mouse on Might not have room beside the computer for a mouse Mouse is harder to control than trackball Others</p> <p><i>1 mark</i> <i>CS (Peripherals) – PS</i></p>

12.	<p>Mrs McNeil's computing class is working on a programming task.</p> <p>(a) When writing their programs, pupils often make use of <i>nested loops</i> and <i>logical operators</i>.</p> <p>(i) Explain what is meant by the term "nested loop".</p> <p>(ii) Give one example of a "logical operator".</p>	<p>A loop that is completely contained within another loop.</p> <p><i>1 mark</i> <i>SD(Lang & Constructs) – KU</i></p> <p>AND OR NOT</p> <p><i>Any one of above, 1 mark</i> <i>SD(Lang & Constructs) – KU</i></p>								
	<p>(b) The class is writing a program that will calculate the wages of a worker.</p> <p>The table below shows the variables used in a program.</p> <table border="1" data-bbox="833 1146 1067 1942"> <thead> <tr> <th><i>Variable Name</i></th> <th><i>Purpose</i></th> </tr> </thead> <tbody> <tr> <td>hours</td> <td>stores the number of hours worked</td> </tr> <tr> <td>rate</td> <td>stores the hourly rate of pay</td> </tr> <tr> <td>wage</td> <td>stores the wage earned</td> </tr> </tbody> </table> <p>The wages are calculated by multiplying the number of hours worked by the hourly rate paid.</p>	<i>Variable Name</i>	<i>Purpose</i>	hours	stores the number of hours worked	rate	stores the hourly rate of pay	wage	stores the wage earned	
<i>Variable Name</i>	<i>Purpose</i>									
hours	stores the number of hours worked									
rate	stores the hourly rate of pay									
wage	stores the wage earned									

	<p>(i) Using a high level language with which you are familiar, write one line of code that will calculate how much a worker earns and assign it to the variable wage.</p> <p>(ii) The program calculates the wage of one worker as £314.36. Describe how a number like 314.36 is stored in the computer.</p> <p>(iii) When typing the program into the computer, where is the program stored before it is saved to backing storage?</p>	<p>wage = rate * hours <i>1 mark The variables, assignment and * must be correct to get the mark SD(Lang & Constructs) – PS</i></p> <p>Floating point representation Mantissa Exponent <i>1 mark each max 2 marks CS(data rep) – KU</i></p> <p>RAM <i>1 mark CS(Comp Structure) – KU</i></p>
	<p>(c) The classroom has 20 computers linked in a network.</p> <p>(i) Describe one economic factor that has led to the development of computer networks.</p> <p>(ii) Mrs McNeil wishes to send the task electronically to a pupil who is ill at home. What information does Mrs McNeil need so that she can send the task electronically?</p>	<p>Failing cost of telecommunication technologies and services Shared access to expensive equipment Geographic spread of organisations Demand for up-to-date information <i>Any one of above, 1 mark CS(Networking) – KU</i></p> <p>E-mail address <i>1 mark CS(Networking) – PS</i></p>

	<p>(iii) Mrs McNeil has a different type of computer at home from that used in the school. She saved her program in school as both a high level language file and a machine code file.</p> <p>Explain why Mrs McNeil was unable to use the machine code file at home but could use the high level language file.</p>	<p>High level languages are portable High level language instructions can be translated to her specific machine instructions <i>any one for 1 mark</i></p> <p>Machine code files are not portable Machine code is machine specific <i>any one for 1 mark</i> <i>SD(Lang & Envir) – PS</i></p>
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END OF SECTION II

SECTION III – PART A – ARTIFICIAL INTELLIGENCE		MARKING GUIDELINES
13.	<i>Eliza</i> and <i>chatterbots</i> simulate conversation between humans and machines.	
	(a) Give two reasons why “Eliza” shows only limited intelligence.	No memory of previous conversation. It just uses keywords to create responses. <i>1 mark each, max 2 marks</i> <i>AI(development) – KU</i>
	(b) Describe one commercial application of “chatterbots”.	A telephone answering service that directs calls Airline/Hotel Booking Systems <i>1 mark</i> <i>AI development – KU</i>
	(c) Robots that respond to our spoken commands are also being developed. A busy office introduces a robotic tea trolley that moves around the office and responds to spoken commands like STOP, TEA, COFFEE. (i) What area of artificial intelligence is the robot using to understand the commands? (ii) Suggest two factors that may make communication with the robot unreliable. (iii) The robotic tea trolley is fitted with sensors so that it can move around the office without bumping into the furniture. Suggest two sensors that would help the robot detect the furniture.	Voice/speech recognition <i>1 mark</i> <i>AI applications PS</i> Background noise Accents/colds <i>1 mark each, max 2 marks</i> <i>AI applications – PS</i> Bump sensor Infra red Touch Magnetic Light <i>1 mark each, max 2 marks</i> <i>AI(applications) – PS</i>

	(iv) Give two advantages of an <i>intelligent robot</i> compared to a robot with no intelligence.	More flexible Adjusts what it does according to conditions Uses feedback from sensors <i>1 mark each, max 2 marks</i> <i>AI(applications) – KU</i>
14.	The Bank of Caledonia has hired a software company to create an <i>expert system</i> that can give financial advice. William, the senior financial adviser, has been asked to work with the software company and help create the “expert system”.	
	(a) Suggest two reasons why the bank believes it needs an “expert system”, rather than relying on human experts.	Human experts retire, die, are too few, are flawed, any sensible answer <i>1 mark each, max 2 marks</i> <i>AI(applications) – KU</i>
	(b) Describe William’s role during the analysis stage of the development of the “expert system”.	Provides knowledge and explains reasoning he uses to reach decision <i>1 mark</i> <i>SD(SDP) – KU</i>
	(c) Suggest one reason why William may have concerns over the possible use of the “expert system” by his employees.	Fears made redundant loss of status Took him a long time to acquire the knowledge <i>1 mark</i> <i>AI(applications) – PS</i>
	(d) The bank asks the staff in its Stirling branch to use the “expert system” for a trial period. Suggest one implication for staff using the “expert system” during the trial period.	Staff need training <i>1 mark</i> <i>AI(applications) – PS</i>

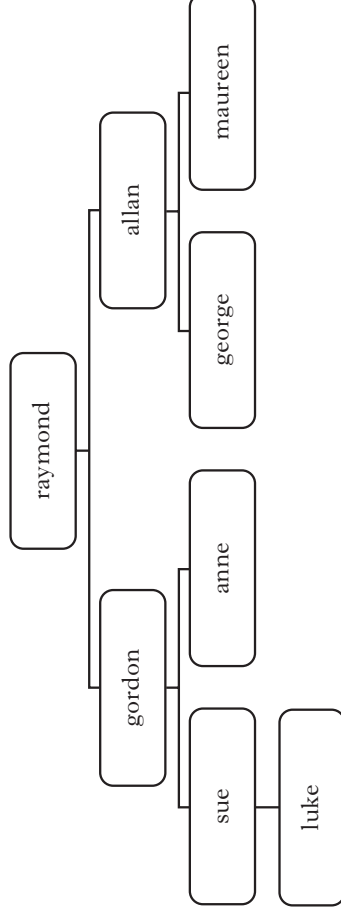
	<p>(e) “Expert systems” were first developed in the 1970s. Today’s “expert systems” hold many more facts and rules.</p> <p>State one hardware development that has made this possible.</p>	<p>Larger capacity hard drives Larger and cheaper RAM</p> <p><i>1 mark</i> <i>AI(Applications & Uses) – PS</i></p>
	<p>(f) Give one example of an application of an Artificial Neural System that could be used in a bank.</p>	<p>Stock market prediction Debt risk assessment</p> <p><i>Accept any reasonable answer</i> <i>1 mark each</i> <i>AI(Applications & Uses) – KU</i></p>
<p>15.</p>	<p>A tourist board has a program written in a declarative language that uses depth first search. The knowledge base holds facts about places in the UK and is used to recommend places to visit.</p> <p>1 location(blackpool,england). 2 location(caernarvon,wales). 3 location(edinburgh,scotland). 4 location(stirling,scotland). 5 location(linlithgow,scotland).</p> <p>6 has(blackpool,tower). 7 has(caernarvon,castle). 8 has(edinburgh,castle). 9 has(stirling,castle). 10 has(linlithgow,palace).</p> <p>11 american_visit(X) if location(X,scotland) and has(X,castle).</p> <p>Means Blackpool’s location is England</p> <p>Means Blackpool has a tower</p> <p>Americans will visit X if location of X is Scotland and X has a castle</p>	

	<p>(a) (i) What would be the result of the following query? location(glasgow,scotland).</p> <p>(ii) What output will result from the query? has(linlithgow,X).</p>	<p>No <i>1 mark</i> <i>AI(knowledge representation) – PS</i></p> <p>X=palace <i>1 mark</i> <i>AI(knowledge representation) – PS</i></p>
	<p>(b) (i) What are all the solutions which will be found from the query? american_visit(X).</p> <p>(ii) Using the numbering system to help you, trace how the system evaluates the query american_visit(X) as far as the first solution.</p>	<p>X=Edinburgh X=Stirling <i>1 mark each, max 2 marks</i> <i>AI(knowledge representation) – PS</i></p> <p>11 – 3 – 8 <i>1 mark</i></p> <p>Subgoal location (X,Scotland) matches at 3 X=Edinburgh <i>1 mark</i></p> <p>Subgoal has (edinburgh,castle) matches at 8 <i>1 mark</i></p> <p><i>Max 2 marks</i> <i>AI(knowledge representation) – PS</i></p>

(c) The diagram below shows a search tree based on a knowledge base of people working in a factory. By listing the nodes in the order in which they are visited, describe the search path taken during a search for allan

(i) using a breadth first search for allan

(ii) using a depth first search for allan



raymond, gordon, allan

I mark
AI(Search techniques) – PS

raymond, gordon, sue, anne, luke, allan

I mark
AI(Search techniques) – PS

END OF SECTION III – PART A – ARTIFICIAL INTELLIGENCE

SECTION III – PART B – COMPUTER NETWORKING		MARKING GUIDELINES
16.	A school library has eight networked computers.	
	<p>(a) The library would like to give all eight computers access to the Internet.</p> <p>What type of Internet connection would be most suitable for the library?</p> <p>Give one reason for your answer.</p>	<p>Either Cable Modem, ADSL or ISDN</p> <p><i>1 mark</i></p> <p>Have sufficient bandwidth to share the connection between eight computers without slowing down too much. – <i>1 mark</i></p> <p><i>Accept negative reasons like dialup insufficient bandwidth or leased line too expensive</i></p> <p><i>Networking(Data Trans) – PS</i></p>
	<p>(b) Before using the Internet, library users must agree to a code of conduct.</p> <p>Suggest two rules that may be in this code of conduct.</p>	<p>Do not download material which is offensive.</p> <p>Do not give out personal details to someone you do not know</p> <p>Do not use offensive language</p> <p>Do not download/distribute harmful material eg virus</p> <p>Others.....</p> <p><i>1 mark each, 2 marks max</i></p> <p><i>Networking(Net Apps) – PS</i></p>
	<p>(c) The library will need an <i>internet service provider (ISP)</i>.</p> <p>Describe the purpose of an ISP.</p>	<p>Provides access to computers connected to the Internet</p> <p><i>1 mark</i></p> <p><i>Networking(Net Apps) – KU</i></p>

	<p>(d) The library has set up software security measures to stop unauthorised access to the Internet.</p> <p>Describe one example of software security measures.</p>	<p>A password is needed before access is given</p> <p><i>1 mark</i> Networking(Net Security) – KU</p>
	<p>(e) The library has purchased a Web browser.</p> <p>State two features you would expect a Web browser to contain.</p>	<p>E-mail File transfer Retrieve Web-pages (Do not accept browse the Web) Save pages Print pages Move backward/forward</p> <p><i>1 mark each, 2 marks max</i> CS(Networking) – PS</p>
	<p>(f) The following URL was entered: http://www.intelligent-games.co.uk</p> <p>A few seconds later, the home page of Intelligent Games was displayed on the monitor.</p> <p>(i) Which service of the Internet is being used?</p> <p>(ii) What type of software is required to change the URL into an Internet Protocol address (IP address)?</p>	<p>World Wide Web (accept WWW)</p> <p><i>1 mark</i> Networking(Net Apps) – PS</p> <p>Domain Name Server software (accept DNS Software)</p> <p><i>1 mark</i> Networking(Net Protocols) – KU</p>

17.	The QAR bank uses a <i>leased line</i> from the public telephone system to transfer customer account details between banks.	
	(a) Justify why the bank has gone to the expense of using a “leased line”.	It is important that the connection is always available for their sole use <i>I mark</i> <i>Networking(Data trans) – PS</i>
	(b) Information is transmitted between banks using <i>asynchronous data transmission</i> . Explain how information is sent using “asynchronous data transmission”.	Character is sent as soon as it becomes available <i>I mark</i> Using start and stop bits <i>I mark</i> <i>Networking(Data trans) – KU</i>
	(c) The bank wishes to intercept and read all messages between banks to ensure the network is being used for authorised purposes only. (i) State whether the bank is allowed to intercept and read messages between banks. Give one reason for your answer. (ii) Name one method of ensuring that the information would be unreadable even if it was intercepted.	<i>I mark for a valid reason of whether they should be allowed to or not. Both situations are acceptable as long as there is a valid explanation. Eg</i> Yes – they own the local network therefore have the legal right to examine all data traffic No – they are using the public telephone system therefore RIPA 2000 states that they must get permission from the home secretary Encryption <i>I mark</i> <i>Networking(Net Security) – KU</i>

	<p>(d) A fire has completely destroyed the QAR bank computer and all the data it contained. Within six hours, bank customers were able to access all their account details again.</p> <p>How was the bank able to be working again in such a short time?</p>	<p>They had a backup strategy They had a backup copy of the data stored in a different location They had backup computer hardware that could be used.</p> <p><i>1 mark each 2 marks max Networking(Net Security) – PS</i></p>
18.	<p>Roxtel is a small company developing <i>converging technologies</i> for the household market.</p>	
	<p>(a) What is meant by the term “converging technologies”?</p>	<p>Home appliances with built-in internal and external communications capability</p> <p><i>1 mark Networking(Net Apps) – KU</i></p>
	<p>(b) Roxtel intend to create and host a Web page.</p> <p>Suggest two economic implications for Roxtel of using the Internet for business.</p>	<p>Marketing opportunity On-line sales Cost of creating and maintaining web-site</p> <p><i>1 mark each 2 marks max Networking(Net Apps) – PS</i></p>
	<p>(c) Each employee has a laptop computer for working at home.</p> <p>(i) The software for the laptop came with a <i>technical guide</i>. Name two of the contents of a “technical guide”.</p>	<p>Hardware requirements Software requirements Troubleshooting guide</p> <p><i>1 mark each 2 marks max SD(SDP) – KU</i></p>

	<p>(ii) When an employee takes their laptop into the workplace they do not need to attach any cables to access the company network.</p> <p>Name one piece of hardware that the laptop requires to allow access to the network.</p>	<p>Wireless (essential) network interface card</p> <p><i>1 mark</i> <i>Networking(Data trans) – PS</i></p>
	<p>(d) Data may be transmitted around the network using <i>unicast, broadcast</i> or <i>multicast</i>.</p> <p>What is meant by the term “unicast”?</p>	<p>One to one or one sender to one receiver</p> <p><i>1 mark</i> <i>Networking(Data trans) – KU</i></p>
	<p>(e) One employee used the network to access on-line gambling.</p> <p>Describe one method of preventing access to this type of website.</p>	<p>Filter the contents for on-line gambling Use a firewall</p> <p><i>Any one for 1 mark</i> <i>Do not accept answers like gambling is blocked – just rewording question</i> <i>Networking(Net Security) – PS</i></p>

END OF SECTION III – PART B – COMPUTER NETWORKING

SECTION III – PART C – MULTIMEDIA TECHNOLOGY		MARKING GUIDELINES
19.	<p>Rachel is a singer with a band. She is creating a multimedia website which will allow fans to listen to the band’s music, view photos and read about the band.</p> <p>(a) State two ways of capturing pictures of the band.</p> <p>(b) Once Rachel has the pictures stored on her computer, she decides to edit them to show only a “head and shoulders” photo. Name the feature of image editing software that she should use to do this.</p> <p>(c) Rachel converts the original bit-mapped pictures in JPEG format. What effect will this have on the size of the file?</p>	<p>Scanner Digital camera <i>1 mark each max 2 marks</i> <i>MM(bit mapped graphic) – KU</i></p> <p>Crop <i>1 mark</i> <i>MM(bit mapped graphic) – PS</i></p> <p>reduces file size <i>1 mark</i> <i>MM(bit mapped graphic) – KU</i></p>

	<p>(d) Rachel records audio clips of the band's music. The software allows her to change the <i>sampling frequency</i> and the <i>sampling depth</i>.</p> <div style="border: 1px solid black; padding: 10px; margin: 10px 0;"> <p>Select settings :</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; border-bottom: 1px solid black; padding-bottom: 5px;">Sampling frequency</td> <td style="width: 50%; border-bottom: 1px solid black; padding-bottom: 5px;">Sampling depth</td> </tr> <tr> <td style="padding: 5px 0 5px 20px;"> <input type="radio"/> 22 kHz <input type="radio"/> 44 kHz </td> <td style="padding: 5px 0 5px 20px;"> <input type="radio"/> 8 bits <input type="radio"/> 16 bits </td> </tr> </table> <div style="text-align: right; margin-top: 10px;"> <input type="button" value="Continue"/> </div> </div> <p>(i) In order to have the best sound quality what settings should she select for <i>sampling frequency</i> and <i>sampling depth</i>?</p> <p>(ii) What effect will recording the sound at best quality have on the size of the sound file?</p>	Sampling frequency	Sampling depth	<input type="radio"/> 22 kHz <input type="radio"/> 44 kHz	<input type="radio"/> 8 bits <input type="radio"/> 16 bits	<p>sampling frequency 44kHz, sample resolution 16bits</p> <p><i>I mark</i> <i>MM(digitised sound data) – PS</i></p> <p>Larger file size</p> <p><i>I mark</i> <i>MM(digitised sound data) – PS</i></p>
Sampling frequency	Sampling depth					
<input type="radio"/> 22 kHz <input type="radio"/> 44 kHz	<input type="radio"/> 8 bits <input type="radio"/> 16 bits					
	<p>(e) Rachel wants to add <i>hyperlinks</i> to her website.</p> <p>Describe two methods of adding a “<i>hyperlink</i>”.</p>	<p>Select item click on insert hyperlink icon, enter address</p> <p>Use HTML</p> <p><i>I mark each max 2 marks</i> <i>MM</i></p>				

	<p>(f) Rachel has completed the implementation stage of creating the website.</p> <p>(i) What is the next stage of the development process?</p> <p>(ii) Describe what Rachel should do at this stage.</p>	<p>Testing <i>1 mark</i> SD (SDP) – KU</p> <p>Preview the website to check layout clicking on links to make sure they work</p> <p><i>1 mark</i> MM(Dev process also link to software development) – PS</p>
20.	<p>Jonathan works for DynamicMedia a company that specialises in the latest technology. They are developing an interactive multimedia presentation to promote the latest <i>Pocket PC</i>.</p>	
	<p>(a) While viewing the presentation, customers are able to listen to audio clips giving reviews and advantages of the “Pocket PCs”.</p> <p>(i) Name two items of hardware that will be needed to capture audio.</p> <p>(ii) Name two file types that can be used to store audio.</p>	<p>Microphone sound card</p> <p><i>1 mark each max 2 marks</i> MM(digitised sound data) – KU</p> <p>Wav MP3 RAW</p> <p><i>1 mark each max 2 marks</i> MM(digitised sound data) – KU</p>

	<p>(b) The presentation includes a video clip of people using the “Pocket PC”. The video is high quality but the file size is too large. To reduce the file size Jonathan can alter the following properties.</p> <ul style="list-style-type: none"> • colour depth • resolution • frame rate • video time. <p>(i) Select the two properties that you think he should change and give a reason to support your recommendation in each case.</p> <p>(ii) Name two items of hardware that a desktop computer will require to display video.</p>	<p>colour depth –human eye will not notice the difference resolution – you may not need as high quality frame rate – but not too small–too few would give a jerky presentation video time – only a short clip of a few minutes is needed must give reason <i>1 mark each max 2 marks</i> <i>MM(video data) – PS</i></p> <p>graphics card monitor <i>1 mark each max 2 marks</i> <i>MM(video data) – PS</i></p>
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21.	<p>Andrew is creating a multimedia game called Survival. He is using 3-Dimensional (3D) graphics software to create the world where the game is set.</p>	
	<p>(a) Andrew defines <i>textures</i> for objects. One of the objects he creates is an aeroplane. Suggest a suitable “texture” that can be applied to an object like an aeroplane.</p>	<p>Shiny, metallic appearance <i>1 mark</i> MM(Vector graphics data) – PS</p>
	<p>(b) After creating the graphic of an aeroplane, Andrew uses copy and paste to get a second identical aeroplane. He wants it partly hidden behind the first plane. What feature of vector graphics will allow him to do this?</p>	<p>layering, send to back <i>1 mark</i> MM(Vector graphics data) – PS</p>
	<p>(c) Andrew creates the 3D world using vector graphics. Name two file types used to store graphics in vector format.</p>	<p>WRL VRML SVG <i>1 mark each max 2 marks</i> MM(Vector graphics data) – PS</p>
	<p>(d) Music stored as MIDI files is used in the game. Suggest two attributes of the sound that could be changed as the game gets more exciting.</p>	<p>Pitch Volume Duration Instrument <i>1 mark each max 2 marks</i> MM(synthesised sound data) – PS</p>

(e) Below is the screen that is shown at the end of the game.

TODAY'S TOP SCORER
ALAN 320 Pts

What standard algorithm was used to identify "Today's Top Scorer"?

Find Maximum Algorithm

I mark
SD(standard algorithms) – PS

END OF SECTION III – PART C – MULTIMEDIA TECHNOLOGY

[END OF SPECIMEN MARKING INSTRUCTIONS]