

Answers to 1 Communications Software

Check your understanding page 5

1	What am I?	Description
	Browser	Allows you to access information on websites
	Search engine	Allows you to enter keywords or phrases to locate relevant websites
	Website address	A Uniform Resource Locator (URL)

- 2 Three features of a typical web browser include:
- Back and Forward buttons that enable the user to visit the previous or next page
 - Refresh button that enables the user to update the web page to take account of changes that have occurred since it was downloaded
 - Home button that enables the user to return to their home page.

Check your understanding page 7

- 1 A copy of the email is sent to a Cc (carbon copy) address and other recipients can see that address. A copy of the email is sent to a Bcc (blind carbon copy) address but other recipients cannot see that address.
- 2 To send your teacher an email including a word-processed essay, you would:
- a) Create a new email.
 - b) Use the address book to find the teacher's email address.
 - c) Enter the teacher's email address into the To box.
 - d) Add an email title into the Subject box.
 - e) Write a message in the main body.
 - f) Attach the file using the Attach button.
 - g) Send the email.
- 3 Three features of an email program include:
- viewing emails by the date and time sent
 - adding a signature that is automatically added to new emails
 - storing emails in personal folders.

Check your understanding page 8

- 1 Three advantages of using a VLE in teaching and learning are:
- Staff and pupils can share resources.
 - Teachers can incorporate multimedia into lessons.
 - Individuals can learn beyond the classroom with 24/7 access to the VLE.
- 2 Three services available to a student who is using a VLE are:
- the ability to upload files from a home computer
 - participation in online discussion forums
 - access to their school timetable.

Answers to 2 Presentation Package

Check your understanding page 10

- Options c (including multimedia) and d (formatting text) are features of a presentation package.
- Navigation buttons allow users to select different pathways through the presentation. Users click on a link or button to move from one slide to another.
- Any features included on a master slide appear on every slide in the presentation.
- Navigation buttons and hyperlinks allow the display sequence of the presentation to change.
- Linked files are not part of the presentation and you must copy them with the presentation file to make sure they appear when you are showing it to your audience. Embedded files become part of the presentation once it is saved and do not need to be copied with it.

Check your understanding page 12

- When planning a presentation, I would:
 - define the purpose of the presentation
 - identify the target audience
 - produce a storyboard
 - collect digital assets.
- Digital assets are pictures, sounds, videos and other digital files that you intend to include in your presentation.
- The target audience is the group of people to whom you will give the presentation or who will view the presentation.
- It is important to test a presentation to ensure that all parts work as expected across all slides.
- Testing should include checks to ensure that:
 - there are no grammar or spelling mistakes
 - all pictures are present
 - hyperlinks and buttons link to the correct slides
 - embedded or linked files operate as expected
 - any special effects are working as planned
 - any timings set are rehearsed.
- Evaluation can show how well the presentation communicates the message and strengths and weaknesses can be identified. This is important if the presentation is to be improved.
- Take account of the target audience and ensure that the information makes use of words and pictures that they will understand. Plan the presentation first and create a storyboard. Collect any digital assets before creating the presentation.

Answers to 3 Information Handling Package

Check your understanding page 14

- 1 Tables are made up of records and each record is made up of fields. In a file or table, a row usually represents a record and a set of field values are contained in a column.
- 2 Numeric, Text/alphanumeric, Date/time and Boolean (Yes/No) are data types.
- 3 I would store:
 - a) a date of birth in a Date/time field
 - b) a surname in a Text/alphanumeric field
 - c) a gender in a Boolean (Yes/No) field.
- 4 Validation ensures that data is present, in the correct range and in the correct format.
- 5 Length, presence, type, format and range are types of validation check.
- 6 A key field is a value that uniquely identifies a record in a table.

Check your understanding page 16

- 1 A relationship is a link between two tables, made using common fields.
- 2 Linking can reduce the amount of data which has to be stored and makes the searching and sorting of data more efficient.
- 3 To complete a mail merge, you need to:
 - a) create the standard letter
 - b) select the data source
 - c) select the appropriate merge fields
 - d) merge the data from the data source.
- 4 A wizard is software that helps the user complete a task, step by step.
- 5 A Report wizard, a Query wizard and a Form wizard are available in database software.
- 6 A query is used to search or select records from the database that fit certain criteria.
- 7 To create a query, you need to:
 - a) select the table
 - b) select the fields from the table
 - c) enter the criteria
 - d) run the query
 - e) view the results.
- 8 Criteria can be combined using logical operators, such as AND, OR and NOT.
- 9 Three logical operators are:
 - AND – all of the criteria must be fulfilled for the record to be included in the results.
 - OR – one or more of the criteria must be fulfilled for the record to be included in the results.
 - NOT – only records that do not fulfil the criteria are included in the results.

Check your understanding page 18

- 1** A report presents information in an appropriate format for printing or viewing by the user. Output on a report can be sorted and grouped.
- 2** When planning a database solution, you need to:
 - a)** List the user requirements in terms of input, processing and output, including reports, queries and forms to be used in the system.
 - b)** Identify tasks that the user needs to perform, such as adding, deleting and updating records.
 - c)** Identify the data which needs to be collected.
- 3** When developing a database solution, you need to:
 - a)** Organise the data into fields, records and tables. Select a suitable data type for each field.
 - b)** Identify the validation and formatting requirements for each field.
 - c)** Identify the key field for each table.
 - d)** Identify the relationships which need to be created between tables.
- 4** To test a database solution, you need to:
 - a)** Use the list of user requirements to ensure that each item on the list has been completed.
 - b)** Test the data capture forms to ensure that the data collected is valid.
 - c)** Run queries to ensure they produce the correct results.
 - d)** Check reports to ensure the correct information is produced.
- 5** Evaluation assesses how well the database meets the user's requirements and how user friendly it is. It should identify strengths, weaknesses and areas for improvement.

Answers to 4 Spreadsheet Package

Check your understanding page 20

- Four other methods of formatting a cell are:
 - Accounting
 - Date
 - Time
 - Percentage
- Conditional formatting allows the user to apply cell shading or font colour to a cell if a specified condition is true.

Check your understanding page 22

- The MAX function finds the largest value stored in a group of cells. For example, =MAX(I5:I16) returns the highest value in this group of cells.
 - The MIN function finds the smallest value stored in a group of cells. For example, =MIN(I5:I16) returns the lowest value in this group of cells.
- If you do not want a cell reference to change when you copy a formula you can make it an absolute reference by using a \$ sign. For example, \$I\$5 always refers to cell I5.

Check your understanding page 23

- A VLOOKUP function takes the value in a particular cell and looks for a match in a selected column of values (vertical lookup) in a lookup table. It returns the corresponding value in the next column.
- Using a wizard to produce a graph:
 - guides you through the process, showing the result of each stage until the graph is produced
 - offers you a number of options in dialogue boxes, including default values.

Check your understanding page 24

- It is important to test a spreadsheet to ensure that:
 - it meets the user requirements
 - the formulas work
 - recalculations are automatic when a value in a cell changes
 - all data is correctly formatted
 - any data validation rules work correctly
 - any graphs designed are as expected
 - links between worksheets are working.
- You should test the following aspects of a spreadsheet:
 - formulas – to ensure that they are designed to carry out the correct calculations
 - data validation rules – using different values to ensure only valid values are accepted
 - links between worksheets – changing data in a worksheet to ensure these changes occur in all worksheets
 - graphs – checking the results of the graph against the values held in the rows and columns.

- 3** It is important to evaluate a spreadsheet to consider:
- how well the spreadsheet makes use of fonts, styles and formatting
 - how well the spreadsheet uses data formats and text alignment
 - how well the spreadsheet uses functions and formulas
 - whether any graphs enhance the presentation of results
 - areas for improvement in the spreadsheet.
- 4** To ensure the results produced on a spreadsheet are accurate, you can:
- fully plan your spreadsheet
 - take full account of all user requirements
 - test the spreadsheet fully, worksheet by worksheet
 - make appropriate use of formulas and functions in your solution
 - use appropriate data validation rules
 - evaluate the finished product.

Answers to 5 Using Graphics

Check your understanding page 26

- Three devices that can be used to capture images are digital cameras, mobile phones and scanners.
- Different types of graphics include any three from:
 - clip art
 - digital photographs
 - word art
 - scanned images
 - images created using graphics packages
 - animation.
- James could capture the image:
 - using his mobile phone's digital camera and upload it to his computer via a cable or by removing the memory card from his phone and inserting into a memory card reader attached to his computer
 - with a traditional camera, get it developed and then scan it into his PC.
- The flip tool allows the user to create a vertical or horizontal mirror image of the original graphic. The rotate tool allows the user to rotate the image freely about an axis.
- Other image manipulation tools available in most graphics packages include any two from:
 - crop
 - zoom
 - fill
 - group
 - stretch
 - text box.

Check your understanding page 28

- A bitmap file format is not suitable for graphics on a website because they store information about every pixel making up an image. This means that files can be quite large:
 - They can take a long time to download.
 - They can take up a lot of web space, which is often limited.
- A graphic designer might prefer to use bitmap graphics because they store information about each pixel and the designer can edit the graphic at pixel level.
- Bitmap graphics characteristics include:
 - store detail about every individual picture element (pixel) in the image
 - have a higher resolution (better quality) when more pixels are used to create the image
 - tend to give large files
 - can be compressed (reduced in size).
- Vector graphics characteristics include:
 - store information about the objects that make up an image: shape, location in image, colour etc.
 - don't depend on resolution for quality
 - can be more easily resized and stretched than bitmap images
 - much smaller file size than bitmap.

- 5 Larger file sizes store more information about each individual pixel making up an image and therefore these images tend to be higher quality. The smaller the file size, the less information is held about each element in the graphic and therefore the lower the quality of the image represented.
- 6 Resolution refers to the number of pixels being used to represent an image. The lower the number of pixels, the lower the quality of the graphic being represented

Check your understanding page 29

- 1 The following file formats are suitable for representing graphics on a website: GIF, JPEG, PICT, PNG, TIFF.
- 2 The acronyms have the following meanings:
 - GIF – Graphics Interchange Format
 - TIFF – Tagged Image File Format
 - JPEG – Joint Photographic Expert Group
 - PNG – Portable Networks Graphics.
- 3 GIF is a suitable file format for representing animated graphics.
- 4 BMP graphics store information about each pixel comprising a digital image and graphic designers can therefore edit the graphic at pixel level.
- 5 BMP is the odd one out as it is the only uncompressed graphic file format.
- 6 The JPEG file format is appropriate for storing digital photographs.

Answers to 6 Using Digital Video and Sound

Check your understanding page 31

- 1 You can transfer video files from one mobile phone to another:
 - using MMS
 - using Bluetooth
 - ejecting a memory card from one phone, inserting it into another and copying the file.
- 2 Optimising involves reducing the file size. An optimised video file can be transferred across the internet more quickly. If the video is to be distributed via a webpage, the page will load more quickly in the user's browser if the video file is reduced in size.
- 3 A codec is compression/decompression software and is used to carry out the optimisation process.
- 4 Any three of the following file formats are suitable for distributing video files across the internet: .fla, .wmv, .mpeg, .mp4, .mov and .avi.
- 5 Any three of the following file formats are suitable for distributing sound files across the internet: AIF, WAV, MIDI, MP3, WMA.
- 6 Sound waves are in analogue format; computers can only store data in digital format so sound waves must be converted from analogue to digital before they can be stored electronically.
- 7 Digital video, sound and picture files can take up a lot of storage space. Many mobile phones provide expansion slots for additional memory so these multimedia files can be stored.
- 8 The acronyms have the following meanings:
 - FLA – Flash Movie Authoring
 - MPEG – Moving Pictures Expert Group
 - AVI – Audio Interchange File
 - MIDI – Musical Instrument Digital Interface
 - AIF – Audio Interchange File
 - WAV – Waveform Audio File
- 9 There is no cost associated with sending multimedia files using Bluetooth whereas MMS can be expensive.

Check your understanding page 33

- 1 Any three items from the following list should be identified in a storyboard for a digital video:
 - details of any title or credit screens
 - a timeline that includes a description of any movie clips and still images and how long they will appear for
 - the name and duration of any audio files or effects to be included in the movie
 - any special effects – e.g. transitions or video effects.
- 2
 - a) A timeline shows the various components that make up a movie (titles, credits, movie clips, still images, audio files, transitions, movie effects, etc.), their durations and the order in which they appear. It can be used to reorder the components in a movie.
 - b) Trim means reducing the duration of a movie clip by altering the start or end point of the clip.
 - c) Transitions are effects that determine the way a movie transfers from one video clip to another.
- 3 Any two of the following elements could be added to the timeline of a digital movie: titles, credits, movie clips, still images, audio files, transitions, movie effects.

- 4 The following options are ways in which a digital video can be distributed: CD-ROM, DVD-ROM, internet, LAN, digital video.
- 5 Movies distributed via a website must be limited in file size, and therefore duration, as this can affect the download time of a webpage and the amount of web space it takes up. If the movie is to be fit for purpose and audience, this can only be achieved by careful planning.
- 6 Digital video files that are to be distributed via the internet should be as small as possible to help speed up transmission speed; file compression will help achieve this. Files that are being distributed via CD-ROM or DVD-ROM may not require the same level of compression.

Check your understanding page 35

- 1 You can edit digital sound files in the following three ways:
 - change the duration
 - adjust the volume
 - add special effects.
- 2 You can record digital sound files with a microphone or an electronic keyboard (or any other electronic musical instrument that can be attached to a PC).
- 3 There tends to be a trade-off between sound quality and file size when sound files are compressed. Some users may require high-quality sound output from the files they are editing and therefore need to store the sound files in uncompressed format.
- 4 Sound files come in a variety of formats. Sound editing applications need to meet the needs of a broad audience and must therefore support a variety of file formats for exporting if they are to meet the needs of the wider audience.
- 5 AIF and WAV are uncompressed formats for digital audio files.
- 6 MIDI, MP3 and WMA are compressed formats for digital audio files.

Answers to 7 Games Technology

Check your understanding page 37

- 1 Four teams of people that may be involved in the development of computer games are:
 - programmers to develop the application
 - musicians to develop the soundtrack
 - artists to develop the graphics
 - hardware designers.
- 2 Advantages to the user of realistic games controllers are that:
 - users are already familiar with the hardware from real-life experience
 - users find the game easier to control without having to learn new skills.
- 3 The following methods can be used to distribute games: CD-ROM, DVD-ROM, download from internet.
- 4 Hardware platforms used to play computer games include: PCs, hand-held devices and games consoles.
- 5 Action games, adventure games, puzzle games and role-play games are four game genres.
- 6 Puzzle games place a time restriction on the completion of the game – adventure games often do not. Puzzle games present the user with increasing levels of difficulty but the user pathway through an adventure game is often dependent on the outcome of a puzzle or question asked.
- 7 Characteristics of role play games include:
 - A role play game is played in the persona of an individual character.
 - User interaction can often be in the form of conversation.
- 8 Elements that should be included in the game play of a new computer game include:
 - the rules of the game, e.g. how points can be scored,
 - the various pathways through the game, e.g. how the user can move from one level in a game to the next
 - a detailed outline of the script of the game (normally using a storyboard)
 - how the user interacts with the game (e.g. what controls to use, what feedback to expect).

Check your understanding page 39

- 1 Many games consoles now enable users to play DVD or Blu-ray movies and to access the internet.
- 2 The following devices can be used to allow users to interact with computer games: keyboard, touch screen, joystick, touch pad, haptic peripheral devices, steering wheel.
- 3 Technology has improved the quality of computer games in the following ways:
 - Increases in processing power have led to increased game responsiveness.
 - Improvements in hardware have led to more realistic and natural interaction with games consoles.
 - Improved graphics cards have led to more realistic graphics.
- 4 Haptic peripheral devices provide users with additional sensory feedback, e.g. vibrations.
- 5 The following effects have resulted from improved internet access:
 - increased gaming on demand (GoD) as more people have broadband access
 - increased popularity of social gaming as people are able to access websites on the move
 - increased online gaming as more people have broadband access.

- 6** The following reasons explain why peripheral-free game play increases the popularity of computer gaming:
- People can use natural movement to play games so it appeals to a wider population.
 - People with limited fine motor control can play computer games without needing to be able to use controllers.
 - There is no need to purchase expensive controllers to play these computer games.
- 7** Social gaming is normally played via a social networking site and against people who are members of your 'friends' list. When playing an MMPORG, players may not know the people they are playing against.
- 8** The following professions could use training games:
- Doctors could use training games to practise carrying out specialised procedures without endangering someone's life.
 - Pilots could use training games to practice flying aeroplanes in dangerous conditions without risking loss of life or damage to expensive equipment
- 9** 'Altered reality gaming' refers to games that use the real world as a platform with additional images or characters superimposed upon it. The user can interact with the characters in a gaming situation that shows the character in the real world.

Check your understanding page 41

- 1** The following elements should be included in a game proposal:
- a description of the target audience
 - details of the game genre
 - details about the game play
 - a storyboard detailing the various elements of the game.
- 2** The 'target audience' is the group of people the game is aimed at. When identifying the target audience you should specify the age and any specific characteristics of the audience.
- 3** Game players can receive visual, sound and touch (or vibration) feedback.
- 4** The user guide or help facility should include:
- the rules of the game
 - how to control or play the game
 - explanation of feedback the user might get
 - instructions on how to exit the game.
- 5** The following elements should be included in a game storyboard:
- background colour and text colour
 - type and location of graphics
 - location of key elements (title screen, main menu, screen titles, game instructions, game elements, navigation buttons, scoring mechanism, graphics and animations)
 - feedback to be given
 - content of the help facility.
- 6** The storyboard should include detailed information because the game may not be developed by the person who designed it.

Check your understanding page 42

- 1** You should test the following elements of a computer game:
 - pathways through the game
 - the scoring mechanism
 - the appearance of feedback.
- 2** If technical support is not easy to understand or cannot be easily obtained, people may not play the game and therefore the game developers will lose money.
- 3** It is important to ensure that the language, the interface, the style of graphics and the font are appropriate, otherwise the game will not be accepted by the target audience.
- 4** The more platforms on which a game is available, the wider the potential target audience and the more money the developers can make from the game.

Answers to 8 Using Multimedia Assets

Check your understanding page 44

- 1 HTML means HyperText Markup Language.
- 2 A 'hyperlink' is text or an image that takes you to another webpage or another website when you click on it.
- 3 Hyperlinks can be provided on a webpage using text, graphics, navigation buttons and hotspots.
- 4 Video, sound, animated images and digital photographs are multimedia components that can be added to webpages.
- 5 A website storyboard should include the following elements:
 - the position and function of graphics, animations, videos and other digital assets
 - the colour scheme for each webpage
 - the location of navigation elements.
- 6 The following multimedia components can be saved in these file types:
 - animation – FLA or animated GIF
 - video – AVI, MPEG, MOV, WMV and SWF
 - sound file – WAV, AIF, MP3 and WMA.
- 7 A 'plugin' is a computer program that works within another program or application (such as a web browser) to add extra functions or allow it to support different file types.

Check your understanding page 47

- 1 Background images can slow the loading time of the webpage and can make the text in the foreground of the webpage difficult to read.
- 2
 - Code view allows the web developer to view and edit the HTML code.
 - Preview mode allows the web developer to view the webpage in a browser.
 - Design view allows the web developer to add text and multimedia elements to the webpage they are developing.
- 3 A website developer may want to edit the HTML code to add extra functions (e.g. a Java applet) that are not available in the software they are using.
- 4 Breadcrumb trail navigation provides the user with a list of pages visited and the sequence in which they were viewed; a sitemap shows the user all of the pages and external hyperlinks available through the website.
- 5 Breadcrumb trail navigation allows the user to easily retrace their steps through the webpages they have previously visited.
- 6 Websites can contain many multimedia elements and webpages. Organising the web content into folders and using appropriate file names means the various elements comprising the website can easily be located, making it easier to edit the website in the future.
- 7 In vertical navigation, hyperlinks are listed down one side of the webpage. In horizontal navigation, hyperlinks are listed across the page (normally close to the top of the page).

Check your understanding page 48

- 1** The ability to 'preview in web browser' allows the website developer to see the website in the way it would be viewed by other people using the same browser software.
- 2** Webpages can look different in one web browser from the way they look in another.
- 3** Some web browsers interpret HTML slightly differently from others and this can affect how webpages are displayed.
- 4** A 'broken hyperlink' is a hyperlink that directs the user to an incorrect URL, a missing file or a missing webpage.
- 5** Users can use the home page to move around the website.
- 6** A user can return to the home page by clicking on a hyperlink or navigation button or by repeatedly pressing the back button in the web browser.
- 7** A graphic image may not appear on a webpage for any of the following reasons:
 - The graphic may have been deleted from, or moved around in, the website folder structure.
 - The graphic may not have been uploaded to the web server with the rest of the website.

Answers to 9 Knowledge of ICT Components

Check your understanding page 50

- Three features of a digital camera are:
 - stores pictures on a memory card
 - a small liquid crystal display (LCD) screen is attached to view pictures taken immediately
 - pictures can be downloaded to a computer.
- Two benefits of using a touch screen are that:
 - minimal user training is required
 - no additional hardware (such as a keyboard or mouse) is required.

3

Device	Feature
Graphics digitiser	Allows the user to record a hand-drawn image onto a computer system
Scanner	Converts a hard copy of pictures or text into a digital image
Concept keyboard	Has keys with pictures or words
Tracker pad	Senses touch from your finger

Check your understanding page 52

- Three features of an impact printer are:
 - The print head is made up of a series of pins laid out in rows and columns (matrix).
 - Characters are formed as a series of dots.
 - The more pins in the print head, the better the quality of the printer.
- Two benefits of using a plotter to produce hard-copy drawings are that it:
 - produces high-quality, accurate and detailed diagrams compared to a printer
 - can use a variety of paper sizes, such as A0.

3

Device	Feature
Speaker	Can be useful for visually impaired users
Inkjet printer	Contains nozzles or jets that spray ink
Laser printer	Uses a toner kit to produce printouts
VDU	Displays information or output from the computer onto the screen

Check your understanding page 54

- A *bit* is the smallest unit of memory. 8 bits make up 1 *byte*. A *character* is usually 1 byte in size. A *kilobyte* is made up of 1024 bytes.
- In order of size, the units are: byte, kilobyte, megabyte, gigabyte
- A hard drive has the following features:
 - main storage device of a computer system
 - consists of a number of rigid disks stacked on top of one another
 - each disk has two surfaces; each surface consists of a number tracks and sectors.
 - A Blu-ray disk has the following features:
 - much larger storage capacity than a DVD

- used for recording high-definition television without loss of quality
- can store digitally encoded video and audio information.

4 Benefits of using a USB flash drive for GCSE coursework are that:

- they work on the principle of 'plug and play'
- they are portable devices with low power consumption.

Check your understanding page 55

1 Uses of RAM include:

- storing applications software being used
- storing data being used.

2 The features of ROM include:

- the contents are non-volatile
- storing the bootstrapping program.

3

Memory	Feature
Cache	Stores frequently accessed program instructions
ROM	Stores the 'booting up' program for the Windows operating system
RAM	Stores the current application programs and user data

Check your understanding page 56

1 The purpose of an operating system is:

- to provide an interface to allow the user to communicate with the computer
- to manage and control all of the hardware and software.

2 Features of a typical operating system include:

- the interface – allowing communication between the user and the computer
- memory management – allocating internal memory (RAM) to programs and data in use and retrieving and storing data on the external memory devices
- resource handling – controlling peripheral devices (input and output devices) and handling user requests for peripheral devices.

3

Feature	Description of feature
Icon	I am a graphic that represents a program, file or a tool from a toolbar
Window	I can be minimised or maximised.
Menu	I provide a list of options for the user to select from.

Answers to 10 Data and Information

Check your understanding page 58

- 1 Data is raw facts and figures. Information is data that has been processed and given a meaning.
- 2 Median mark, highest and lowest mark.
- 3 A suitable title and instructions which clearly explain the purpose of the form; a logo (if appropriate); a prompt to tell users what data to enter at each part of the form; a suitable space to enter each item of data; boxes, tick boxes, option buttons etc., to make it easier for users to complete the form.
- 4 Fast – inputting large amounts of data can be done quickly as OMR; accurate – because data is read directly from the document; can be analysed to produce high-quality information quickly; Staff need minimum training in the system use.
- 5 Scanning a hard copy of a text document to create an editable electronic copy. Scanning handwritten data such as the postcode on a letter and turning it into electronic data for processing.

Check your understanding page 60

- 1 Data verification is carried out to ensure that data keyed into a computer has been accurately entered.
- 2 Proofreading, double entry.
- 3 When data is being input.
- 4 A presence check will ensure that some data has been entered into an area on the form. This check means that data which must be entered is not omitted. A length check will ensure that data entered is of the correct length. A type check will ensure that the data entered is of the correct type. A format check will ensure that data is entered in a particular format. A range check ensures that data entered is within a given range, e.g. between 1 and 500. A check digit is added to the end of a code. The code is used in a calculation and the check digit is recalculated. If the results of the calculation do not match the check digit an error message will appear. The code will have to be input again.
- 5 Membership Number – numeric and range check, Name – text and presence check or length check, Address – text and presence check or length check, Postcode – text and presence check or format check, Date of Birth – date/time and presence check or length or format check, Gender Yes/No or Boolean and presence check or length or format check.

Check your understanding page 62

- 1 Data portability is the ability to transfer data from one system or software application to another without having to re-enter the data.
- 2 Data is compressed for the following reasons:
 - to reduce the size of a file for storage
 - to reduce the size of the file for data transfer, e.g. emailing
 - to bring a folder of data together so that it can be emailed as a single attachment.
- 3 Graphics software and specialist compression software, such as Winzip, can compress data.
- 4 A compressed folder of data:
 - can be emailed as a single attachment
 - will be smaller in size so should transfer quicker.

- 5 CSV stands for 'comma separated variable'.
- 6 PDF stands for 'portable document format'.
- 7 MIDI stands for 'musical instrument digital interface'.
- 8 GIF, JPEG and MPEG are compressed file formats.

Answers to 11 Digital Communication Systems

Check your understanding page 64

- 1 LAN means local area network; WAN means wide area network.
- 2 LANs and WANs differ in the following ways:
 - A LAN is spread over a small geographic area (usually one or two buildings) and a WAN is spread over a vast geographic area (countries or the world).
 - Computers on a LAN can be linked effectively using copper cabling. A WAN is a network of networks and networks can be linked most effectively using a fibre optic link or a wireless link, such as satellite.
- 3 Advantages of using a network are that:
 - Expensive peripherals can be shared between a number of computers.
 - Users can communicate with each other.
 - Users can share files and work on joint projects using shared resources and folders.
 - Users can log on at any computer and access their files.
- 4 A file server manages file and network security across the network and makes sure that only authorised users log on to the system. It holds user data and all software.
- 5 A network card enables the computer to be connected to a network.

Check your understanding page 65

- 1 A switch is a single connection point for a group of computers. It is also connected to the file server and organises communication between the file server and the computers. It can send data to a specific computer.
- 2 A router shares a network connection between devices; for example, a wireless router may connect school laptops to the network or enable home users to connect to the internet.
- 3 A firewall can be built into a router.
- 4 To connect to a wireless router, a computer must have a wireless network card, be wireless enabled or have a wireless dongle connected.
- 5 A communications protocol is an agreed standard or set of rules for sending or receiving data on a network. Protocols are needed to ensure that computers can communicate with each other.

Check your understanding page 67

- 1 A network faces the following threats:
 - viruses such as Trojan horses and worms
 - unauthorised access by users or hackers
 - authorised users who might damage important files
 - unexpected breakdown resulting in the loss of data
 - physical damage.
- 2 Usernames are unique and passwords are known only to the user. This ensures only authorised users can log on to the system.
- 3 Good passwords should:
 - be a combination of letters and numbers
 - have a minimum number of characters

- be changed regularly
 - be kept confidential.
- 4 Levels of access are used to limit the things which users can do on a network. Network managers can add users and see all users' data; normal users can only see their own data.
 - 5 Encryption is the process of encoding data before transmitting or storing it. Only a user with the encryption key software can read the data.
 - 6 Virus attacks can be avoided by installing virus protection software and updating it regularly. Regular virus scans must also be performed.
 - 7
 - A worm is designed to spread by replicating itself. It does not have to be attached to a document or program.
 - A Trojan horse gains entry to a user's computer disguised as a useful program. It provides hackers with an entry point to the user's computer.
 - 8 A firewall can prevent hackers, viruses and spam from entering the network via the internet. It can also prevent users or computers within the network from uploading data to the internet

Check your understanding page 68

- 1 A 'backup' is a copy of the original data file.
- 2 If the original data is deleted or corrupted, a backup can be used to restore it.
- 3 Network data can be backed up to a NAS, a DAS, magnetic tape or online.
- 4 PC data can be backed up to a CD, a DVD or online.
- 5 Data is uploaded to an online location, such as a secure server. Backup can be scheduled to be completed automatically.
- 6 Files stored online can be accessed from anywhere.

Check your understanding page 71

- 1 A mobile phone can be used to communicate by text, email or voice calls.
- 2 PDAs and smartphones allow users to communicate using Wi-Fi and 3G technologies. They function as a mobile phone and provide many if not all of the functions of a mobile phone.
- 3
 - a) laptops support Wi-Fi and Bluetooth
 - b) mobile phones support Bluetooth and WAP
 - c) smartphones support Bluetooth, Wi-Fi and 3G.
- 4 Wi-Fi is the wireless technology that provides the fastest data transfer speed.
- 5 The disadvantages of connecting a gaming headset over Bluetooth are:
 - It uses a lot of power.
 - The headset will need to be recharged frequently.
 - Data transmission is slower.
 - Bluetooth has a short range.
- 6 3G is 'third-generation' wireless technology. It allows mobile phones to connect to the internet. 3G use is very expensive when roaming.

- 7** When using 3G, download time is affected by:
- network coverage
 - the strength of the signal
 - the number of users in a network cell
 - the amount of data being downloaded.
- 8** Limitations of Wi-Fi are that:
- devices lose connection with the wireless router after a certain distance
 - signal strength can vary according to how close you are to the wireless router
 - signal strength can vary according to weather conditions.
- 9** Wireless Application Protocol (WAP) is a communications protocol designed to allow hand-held devices to access the internet.
- 10** Bluetooth has the shortest range of the wireless technologies.

Check your understanding page 73

- 1** WWW means World Wide Web. The internet is a network of networks and the WWW is an application which runs on it.
- 2** An intranet provides the following advantages:
- Users can communicate using the email facility.
 - Users can share resources.
 - Once information is uploaded, it can be viewed by everybody within the organisation at any time.
 - An intranet improves communications within an organisation.
- 3** An ISP provides:
- a variety of bandwidth options
 - an email service
 - a security package (protection against hacking, viruses, spyware and identity theft)
 - a web-hosting service for users' web pages
 - online and telephone assistance
 - junk-mail and pop-up ad blockers
 - website filtering.
- 4** The software required to connect to the internet is ISP software and browser software to view web pages.
- 5** The hardware required to connect to the internet is a PC, a telecommunications line and a modem.
- 6** An ADSL modem allows the computer to communicate with the internet and splits the signal into two channels, for voice and data transfer.

Check your understanding page 75

- 1** The main function of a web browser is to display web pages.
- 2** An address bar in a web browser allows users to enter the web address or URL of a website.
- 3** URL means Uniform Resource Locator.

- 4 ● http means that the hypertext transfer protocol is used to transfer the information.
 ● www.google.co is the domain name.
 ● .uk is the country-level domain name for the United Kingdom.
- 5 Features provided by a typical browser include:
- a navigation bar
 - a home button
 - a favourites list
 - an address bar
 - forward and back buttons
 - a history button
 - browser settings options.
- 6 Private browsing helps to ensure that users do not leave any personal data behind on the public computer they are using.

Check your understanding page 77

- 1 Bandwidth is the rate at which data can be transmitted down a communications line in a given period of time. It is measured in the number of bits (binary digits) per second.
- 2 The higher the bandwidth, the quicker data will flow.
- 3 Connection types in order of bandwidth are fibre optic, ADSL and PSTN.
- 4 People whose email address is in the Cc or Bcc field receive a copy of the email. Bcc means 'blind carbon copy'. The email addresses of people in the Bcc field are not seen by any of the other recipients. Cc means 'carbon copy'. The email addresses of people in the Cc field are seen by the other recipients.
- 5 The advantages of using email are that it:
- is flexible – emails can be sent any time day or night
 - is easily managed – less paper is used and all emails arrive in the inbox
 - is fast – delivery to any location in the world and to any number of people is instant
 - is cheap – when compared to telephone calls and faxes
 - filters – protects users from inappropriate communication
 - can have attachments – the sender can attach any type of file to the email
 - is secure and private – emails can be sent securely and privately, unlike faxes and telephone calls.
- 6 A fax machine is made up of a printer and an optical scanner. It scans a document and sends it across a telecommunications line. Faxes can print and copy documents as well as perform their fax function. The disadvantages of using fax are that:
- A dedicated fax line is required so that incoming faxes are not interrupted because of telephone calls.
 - Fax machines are expensive to buy.
 - The running costs include toner cartridges for printing, electrical charges and the cost of telephone calls every time a fax is sent.
 - If the receiving fax machine is not free to receive the document, it has to be sent again.

Check your understanding page 78

- 1** VoIP allows users to make telephone calls over the internet using software which can be downloaded. It makes use of the user's internet connection so can be cheaper than making a telephone call.
- 2** Video conferencing involves using the internet to transmit pictures and sound between computers. Low bandwidth may mean that images and sounds do not arrive together and the overall quality of the video will be poor.
- 3** Video conferencing requires a PC, a video camera or webcam, a microphone, a screen, a high-bandwidth connection and video-conferencing software.
- 4** Video conferencing can help a company with branches all over the world provide face-to-face meetings without the travel costs and time.
- 5** Bulletin boards provide text-based messaging without instant replies. Users log on to a bulletin board and 'post' a message. It may be a few hours or days before a reply is posted onto the bulletin board.

Answers to 12 Applications of ICT

Check your understanding page 81

- 1
 - EFT means 'electronic funds transfer'.
 - EFTPOS means 'electronic funds transfer point of sale'.
 - ATM means 'automatic teller machine'.
- 2 Information stored in a typical barcode includes:
 - product code
 - manufacturer code
 - country of origin
 - check digit.
- 3
 - A smart card is a plastic credit or debit card that contains a tiny embedded microchip.
 - The card is authenticated automatically using a PIN keyed in by the customer, when paying for goods and services.
- 4 Advantages of EFTPOS to a customer include:
 - less chance of theft because no cash is used
 - Access to cash at the checkout.
 Disadvantages of EFTPOS for a customer include:
 - unplanned or impulse buying, leaving the customer in serious debt.
 - card fraud.
- 5 Facilities available at a typical ATM include:
 - withdrawal of cash (with or without a receipt)
 - ordering a bank statement
 - ordering a new chequebook
 - obtaining the account balance.
- 6 Advantages to a bank of online banking include:
 - Fewer branches and staff are required as customers do not need to visit the bank as often.
 - E-statements save on paper and post.

Check your understanding page 82

- 1 Batch processing involves:
 - collecting groups (or batches) of similar data over a period of time
 - no processing of data at collection time
 - inputting the data into a computer system
 - processing the data collectively without human intervention.
- 2
 - A master file stores information which does not change in the short term, such as the customer number and name in a billing application.
 - A transaction file stores current data, such as the meter reading in a billing application. It also contains the key field of the master file to allow the files to be linked.
- 3 Batch processing produces electricity bills in the following way:
 - a) Meter readings are recorded onto the customer data collection form.

- b) Meter readings are placed together into batches and entered into the computer system.
- c) The data is checked, using data verification and data validation techniques, and any errors are notified.
- d) The valid data is used to create a transaction file, sorted into the same order as the master file.
- e) The master file and the transaction file are used to calculate and print customer bills.
- f) The details on the transaction file are used to update the master file and this is saved as a new master file.
- g) Customers are sent their bills.

Check your understanding page 83

- 1 A virtual reality system:
 - enables a person to 'move' and react within an environment simulated by a computer
 - is a computer program that models a real-life situation.
- 2 Devices used to simulate human senses in virtual reality applications include:
 - stereoscopic helmets (head-mounted devices, HMD) to allow 3D sight and hearing
 - gloves for touch sensations
 - tracking devices (joysticks) to navigate around the environment.
- 3 The benefits of using virtual reality and simulation to train pilots are that it:
 - is a full-size replica of a typical cockpit
 - gives the pilot an experience of a range of real environments
 - is programmed to let pilots experience situations that they may encounter in the future.

Check your understanding page 85

- 1 Types of sensor include:
 - light sensors to measure light intensity
 - temperature sensors to measure temperature changes
 - sound sensors to measure the level of noise.
- 2 Advantages of using a computer for data logging include:
 - automatic capture and storage of data, without human intervention
 - storage of data over a period of time for analysis by specialised software.
- 3 In analogue-to-digital conversion:
 - an interface called an analogue-to-digital converter (ADC) is connected between the sensor and the computer
 - the ADC changes analogue data (a varying voltage) into digital data.
- 4 Feedback means that a computer system can monitor its own activity through controlling the outputs according to the inputs.
- 5 Computer systems are used to control traffic in the following ways:
 - Traffic lights are networked and controlled by a central computer. Each set of traffic lights can be programmed to vary in operation throughout the day. Feedback helps the computer to make decisions based on traffic flow.
 - Speeding systems consist of sensors that can detect and log car speeds. If the speed is over the predefined limit then a digital camera captures the car details to help locate and fine the owner.

Check your understanding page 86

- 1** ICT can be used in education in the following ways:
 - Computer-assisted learning (CAL) packages can deliver a topic in a multimedia environment, allowing pupils to learn at their own pace.
 - Science and technology make use of data-logging equipment including sensors.
 - MIDI equipment assists in learning and producing music.
 - DVD technology provides pupils with interactive films.
- 2** ICT can assist with pupils who have special educational needs in the following ways:
 - A magnifier magnifies text so that sight-impaired pupils can read it.
 - An on-screen keyboard gives pupils with low mobility an easier way to 'type'.
 - Voice recognition software can be trained to understand the spoken word.
- 3** The internet has the following advantages in education:
 - Search engines allow pupils to enter keywords and phrases for research purposes
 - Pupils and teachers can use email as a means of communicating.
 - Video conferencing allows pupils to take part in two-way visual communication with pupils in other schools.
- 4** Advantages of using a VLE in education include:
 - a central storage area for digital resources
 - shared resources for collaborative teaching and learning
 - learning beyond the classroom with 24/7 access to the VLE.

Check your understanding page 87

- 1** The following jobs used to be manual but are now automated:
 - paint spraying in car factories
 - moving stock in a warehouse
 - office administration work
- 2** The following jobs have been created since the introduction of ICT into the workplace:
 - software engineers
 - database administrators
 - web designers.
- 3** Advantages to an employee of teleworking include:
 - saving on travel costs and time to and from work
 - allowing people with disabilities to carry out their jobs in an environment designed for them.
 Disadvantages to an employee of teleworking include:
 - feeling isolated because of loss of social interaction and teamwork
 - the cost of providing an office at home.

Check your understanding page 88

- 1** Video streaming means downloading a video from the internet and playing it as soon as the compressed data is received rather than waiting for the download to be completed.

- 2 One drawback of using ICT for social networking is that there is so much personal data stored in social websites that the risk is greater.
- 3 Interactive TV includes:
 - an electronic program guide that gives viewers additional information about programs
 - the ability to record one channel while watching another one
 - the ability to play games, perform home shopping and vote in competitions.

Check your understanding page 89

- 1 E-commerce is the buying and selling of goods on the World Wide Web.
- 2 Advantages for the customer of shopping in a global way are that:
 - shopping can be done from the comfort of their own home 24/7
 - they do not have to visit the shop
 - they have access to a wider variety of stores.
- 3 Advantages for the company in providing shopping in a global way are:
 - a reduction in staff – checkout operators are not required
 - access to a larger (global) customer base
 - a reduction in overheads with no need to rent premises that customers can visit.
- 4 A website used for shopping transactions can be made more secure using:
 - an internet protocol called Secure Socket Layers (SSL) to encrypt data before it is sent from your computer
 - Secure Electronic Transaction (SET) two-stage authentication process using digital signatures.

Check your understanding page 90

- 1 Health issues associated with ICT include:
 - RSI – a range of conditions affecting the muscles and joints in the neck, shoulders, arms, wrists and hands; you can minimise it by taking regular breaks
 - eyestrain – caused by over exposure to screens; you can minimise it by using anti-glare screens
 - back pain – related to the sitting posture or unsuitable furniture at the computer; you can minimise it by using chairs that allow height adjustment and backrest tilting.
- 2 An employer can help make a workplace safer by:
 - regular testing of electricity switches, plugs, sockets and computer equipment
 - using cable management for computer cables and network leads allowing safe organisation
 - providing properly vented offices so that room temperature can be controlled.

Check your understanding page 93

ICT contributes to the following environmental concerns:

- Reliance on road transport and air travel can be reduced through arranging meetings using video conferencing.
- Power consumption can be reduced by allowing computers to go into hibernate or sleep mode if they are not being used for a period of time and using screensavers.
- Printer usage can be reduced by optimising printer controls, such as duplex (double-sided printing), and using print management software to control the number of copies a user can print.

Check your understanding page 92

1	Law	Description
	Copyright, Designs and Patents Act	Using ICT (including the internet) to copy or download material such as music, video or text-based files, thus avoiding the price of purchase
	Computer Misuse Act	Intentionally accessing computer systems without consent or authorisation
	Data Protection Act	Keeping personal data for reasons other than the specified purpose

- 2**
- A data controller is the person in a company who is responsible for controlling the way in which personal data is processed.
 - A data subject is the individual whose personal data it is. They can prevent processing of their data if it is inaccurate. They may also receive compensation for loss of their data or unauthorised disclosure.
- 3**
- A hacker is someone involved in digital crimes that intentionally access computer systems without consent or authorisation.
 - A virus is a piece of software designed to disrupt the normal operation of a computer. Some viruses destroy user files, others display annoying messages and some store themselves as 'hidden' files on your hard drive to be triggered on a certain date.