

# **IGCSE ICT**

## **Useful Knowledge for Practical Tests**

**Summer 2016**

# **Audience**

## **Categories of target audience**

- Young children, teenagers, adults, senior citizens

## **Finding out about the target audience**

- What are their needs?
- How much do they know already?
- Knowledge of the reader about the subject
- What level of literacy do they have
- How much specialist vocabulary will they be able to understand?

## **A website or presentation aimed at young children would need to include**

- Lots of images, animations/cartoons, no long words or sentences, bright colours, easy navigation, appropriate images

## **A website or presentation aimed at adults would need to include**

- More complex page design and navigation, longer sentences and words, subtle use of colours, images aimed towards an adult audience

# **File Management**

## **Generic file formats**

- Documents created in one program package may not work/open in another program
- To get around this, a 'generic file format' can be used – this is when a document is saved in a format that can be used in different programs
- Example of generic file formats:
  - .csv (comma separated values)
  - .rtf (rich text format)
  - .txt (text)
  - .htm (hypertext markup language)
  - .css (cascading style sheets)
  - .pdf (Adobe Reader format)
- Example of saving a document in a generic file format:
  - Create a document in a spreadsheet
  - Save the document in .csv format (not the regular spreadsheet format)
  - Import the .csv document into a database
  - Save the document in the regular database format

## **Reduce file sizes for storage or transmission**

- Reducing the file size of a document can help to increase transmission speed (i.e. send it more quickly) and reduce the memory needed to store the image
- Reasons for needing to do this:
  - There may be size restrictions for email attachments
  - Large files take longer to download – that may use up a data allowance which could lead to paying more money if it is exceeded

- There may be restriction on the file size that can be uploaded onto a site (e.g. profile pictures on social networks)
- Websites prefer lower quality images to make browsing faster
- Smaller file sizes means taking up less memory

## **Images**

### **Aspect ratio**

- This is the ratio of an image in terms of width and height:
  - An image that is 16cm wide and 9 high would have an aspect ratio of 16:9
  - When an image is resized, the 'aspect ratio' may need to be maintained
  - If an image is made smaller by 50%, then it would become 8cm wide by 4.5cm high – the aspect ratio of 16:9 has been maintained

### **Resolution**

- Image resolution is the number of dots, or pixels, in an image:
  - If an image is 640 x 480 pixels, they are multiplied together (width x height)
  - Total of 307,000 pixels (or 0.3 megapixels)
- Image resolution can be adjusted, but this changes the file size
- Higher resolution images:
  - Better quality, but slower to transmit/download or view on a webpage
  - File size is higher, taking up more space on the device and may exceed file size limits
- Lower resolution images:
  - Lower quality, but faster to transmit/download or view on a webpage
  - File size is lower, taking up more less space on the device

## **Layout and Styles**

### **Headers and Footers**

- Headers are found in the margin area at the top of a page
- Footers are found in the margin area at the bottom of a page
- Headers and footers are separate to the main area of the page
- Types of information found in headers and footers:
  - Page numbers, today's date, title, author's name, document filename, image (e.g. company logo)
- They can be aligned to the left, centre and right
- Some aspects can be automated (e.g. filename and filepath, date)

### **Corporate house styles**

- Ensures all documents for a company/organisation have a consistent appearance
- Ensures that all documents have a professional appearance
- This could include fonts (size, colour, serif/sans serif), alignment, line spacing

## **Proofing**

### **Spellcheckers**

- Not always 100% accurate because:
  - A misspelled word may have been added to the dictionary already
  - Specialist terms have not been added to the dictionary, so may appear as if they have been misspelt

### **Validation**

- Validation is the checking of data to see if it meets certain rules:
  - Data type check (check that the correct data type has been entered)
    - The word *nine* has been entered instead of the number 9
  - Range check (a number has been entered within a certain range)
    - A test mark must be between 0 and 100
  - Presence check (some data must be entered)
    - Card number and expiry date when buying something online
- Data may be valid but still wrong (e.g. a test mark was 87% but was entered as 78%)

### **Verification**

- Verification is the checking of data to ensure it is as accurate as possible
  - Visual verification - checking that the data being entered matches the original data (e.g. entering responses to a questionnaire)
  - Double entry of data – the data is entered twice and checked to see if it is identical. If both sets of data are identical, it is accepted for processing (e.g. setting a password)
- Verification and validation can help to improve the accuracy of data being entered, but doesn't guarantee 100% accuracy

### **Consequences of data entry errors**

- Embarrassment (e.g. wrong date for a school event)
- Loss of money (may result in compensation or refunds being given)
- Prosecution (if the law is broken, they could go to court and receive a fine or in serious cases go to prison)
- Wrong goods being sent out (need to arrange return of the wrong items and send out the correct items)

### **Ensuring accuracy of information:**

- Facts should be checked using several reliable sources
- Ask someone who is knowledgeable about the subject to check for accuracy of information
- Use spelling and grammar checks in software
- Ask other people to check (proof-reading) and look for mistakes
- Check it yourself by printing it out and reading through it slowly

### **Transcription and transposition errors**

- Transcription error means spelling mistakes (e.g. *recrd* instead of *record*)
- Transposition errors means characters have been entered in the wrong order (e.g. *1243* instead of *1234*)

## **Document Production**

### **Text issues: widows and orphans**

- They can ruin the appearance of a document and makes it less readable
  - Orphan –the first line of a paragraph, but it is the last line of text on a page. The rest of the paragraph is on the next page.
  - Widow – the last line of a paragraph that appears by itself at the top of a page. The rest of the paragraph is on the previous page.
- They can be avoided by using the following
  - Page breaks, column breaks, changing page margins

### **Mail merge**

- This can be used to send the same document to lots of people (or recipients), but makes it more personalised
  - Master document – the standard text that will go out to all recipients. This may be the text of a letter.
  - Data source – details of the recipients (e.g. their names and addresses)
- The letter and data source are combined to produce personalised documents
  - Fields from the data source are inserted into the letter before merging
- Mail merging can produced personalised letters for a large number of people more quickly than creating them individually
- The data source must be as accurate and up-to-date as possible

## **Data Manipulation (Database)**

### **Flat file databases**

- Contain one table of data only and is a simple data storage method
- A record is the complete information about a person, product etc.
- A primary key is often needed in a database
  - Uniquely identifies each record in a database
- Advantage:
  - Simpler to set up than a relational database
- Problems:
  - This may lead to data being repeated within a record (data redundancy)
  - When a record is deleted, any useful data within the record may also be deleted

## Relational databases

- Data is stored in several tables, with links set up between them (relationships)
- Each table will need its own primary key
- Relational databases also use foreign keys to establish relationships between tables
  - A field in one table which is also the primary key in another table
- Advantages:
  - Reduces the amount of redundant data being entered
  - Time is saved when typing in data
  - Errors can be reduced
- Disadvantage:
  - More complex to set up than flat-file database
  - It may take longer to set up than a flat file database

## Commercial databases

- Other types of multimedia data can be entered into a database
  - Images, sound files/sound clips, video clips
- 'Placeholders' are used to hold these types of data in a commercial database

## Data Analysis (Spreadsheet)

### Basic definitions

- Cell – each box on the spreadsheet has a cell address, made up of its column and row position (e.g. A1)
- Columns – cells that go down the sheet, indicated by a letter
- Rows – cells that go across the sheet, indicated by a number
- Sheet – the part of a spreadsheet where data is entered. It is sometimes known as a worksheet. More than one worksheet can be used to hold data.
- Sheet tab – displays the name of the worksheet
- Pages – data may be in a worksheet, but might take up more than one page when printed out
- Charts – a selection of data in a spreadsheet is converted into a chart/graph, which can make it easier to understand

### Accuracy of data

- If data in the spreadsheet is wrong, then any calculations using this data will also be wrong
- Mistakes can be spotted by visually checking that data to see if it has been entered properly (verification)

### Formulae, functions etc.

- Formulae – performing basic calculations on cell contents, by using cell addresses.
  - An example would be =B2+B3 which adds the contents of the two cells together
- Functions – more complex calculations that the spreadsheet has memorised.
  - An example could be =SUM(B2:B6) which adds up all of the contents from cells B1 to B6
- Absolute cell referencing – a cell within a formula is fixed when it is copied (or replicated). The dollar sign is used to indicate this type of cell reference.

- \$B\$2 means that cell B2 will not change in a formula if it is copied
- Relative cell referencing – when a formula is copied (or replicated), the row and column will automatically change
- Named cells – a cell can be given a name instead of its regular cell address
  - Example: cell B2 could be named: *interest\_rate*
- Named range – a highlighted group of cells can be given a name
  - Example: cells B3 to B6 could be called: *codes*
- Nested functions – a function that is inside another function

### Order of mathematical functions in a formula

- Spreadsheets carry out calculations in this order
  - Brackets
  - Percentages
  - Indices (i.e. powers and roots)
  - Multiplication or division
  - Addition or subtraction

### Testing the data model

- Testing is helpful in identifying problems and developing solutions to ensure something works as it should do
- Spreadsheets should be tested to make sure they are producing the correct results
  - Use the 'calculator' program to double-check the answers produced by a formula
- Common errors to look out for:
  - Mistakes in the formula
  - Incorrect cell addresses being used in a formula/function
  - Relative cell referencing being used instead of absolute cell referencing, and vice versa
  - The wrong filters being applied, which brings up incorrect data
    - Sorting data in the wrong order, not filtering the correct column

### Test plan

- Testing should be performed in three ways
  - Normal data – within an acceptable range and should be accepted
  - Abnormal data – data that is outside of the acceptable range and would be invalid. An error message would appear.
  - Extreme data – data on the boundaries of acceptability, but will be accepted
- A test plan is made up of the following:
  - Test number
  - Data to be entered/used for the test
  - Purpose of the test
  - Expected result
  - Actual result

Below is a test plan for the results of a test. The marks will range from 0 to 100.

Test Number	Data entered	Purpose of test	Expected result	Actual result
1	55	Test normal data	Accept	
2	0	Test extreme data	Accept	
3	100	Test extreme data	Accept	
4	102	Test abnormal data	Reject and show error message	
5	-1	Test abnormal data	Reject and show error message	
6	BRC	Test abnormal data	Reject and show error message	

- The actual results will be entered when the test was actually carried out
  - If the expected result and the actual results are the same, then the test plan has done its job
  - If the expected result and the actual result are not the same, it may need further checking and retesting

### Use of data in testing

- Artificial data (i.e. not actual data) can be used to test the spreadsheet
  - If it goes wrong, no actual data is lost
- Live data (i.e. actual data) can also be used for testing
  - Tests carried out on a new system can be compared to tests carried out on the previous system

## Website Authoring

### Web development layers

- Content layer
  - The content of a web page, such as text and images
- Presentation layer
  - How the page looks to the reader
  - Settings can be defined in a Cascading Style Sheet (CSS)
- Behaviour layer
  - Actions that happen when the user does something
  - Examples: click on a hyperlink to go to another webpage, play a video
  - This layer can be created using HTML (HyperText Markup Language)

### Use of tables to create a webpage

- It can be easier to create a webpage by using a table
- Text, images and other objects can be placed into a cell in the table
  - Cells can be merged
  - Borders can be shown or hidden
  - Items can be aligned in a cell (left, centre, right)
  - Rows and columns can be widened



## Hyperlinks

- Allows a user to move from one webpage to another by clicking on text, or an image
  - To an external website
    - In the same window
    - In a new window
  - To locally stored webpages within the same website
    - Example: Moving from BBC News webpage to BBC Sport webpage
  - To a different part of the same webpage
    - From the bottom of a webpage up to the top of the webpage
    - These can be set up using a reference point call an 'anchor'
    - A user won't see the 'anchor' because it is a point of reference on a webpage, not a hyperlink
  - To a specified email address
    - Will bring up the system's email software, with the recipient's name already entered

## Cascading Style Sheets (CSS)

- They are not webpages, but a separate file that is attached to a webpage
- A stylesheet contains the settings for the appearance of text (font, size, colour, alignment) and background colour
- Advantages:
  - Saves time – if a setting has to be changed, it only needs to be done once
  - Consistent appearance across all pages within a website

## Absolute file path

- Needed when creating a hyperlink to an external website
- This is the full file path to an external website or image:
  - *http://www.mysite.com*
  - *http://www.mysite.com/graphics/image.png*
  - *http://www.mysite.com/help/articles/how-do-i-set-up-a-webpage.html*

## Relative file path

- Needed when creating a hyperlink to a webpage within the existing website
  - The hyperlink does not go to an external website
- The full file path is not required:
  - *index.html*
  - */graphics/image.png*
  - */help/articles/how-do-i-set-up-a-webpage.html*
- Because stylesheets are linked to all webpages within a website, a relative file path must be used