AS ICT

Student Workbook

Teacher Notes

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Introduction

This student workbook contains questions that are generic to the three main examination boards offering ICT at advanced level (OCR, WJEC, AQA), and would also be suitable for some of the theoretical parts of Applied ICT.

The eight chapters are aimed at reminding the student of the key parts of the specification, reinforcing the vocabulary they must learn, and enabling them to practise answering examination-type questions.

The chapters cover the following points:

- data, information, knowledge and processing and how they are related
- software and hardware components of an information system
- the characteristics of standard applications
- the concepts of spreadsheets and relational databases
- presentation and communication of data
- networking and processing
- the role and impact of ICT on life in general

The teacher notes are mainly concerned with providing possible (though not exhaustive) answers of the type that examiners will find acceptable. One of the hardest things to get across to students is the need to **make a point** to **score a mark**. Repetition in an answer only wastes time and can prevent the student including material that could score extra marks.

P01499

The workbook is not intended to be stand-alone, but to enable revision once the work has been covered. In each chapter the questions are roughly graded so that, in general, the earlier questions are less demanding in terms of analytical skills than the later ones — although in some cases the subject matter means this is not possible.

The workbook is a good source of homework questions and would work well when used alongside past papers. The convenience of these workbooks is that the topics are grouped together for ease of use.

The introduction to the workbook offers the student guidance on interpreting questions. It would be helpful if you amplified these points.

1 Data, information, knowledge and processing

Question 1

a Examples of data could be Smith, 121254, 4, yes.

b Examples of information could be:
- name – Smith
- date – 12 December 1954
- number of films – 4
- enhance film? – yes

c Examples of knowledge could be:
- The film has deteriorated over the years.
- The film was made when Winston Churchill was prime minister.

Question 2

Examples of data types could include:

a Boolean: yes, no

b integer: 4, 1

c character: S, t, 9

d string: Smith, PE33 0XY

e date: 12 December 1954

Question 3

Data types for the following could include:

a telephone number: character or string (**not** integer or number)

b number of films: integer

c date the film was made: date or date/time

d do you want the film enhanced?: Boolean

Question 4

a The only way the customer's name could be verified in this case is by proofreading, since the customer is entering the data.

b Validation checks could be **type check** or **length check**.

c The customer's name could be verified by using double entry with automatic comparison.

d It is **not** possible to know if the customer's name is correct. The customer can choose any name he/she wants as long as it conforms to the type of characters accepted by the validation rule for entering a name.

e The data are verified in order to ensure they have been entered correctly.

f The data are validated in order to ensure they make sense.

Question 5

a The purpose of test data is to make sure the system produces the correct results. They make sure the program is robust.

b The test plan is written in order to:
- provide a systematic approach to the testing
- ensure no test is missed out
- provide the expected results
- ensure the system works under all circumstances

If the system is tested thoroughly it will also give the users confidence in purchasing and using the system.

c We are looking for the students to provide normal, abnormal and extreme data. Possible examples are:

Item of test data	Expected result	What is being tested
6	Data accepted	Whether the system works when a sensible number of films is entered.
0 or 999	Error message	Whether the system can cope with very large or very small numbers of films being entered.
Twenty-three	Error message	This is a numerical field and the system is tested to make sure it does not crash when unusual data are entered.

Question 6

a Backing up is the process of making copies of live data and storing those data on another medium, whereas archiving is taking data that are no longer required by the system and storing them offline.

b The company will need to back up the data every day so the customer orders are safe and the data it has stored on the system are not lost in the event of a disk crash or human error (such as deleting valuable data by mistake).

The company will need to archive the data, because otherwise the hard drive will gradually fill with former customers' details and orders fulfilled a long time ago, which are no longer needed on the system.

Question 7

a Advantages of using codes could include:
- They are quick to enter.
- Customers are forced to use a set list of codes.
- They take up very little room on the company disk.

b Disadvantages could include:
- The customer might not understand how the codes were applied/they might be off-putting.
- The codes are not flexible enough to allow a customer to enter anything different (for example, if they have a 32 mm film).
- The customer is expected to make a value judgement, which they might not be able to do.

Question 8

The costs associated with collecting and storing data are those of purchasing the hardware needed to collect, hold and process the data, and the cost of keeping them maintained and renewed as necessary. The software will need to be purchased and upgraded as necessary. Costs will be incurred for consumables, such as paper, toner and ink cartridges.

The personnel collecting the data and producing the information will need to be paid. They may need training and they will need to be given office space, all of which costs money.

Question 9

Static data: city of origin, flight number.
Dynamic data: estimated time of arrival.

Question 10

Discussion points should include:

- Users may make value judgements when encoding.
- The user may not know the codes.
- Some loss of precision may be necessary for certain data to be encoded.
- The number of codes may be limited.
- Some data may be impossible to encode.

2 Software and hardware components of an information system

Question 1

Software	Input device	Output device	Storage device	Interface
Operating system	Keyboard	Monitor	RAM	USB
Games	Mouse	Speaker	Hard drive	
Word processor	Scanner	Printer	CD/DVD writer	
Spreadsheet	Webcam		Floppy-disk drive	
Web page designer			Flash memory	

Question 2

The applications programs are:

- a publisher
- a word processor
- a spreadsheet program
- a database program

The applications packages are:

- an 'office' package
- an e-mail package

The systems software is:

- operating system
- printer driver
- web browser

Question 3

The alternative name is 'generic software'.

Question 4

Hardware:

- Braille printer/keyboard
- speakers
- microphone

Software:

- sticky keys
- zoom
- voice recognition
- speech synthesis

Question 5

The purpose of a user interface is to provide communication between the user and the computer.

Question 6

a Command-line interface (CLI)

Characteristics

- The user types commands as lines of text.
- The user needs to know the command language.

Example use
- An experienced user can instruct the computer to carry out a task that is not readily available by other means.

b Form

Characteristics
- Separate prompts allow individual fields to be input.
- Each field can be separately validated.
- It looks natural, like a paper form.
- It can have buttons, drop-down boxes etc.

Example use
- For making purchases online.

c Dialogue box

Characteristics
- The dialogue box may take the form of a list box, check box or text box.
- The user has to make a choice or provide some information; this may be from a limited number of options.

Example use
- To enable the user to make choices and decisions, e.g. 'Do you wish to delete this file?' Y/N.

d WIMP

Characteristics
- This interface consists of windows, icons, menus and pointers and is usually accessed using a mouse and keyboard.

Example use
- For an inexperienced user, as it allows intuitive interaction.

e Natural language

Characteristics
- This interface uses speech or text in a natural way.
- It could be linked to voice commands.
- It may autocorrect as you speak or type, or may ask for confirmations.

Example use
- To enable an author who has difficulty typing to input to a word processor using speech.

Question 7

a Standardisation means the requirement for hardware or software to adhere to certain standards so that they can be used by different users on different systems without problems. This includes, for example, the use of standard plugs or the requirement for data to be interchangeable between packages.

b Problems that can be encountered when using non-standardised hardware and software can include:
- loss of formatting when transferring data
- file types not being recognised
- drivers not being found
- plugs not fitting sockets

Question 8

The six components are:
- people
- data
- procedures
- software
- hardware
- information

Question 9

The discussion should include points for and against the menu-based system and for and against CLI. There should be a conclusion. Some points are shown below.

For the menu system:
- All the possibilities available — can be seen at a glance.
- Entry is fast, using just a click.
- It is a user-friendly method — little or no expertise or training is needed.
- The firm does not have to validate the entries — only those on the list are accepted.

Against the menu system:
- It is not possible to choose something that is not on the menu.
- There are a lot of items for sale, and it might not be possible for customers to find the item they want buried in the submenus.
- If customers do not find what they want quickly it could put them off.

For CLI:
- Customers can type in exactly the item they are enquiring about.
- Customers are used to words and are likely to know the name of the item they want to find.

Against CLI:
- The system may not accept the customer's spelling of the item.
- It is difficult to explain to the system the difference between, for example, a large or small frying pan.
- It looks old fashioned and does not portray the right image to the public.

Question 10

Ways to make the screen easy to use could include:
- provision of a title to remind the user what the screen is for
- validation checks to make sure invalid entries are not made
- help options in case the user gets stuck
- menus to limit choices for the user
- use of colours, text size and simple language to make the screen user-friendly
- logical order and clear presentation to speed up data entry

Question 11

a The main features of a CAD/CAM package are:
- It is a computer-aided design process.
- It has the ability to work out complex ideas automatically, for instance stresses and strains, or checking electrical circuits.
- It will automatically work out costs.
- It can link directly to and control a process in a factory.
- It can help with the supply of materials.
- It can schedule jobs in the production process.

b The hardware requirements for using a CAD/CAM package include:
- a high-speed processor
- a large RAM
- a good quality graphics card
- a high-resolution screen
- a printer/plotter

c The discussion should include points for and against using CAD. There should be a conclusion. This question may also be used with other examples, such as product design, house design and fashion design.

3 Characteristics of standard applications software and application areas

Question 1

Basic task	Generic application
Letters	Word processor
Memos	Word processor
Reports	Word processor
Flyers	Publishing package
Brochures	Publishing package
Posters	Publishing package
Business cards	Word processor or publishing package
Graphs	Spreadsheet
Data modelling	Spreadsheet
Forecasting	Spreadsheet
Data handling	Database
Sorting	Database
Searching	Database
Mail merging	Database, word processor
Presentations	Presentation software

Question 2

The characteristics of a school administration system using ICT could include:

- Records are kept accurately and in consistent formats.
- It is possible to search and sort records.
- Contact with parents is by e-mail.
- Tasks such as registration and report distribution are done electronically.

Question 3

a The advantages of the school administration system in attendance record-keeping could include:

- Records are accurate.
- Records are easier to read.
- All class registers are accessible from one place.
- Statistical analysis is straightforward.

The disadvantages could include:

- Installation is expensive.
- Equipment must be kept running efficiently.
- The staff lack IT expertise.

b The advantages of keeping personal details of students in a database could include:

- rapid searching and sorting
- the ability to do a mailmerge
- automatic updating of all tables with one change
- reduced likelihood of conflicting data in different areas of the school

The disadvantages could include:
- risk of breaches in confidentiality
- risk of loss of privacy
- lack of security
- risk of poor data integrity
- cost

(Similar questions could be set using school teaching systems, stock control, booking systems, online training systems, timetabling and route finding systems, customer records systems and online banking systems.)

Question 4

a A wizard helps a user to perform a common task in certain applications by asking a series of questions.

b A style sheet provides the information for the basic structure of a document — page layout, font etc.

c A template ensures a uniform look to documents by providing a page layout structure to work within.

d A macro enables a set of instructions to carry out a common task to be activated by a single command, thus saving time.

Question 5

a Wizard

Advantages could include:
- It helps a (novice) user to achieve a structured result.
- It achieves the result quickly.

Disadvantages could include:
- There is no allowance for individuality.
- It may not let the user do exactly what he/she wants.

b Style sheet

Advantages could include:
- All documents will have a similar identity.
- All documents will conform to house style.

Disadvantages could include:
- There is no allowance for individuality.
- It may not be possible to lay out the document exactly as the user wants.

c Template

Advantages could include:
- It enables standard styles to be used for documents.
- It can be used by a novice.

Disadvantages could include:
- It restricts styles.
- It lacks flexibility.

d Macro

Advantages could include:
- It reduces the number of keystrokes required to complete a task.
- It provides an easy way to complete an unfamiliar task.

Disadvantages could include:
- The user has to remember which key or keys to press to make a particular macro work.
- The macro may not do exactly what the user wants.

Question 6

The data entry screen can contain buttons, forms, form controls and menus to help the school secretaries enter the data. Students should give examples of how each feature is used.

Question 7

The advantages of tailoring standard/generic applications software could include:

- menus for guidance and closed lists of possibilities
- drop-down lists
- on-screen calendars
- update buttons

The disadvantages could include:

- lack of flexibility
- not being able to get exactly the changes you require because of inflexibility in the application

Question 8

a A house style outlines standards for the production and publication of the school's documents, keeping the style consistent and recognisable.

b Reasons why the school should use a consistent house style could include:

- Documents will be instantly recognised as belonging to the school.
- All departments and offices will use the same style based on the same templates.

Question 9

A master document is a file that contains a number of other files or documents. It is used to manage a multi-part document such as a book with many chapters. For school secretaries, this might be a file for the school prospectus. The master document will help combine a number of small documents written by different members of staff into one large one, and it will act as a table of contents.

Question 10

a An expert system is a base of human knowledge with artificial intelligence supplied by means of a computer program and a rule base.

b An expert system shell is a knowledge base, inference engine and user interface.

c The advantages of using an expert system to help diagnose an illness could include:

- It allows doctors more time to deal with serious cases.
- It allows access to more up-to-date/specialist knowledge.
- It enables faster diagnosis for patients.

The disadvantages could include:

- Too much reliance may be placed on the system.
- There is a risk of errors in diagnosis leading to disease going undetected because of faith in the system.

Question 11

Aspects to consider concerning how ICT developments might change the way school lessons are taught in the future could include:

- computer-assisted learning (CAL)
- distance learning
- podcasts
- school websites
- electronic books
- e-learning
- e-examinations
- intelligent desks
- laptops
- organisers
- mobile phones

This is a discussion, so it should include some advantages and disadvantages of ICT in education and a conclusion.

4 Spreadsheet concepts

Question 1

Find	Answer
A cell that contains a formula	e.g. B20
A cell that contains a variable	e.g. B13
The name of the workbook	Book 2
The name of the worksheet	Sheet 1
A cell in which absolute referencing is used	e.g. B17
A cell in which relative referencing is used	e.g. C16 when copying from B16

Question 2

Cell	Formula
B13	=B11*B12
B15	=B14*E5
B16	=B13+B15
B17	=B16*E4/100
B18	=B16+B17
B20	=SUM(B18:E18)

Question 3

a Characteristics of modelling software include:
- the ability to ask/answer 'what-if' type questions
- the ability to use equations, variables and constants
- the fact that cells can be linked
- formulas can be automatically recalculated when numbers are entered
- cells and ranges of cells can be given names, making comprehension easier
- the replication of cells automatically adjusts formulas

b In general, you would use a model because to test the real thing could:
- be too dangerous, e.g. building a new bridge
- be too expensive, e.g. building a tall building
- take too long, e.g. watching the growth of an oak tree
- be too fast, e.g. investigating the movement of particles in an explosion
- be too inconvenient, e.g. installing new traffic lights at a road junction

Question 4

Rules are a set of procedures or a sequence of events that must be followed in order for the modelling calculation to work. A function is a short cut representing a more complex formula.

Question 5

a A hypothesis is a proposition that you test with your model.

b A 'what if?' question is one that outlines a possible scenario. Changing particular values in the model according to this scenario enables the spreadsheet to project possible outcomes.

Question 6

a A simulation is the use of a model to predict what might happen under various conditions.

b The advantages of using a spreadsheet to carry out a simulation could include:

- less dangerous to model on a spreadsheet than actually building a new bridge
- cheaper to make a mathematical model than to see if a real 100-storey building could withstand an earthquake
- quicker than watching the growth of an oak tree in real life
- makes it possible to investigate the movement of particles that normally move too quickly, for instance in an explosion
- saves inconvenience to the public, such as when installing new traffic lights at a road junction

The disadvantages could include:

- a simulation may oversimplify complex problems or fail to take into account all variables
- the problem may not fully have been understood
- there is too much reliance on the outcome, and human judgement can be clouded by the thought that 'computers are always right' — using simulations can take away an element of common sense

Question 7

a A range is a group of cells in a spreadsheet, and is sometimes given a name, e.g. A4:C7.

b The purpose of a range is to allow a set of related values to be grouped together under one name for ease of use.

Question 8

The features of a spreadsheet that make it suitable to make the model include:

- formulas to perform the calculations
- functions to carry out inbuilt complex problems
- variables to allow hypotheses to be tested and entry values to be changed
- graphs to represent the outcomes visually

5 Relational database concepts

Question 1

Term	Description	Example
Table	A group of similar data in a database containing attributes (columns) and entities (rows).	CUSTOMER, DVD, ORDER
Primary key	An attribute used for unique identification of a record.	Customer_ID, DVD_ID, Order_Code
Field	An individual attribute of an entity. Part of a record.	Any example from the three boxes
Record	One entity from a table. A basic unit of data in a data file. A group of related fields.	Customer record, DVD record, Order record
Relationship	The way in which entities can be linked. One–one, one–many, many–many.	The link between CUSTOMER and ORDER
Foreign key	A key used to link tables together. It is the primary key of one table appearing in another table to make a link.	Customer or DVD in the ORDER table

Question 2

a A relational database is a complex data structure. Where data items are related, they are linked together by pointers stored in the database.

b Redundant data are identical data that are repeated unnecessarily in the database. Tables are normalised to reduce redundancy.

c Duplicate data are the same record appearing more than once in a table.
d Referential integrity is the condition that applies when the database contains no references to links that do not exist.
e An entity is a basic item about which it is necessary to keep data.
f An attribute is a particular element of an entity.

Question 3

a The primary key of CUSTOMER is: Customer_ID.
b The foreign keys in ORDER are: Customer, DVD.
c The relationship between the CUSTOMER and ORDER entities is: one–many.
d

Question 4

a Data in un-normalised form have not yet been made into tables containing the smallest number of entities.
b Data in 1NF have no repeating attributes or groups of attributes.
c Data in 2NF are already in 1NF but have no partial dependencies.
d Data in 3NF are already in 2NF and have no non-key dependencies.

Question 5

It is important to normalise data in a database in order to make sure the data are robust and valid. There should be no redundant or duplicate data. Referential integrity should be ensured. The database will then be efficient and flexible.

Question 6

Items one would expect to find in a data dictionary could include:

- names of tables
- names of fields (attributes)
- data type
- data length
- restrictions
- data validation
- relationships
- key fields

Question 7

a An example of a simple query could be to find out if a DVD is in stock.
b An example of a complex query is looking for all customers who have rented DVDs of certificate 18 and who like horror movies.
c A simple query searches on one parameter, but a complex query searches using two or more parameters, usually using the Boolean operators AND, OR or NOT.

Question 8

a An example of a static parameter query is any query where the parameter is fixed, e.g. a predefined query to produce a report of all DVDs classified certificate 18.
b An example of a dynamic parameter query is asking the system which DVDs were rented out on a particular date. The parameter entered would be 'date' (from the ORDER table).
c A static parameter query contains the predefined parameter(s) for the search, whereas a dynamic parameter query is where the user has to provide the parameter(s) at the time of starting the search.

Question 9

The advantages of storing customer records in a relational database instead of on a card index could include:

- The customers can be found quickly by searching the database.
- The customers can be sorted into different orders quickly.
- Reports, invoices etc. can be produced quickly.

Question 10

The characteristics of the stock control system could include:

- Records what DVDs are in stock, which can be updated.
- New DVDs can be added.
- There will be a reorder level/automatic reordering if products are popular or if the shop also sells DVDs.
- Details about the DVDs can be changed.
- Reports on popularity etc. can be produced.
- Items can be found easily.

6 Applications software used for presentation and communication of data

Question 1

a Application packages involved in sending invoices could include:

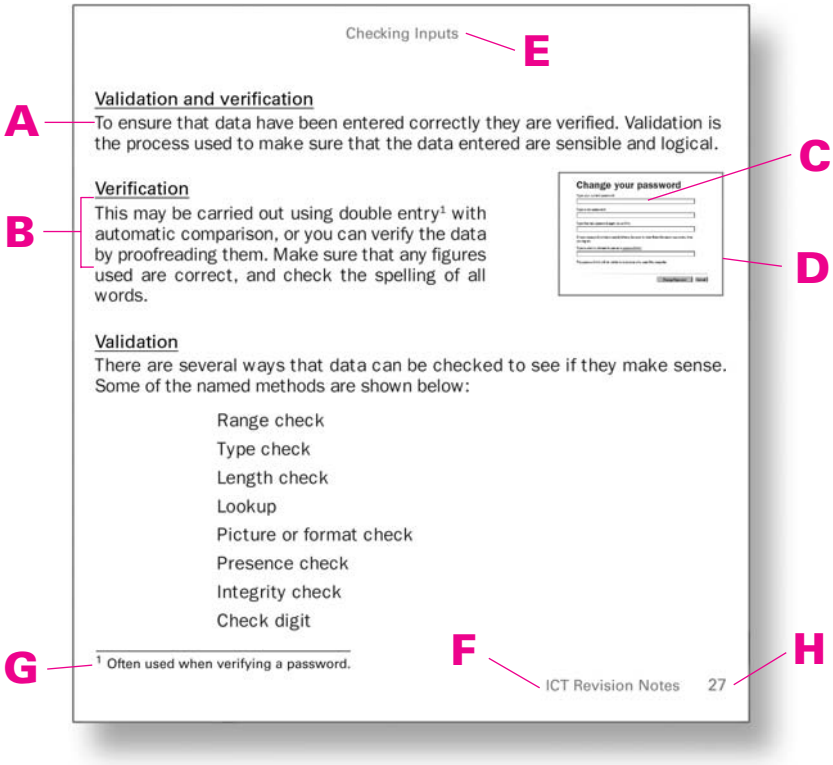
- database
- word processor
- spreadsheet

b The process of mailmerge starts with the user creating a standard document using a word processor. A data source is created using a database. The standard document is merged with the data source, and in this case details from the spreadsheet, to produce a personalised document.

c The advantages for the company of using mailmerge could include:

- The documents can be produced quickly once the master has been created.
- Proofreading only has to be carried out once.
- The master document can be saved and used again.
- The data source can be saved and used again.

Question 2


Checking Inputs

E

A

Validation and verification

To ensure that data have been entered correctly they are verified. Validation is the process used to make sure that the data entered are sensible and logical.

C

B

Verification

This may be carried out using double entry[1] with automatic comparison, or you can verify the data by proofreading them. Make sure that any figures used are correct, and check the spelling of all words.

Change your password

D

Validation

There are several ways that data can be checked to see if they make sense. Some of the named methods are shown below:

Range check
Type check
Length check
Lookup
Picture or format check
Presence check
Integrity check
Check digit

G

[1] Often used when verifying a password.

F

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H

Question 3

a Bitmap graphics are made of pixels, each of which has a position and a colour. The graphic becomes 'pixellated' when enlarged. In vector graphics, points are described by their relative distance from the point of origin and created by equation; components are described by length, thickness and colour. The graphic can be scaled up without loss of quality.

b The company is likely to choose vector graphics for its logo, as it wishes to use the graphic on all sizes of documents from business cards to posters. With vector graphics, the image will not lose quality when enlarged.

Question 4

a A graphics library is a collection of images concerning a particular topic.

b The advantages of using graphics libraries when designing kitchens could include:

- The images are readily available and relate to one topic.
- Thumbnail images can be examined before a choice is made.
- The images are likely to be custom-drawn for a particular use.

The disadvantages could include:

- The image you want may not be available.
- It might cost a lot to produce the library.

(A similar question could be asked for cartography and network design.)

Question 5

Feature	Description
Text	Words, characters or numbers.
Image	A picture or cartoon.
Sound	A clip of music, voice or some other sound.
Video	A clip of moving pictures.
Animation	Movement of the text or other objects on the page.
Slide transition	Special effects applied when one slide changes to another.
Hyperlink	A link which, when clicked, will move to another part of the presentation or to somewhere outside the presentation.
Hotspot	An area on the screen that will respond to a click of the mouse button.
Button	Like a hotspot, will respond to a mouse click to allow the user to move to another slide or introduce a special effect.

Question 6

Points to mention when comparing the advantages of different systems for giving presentations could include:

Overhead projector and acetates:

- The presentation is not dependent on a computer.
- No special computer training is required.
- The equipment may be more reliable than a computer.
- There is less equipment to carry around.
- Hard copy is readily available.
- The user can write on the transparencies during the presentation.

Computer, projector and presentation software:

- It is easy to standardise the slides.
- The presentation can be saved to disk.

- It is easy to edit and to change the order of the presentation.
- Unlike acetates, it is not easily disordered, such as by being dropped.
- The presentation can include special effects, sound, video, animation.

Question 7

a
- A linear presentation is one in which one slide follows another in numerical order.
- A hierarchical presentation allows alternative routes through the presentation, in linear order within each 'tree'.
- A non-linear or mesh presentation allows jumping from slide to slide in any order.

b The advantages of a linear presentation could include:
- It follows a predefined order, so arguments can be developed logically.
- It can be used in an automatic or 'kiosk' presentation.

The disadvantages of a linear presentation could include:
- The presentation lacks flexibility.
- The presentation is presenter-based rather than audience-based.

The advantages of a hierarchical presentation could include:
- It can follow the interests of the audience.
- It can branch into different topics easily.

The disadvantages of a hierarchical presentation could include:
- You need to return to the menu slide each time you take a different path.
- The audience could get confused by this sort of presentation.

The advantages of a non-linear presentation could include:
- The user can take a unique path through the slides each time to satisfy audience needs.

The disadvantages of a non-linear presentation could include:
- It can be confusing to audience and presenter.
- You could miss out important points.

c Examples of a suitable use for each method could include:
- Linear: an automatic slide show.
- Hierarchical: a presentation that can take any point to a deeper level, if the audience requires it.
- Non-linear: a presentation for an experienced audience who wish to be involved in discussion.

Question 8

Characteristics of users that should be taken into account when building an ICT system could include:
- the experience of the user — expert or beginner?
- the user's physical characteristics — any disability or difficulty in using the keyboard or screen
- the environment in which the user uses the system, e.g. on a factory floor or in a wet environment (car wash) they may have dirty or wet hands
- the age of the user

7 Networking and processing

Question 1

Processing system	Characteristics	Use
Batch	No user involvement. Data collected before processing begins. Process is run at times of least demand on computer time.	Payroll.

Processing method	Characteristics	Use
Interactive	Direct user interaction during the processing.	Booking a ticket. Customer-operated checkout at super-market.
Transaction	Allows more than one individual task to be processed, usually on a database, at the time of the transaction.	Moving money from one account to another in the same bank.

Question 2

A Local Area Network (LAN) works within a defined area, usually on one site. It has direct connections between the computers and uses cables owned by the owners of the LAN (or local wireless links).

In a Wide Area Network (WAN), the computers are usually not linked directly by wire but by third-party communications methods over a wide geographical area.

Question 3

a An intranet is a network providing similar services to the internet but with access restricted to users within (for example) one company or school.
b The internet is a network of computers across the world.
c An extranet is part of an intranet that can be accessed by the public using the internet.

Question 4

The World Wide Web is the collection of multimedia information and resources available on the internet, whereas the internet itself is the collection of facilities that allows computers across the world to communicate using telecommunication links.

Question 5

a A web authoring application is software used for the creation of web pages.
b Hyperlinks are a word or phrase, usually underlined, which when clicked will transport the user to another place in the document or to a web page.
c A frame is a part of the screen that is treated independently from other parts. It may contain text or graphics.
d HTML is hypertext mark-up language, used to write the code that makes web pages.

Question 6

A client–server network is organised around one or more servers to provide shared resources. The server also provides security for the network.

Peer-to-peer networks are a simple way of sharing resources by linking all the computers together so that they can communicate.

Question 7

Features that might appear on a web page could include:

- Sound: the signature tune of company, a promotional message, announcement of a change of page.
- Forms: for product orders — can be filled in by the user.
- Hyperlinks: to enable navigation to another page on the same or another site.
- Animation: moving words or images designed to make the page more interesting.

(Other possibilities include: hotspot, mailto, hit counter, navigation map, FAQ, shopping basket, frame, checkout, text, buttons, menus.)

Question 8

The networks shown in Figure 7.1 are:

- A: star or client–server
- B: ring or peer-to-peer
- C: bus

Question 9

Points in the discussion of the advantages and disadvantages of using a word processor or a web authoring package to produce web pages could include:

Advantages of a word processor over authoring software:

- Less training required to use it.
- Compatible with browsers.
- Lower cost to convert current word-processed documents.
- It may be faster to produce the pages (but fewer special effects are possible).

Advantages of authoring software over a word processor:

- Special effects are possible.
- User can produce non-standard images in company house style.
- User can edit code directly.
- Package may include wizards to help learners.
- Software can integrate with other web packages.
- Software offers features such as creating site map.

8 The role and impact of ICT

Question 1

a The Data Protection Act is intended to help protect people from the misuse of information stored about them.

b The Computer Misuse Act is intended to help protect the data held by companies from being stolen or misused by hackers.

c The Copyright, Designs and Patents Act makes it illegal to copy software without the permission of the owner.

d The Regulation of Investigatory Powers Act makes it illegal to intercept e-mails, phone calls, letters and other communications without permission.

e The purpose of the Electronic Communications Act is to set up a register of approved cryptographers. This helps e-commerce by giving ministers the power to remove any restrictions in existing legislation that prevent the use of electronic communications in place of paper, and allowing digital signatures to be admissible in law.

f The purpose of the Freedom of Information Act is to make provision for the disclosure of information held by public authorities or by persons providing services for them, and to amend the Data Protection Act 1998.

Question 2

a Physical security helps to protect ICT systems and prevent the spread of ICT-related crime by keeping data under lock and key.

b Firewalls help prevent unauthorised access from network traffic.

c Backup means that in the event of damage or loss the system's data can be restored.

d Encryption ensures that if data fall into the wrong hands they cannot be understood.

e Biometric security makes sure the right person is accessing the data by using retina scans or fingerprint comparisons.

f Software patches and updates keep the system owners ahead of the hackers and repair gaps in security.

g Anti-virus software helps protect software from virus attacks.
h Anti-spyware software prevents hackers from accessing your private details.
i Access rights restrict the people entitled to access certain data.
j Auditing ensures that system owners can know who was where, when, and doing what.

Question 3

a User IDs and passwords are necessary to ensure security of access to the system: user IDs tell the system who is logging on, so it can establish his/her privileges, such as access rights; passwords provide confirmation that the user is who he/she claims to be.
b The characteristics of an effective password could include:
- It consists of numbers and letters.
- It is changed frequently.
- It is not related to personal details.
- It is kept secret.
- It is not too short.

c A password can remain effective if its user keeps it secret and changes it frequently.

Question 4

Problem	Effect
Carpal tunnel syndrome	Pains in the wrist from repetitive actions such as working for long hours on a keyboard.
Ulnar neuritis	Pains in the elbow from compressing the ulnar nerve, caused by leaning on the elbow.
Deep vein thrombosis	Blood clot, often in the leg, caused by sitting still for a long time.
Eyesight defects	Sore, dry or tired eyes, caused by looking at screens for long periods of time.
Fatigue	General tiredness or stress caused by repeating the same activity for long periods.
Repetitive strain injury	Pain in arms, hands, shoulders or back from incorrect posture at the computer and prolonged contact without a break.
Backache	Pain in the back from poor posture at the computer.
Stress	Fatigue, irritability and despair caused by long periods at the computer without a break.

Question 5

a Carpal tunnel syndrome: avoid repetitive actions; take frequent breaks.
b Ulnar neuritis: use an adjustable chair, correct desk, wrist rests.
c Deep vein thrombosis: use an adjustable chair, correctly positioned, and take exercise in breaks.
d Eyesight defects: use an adjustable monitor with correctly adjusted brightness/contrast controls, take breaks and have correct lighting in room.
e Fatigue: take breaks, drink water and change activity from time to time.
f Repetitive strain injury: use an adjustable chair, footrest, proper computer desk; change activity from time to time; take breaks; use ergonomic keyboards.
g Backache: sit properly and use an adjustable chair, properly adjusted.
h Stress: take frequent breaks; avoid repetitive activity; drink water; talk to colleagues.

Question 6

Safety hazards to be avoided when installing computers in an office could include:
- trailing wires: could trip you up

- risk of fire and electrocution from bare wires
- unsecured equipment: could fall on you
- food: crumbs in the keyboard could cause disease, or food particles might cause electrical shorts, leading to fire
- drink: could spill and cause electric shock
- proximity to water: sinks, taps, sprinkler systems could lead to electrocution
- incorrectly designed chairs: could topple over (they should have five legs)

Question 7

Advantages of networking computers could include:

- communication between computers
- sharing of hardware/peripherals
- sharing of software/data
- easier monitoring of traffic/access
- easier backing up

Disadvantages of networking computers could include:

- harder to keep secure
- may become slow with heavy use
- if the network fails, shared resources may be unavailable

Question 8

Points in a discussion of the impact of ICT on the following areas of life could include:

a **transport:** GPS; speed limiters; emission controllers; traffic congestion zones.

b **medicine:** sensors (analogue and digital) and data collection; scanning devices; magnetic resonance imaging (MRI); computerised axial tomography (CAT); backup and recovery procedures; electronic patient record keeping (EPR); blood bar coding and tracking systems; use of the internet, intranets and extranets; distributed medical databases.

c **disability:** specialist hardware and software; artificial limbs; sight/hearing enhancement.

d **education:** CAL; CBT; distance learning; video-conferencing; e-learning; chatrooms for discussion with tutors or experts; revision programs; authoring software; interactive whiteboards; computer-based methods of registration (e.g. OMR); wireless networks; smart cards; retina scans; student record-keeping.

e **entertainment:** games; photography; music (including downloading from the internet, MIDI, sequencers, notators, sound wave editors); pay-to-view services; home online/interactive shopping; cinema and theatre booking; e-mail; interactive services (e.g. betting, voting, dating); teletext services; mobile phones.

f **shopping:** payment methods; online shopping; e-commerce; bar codes; other methods of data entry; automatic stock control; just-in-time stock control systems; serve-yourself tills; loyalty cards.

g **marketing:** data mining; websites; price comparisons online; buying/selling online; modelling.

h **communication:** benefits, disadvantages and dangers of e-mail; services such as voice mail, address books, group sending, file attachments; FTP (definition and purpose); newsgroups; chatrooms; online databases; internet.

i **online banking:** EFTPOS; security concerns; card services (debit/credit, card crimes and methods of prevention).

Question 9

a Jobs available to an ICT professional could include:

- programmer
- designer
- systems analyst
- ICT coordinator/manager
- network manager
- software engineer
- helpdesk operative

b Personal qualities needed by an ICT professional could include:

- technical skills
- understanding of the problems
- good interpersonal relations
- administrative skills
- analytical skills

Question 10

Useful characteristics of an ICT system could include:

- fast processing of repetitive tasks
- large storage capability
- the ability to search quickly for data or combinations of data
- the ability to combine data in many different ways
- presentation of information in various ways at the touch of a button
- improved accessibility of information and services
- improved security of data

Question 11

Discussion of the external influences that can affect ICT systems could include the following types of influence:

- cultural
- economic
- environmental
- ethical
- legal
- social

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