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| **Question** | **Indicative content** | **Marks** | **Guidance** |
| **Section A: Images** | | | |
| 1 | A bitmap image is made up of a series of **pixels** which each display a **colour** which is represented by a **binary** value. | 3 | 1 mark each (correct answer only) |
| 2 | 1 mark per bullet:   * The resolution of an image is the number of pixels per unit (pixels per inch). * The more pixels per inch the larger the file size. | 2 |  |
| 3a | 1 mark per bullet:   * Reduce download size. * Reduce download time when transferring a file. * Reduce storage requirement. | 2 | Accept:   * uses less bandwidth when transferring over a network/email. |
| 3b | 1 mark per bullet:   * Removing data from a file (commonly images and sound) * ….to reduce its size. * Data is lost when file is uncompressed * ….which means that the image cannot be restored to its original condition. | 2 | Accept:   * reference to the permanent deletion of data. * file becomes irreversible |
| 3c | 1 mark per bullet:   * Compressing a file without losing any information * …No bits are lost after the image has been restored * …. All data is restored after file has been uncompressed. | 2 | Accept:   * reference to run-length encoding. * file is reversible and can be restored to it’s original state. |
| 3d | 1 mark for advantage and 1 mark for disadvantage  Advantages:   * Faster to send/upload/download * Requires less storage   Disadvantages:   * Reduces quality | 2 |  |
| 4 | 1 mark per difference   * Bitmap made up of pixels/vector made up of lines and curves (mathematically defined objects) * Bitmap takes up more storage space and memory compared to vector. * Bitmap is dependent on the resolution of a printer/display device. * Bitmaps aren’t scalable (pixelate when enlarged)/vector adjusts the mathematical equations to maintain quality. * Bitmap edits individual pixels/vector edits individual objects * Bitmap can represent a wide range of colours/vector has limited colour capability/cannot show gradients. * Bitmap uses less processing power in comparison to vector. * Bitmap used for photos/web pages and vector used for logos/web icons. | 2 | Do not award mark if a comparison hasn’t been made. |
| 5a | 1 mark each   * Downloading… data are transferred to a device from a web page and consumed offline. * Streaming…. data transferred to a device without being downloaded. | 2 |  |
| 5b | 1 mark per bullet   * A temporary storage area * Holds downloaded sections of the video that have not been played. * Connection becomes interrupted * Buffer goes down and will begin buffering whilst it catches up. | 3 |  |
| **Section B: Sound** | | | |
| 1 | Hardware   * Microphone * Keyboard * MIDI   Conversion   * From analogue to digital   Reason for conversion:   * Sound needs to be converted into binary/digital format for computers to be able to process it. * Computers can only understand digital format and sound waves are analogue. | 3 | 1 mark per correct answer. |
| 2a | 1 mark per bullet   * This is the number of samples taken at regular intervals… * …if less samples are taken… * …then it will reduce the quality of the song. | 3 |  |
| 3 | Must cover the three key bullet points stated in the question to access Band 3.  **Quality of album cover/track recordings**  • Album cover should contain a high volume of colours/increased quality of image.  • …. File size would increase…increasing loading time.  • Use appropriate resolution for web graphic  • …72dpi recommended (but this doesn’t have to be made explicit)  • The band will need to record the tracks so will need recording equipment…  • …and samples can be taken  • …more samples taken will lead to a more accurate representation of their recording  • …users can clearly hear the track recordings with no compromise on quality.  • …file size would increase…increasing loading time  • …converting analogue sound (sound waves) into digital (binary)  • Compression…  • ….Lossy compression could lose quality…  • ….album cover with diminished quality could have impact on future sales.  • ….track recordings could lose quality and it might not an accurate representation of the original.  • Lossless compression  • …..temporarily re-arranges data/run length encoding could be referenced.  • …so quality is maintained for cover and/or recording.  **Storage requirements**  • Lossy compression  • ….permanently removes data  • ….reduces size of file/good for webpages when loading  • …poor cover quality might be reflective on the band and create a negative impression.  • Lossless compression  • …..temporarily re-arranges data/run length encoding could be referenced.  • ….size of the file could be larger and can impact loading time.  • …this could lead to users getting frustrated and leaving the website.  • ….track recording could take time to load  **Compatibility issues:**  • Album cover….  • …appropriate file format used (e.g. JPEG)  • …. which is compatible with web browsers. For example, TIFF wouldn’t be suitable because it’s a common format for a printed graphic.  • ….appropriate file format used (e.g. PNG)  • ….as it’s easy to transfer to different platforms if required.  • …which is compatible for web browsers. For example, PSD is a Photoshop specific file format.  • Track recording…  • …appropriate file format used (e.g. MP4)  • …. which is compatible with video players. For example, MOV, requires QuickTime media player.  • ….appropriate file format used (e.g. AVI) | 8 | **Band 3 (6-8 marks)**  • The candidate demonstrates a thorough knowledge and understanding of a wide range of considerations in relation to the question; the material is generally accurate and detailed.  • The candidate is able to apply their knowledge and understanding directly and consistently to the context provided. Evidence/examples will be explicitly relevant to the explanation.  • The candidate is able to weigh up both sides of the discussion and includes reference to the impact on all areas showing thorough recognition of influencing factors.  • There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated.  **Band 2 (3-5 marks)**  • The candidate demonstrates reasonable knowledge and understanding of a range of considerations in relation to the question; the material is generally accurate but at times underdeveloped.  • The candidate is able to apply their knowledge and understanding directly to the context provided although one or two opportunities are missed. Evidence/examples are for the most part implicitly relevant to the explanation.  • The candidate makes a reasonable attempt to discuss the impact on most areas, showing reasonable recognition of influencing factors.  • There is a line of reasoning presented with some structure. The information presented is in the most part relevant and supported by some evidence.  **Band 1 (1-2 marks)**  • The candidate demonstrates a basic knowledge of considerations with limited understanding shown; the material is basic and contains some inaccuracies. The candidate makes a limited attempt to apply acquired knowledge and understanding to the context provided.  • The candidate provides nothing more than an unsupported assertion.  • The information is basic and communicated in an unstructured way. The information is supported by limited evidence and the relationship to the evidence may not be clear.  **0 marks**  No attempt to answer the question or response is not worthy of credit |
| **Section C: Measuring and storing data** | | | |
| 1a | Bit, Nibble, Byte, KB, MB, GB, TB, PB | 1 | Correct answer only |
| 1b | Any one from:   * The smallest representation of data consisting of either a 1 or 0. * A single binary digit. | 1 |  |
| 1c | 8 | 1 | Correct answer only |
| 2a | 1 mark per bullet:   * Used to back up data stored in main memory/primary storage. * Stores programs/data and other files that would otherwise be lost when the power is switched off/RAM is volatile/cannot store data permanently. * Need for larger storage capacity. | 2 |  |
| 2b | Any two from:   * CDs * Memory card * DVD * Blu-ray disc * Flash drive * USB memory stick * External hard disk drive * External solid state drive | 2 | Accept other reasonable examples such as: SD Card, CD-R, CD-ROM  Do not accept just USB as an answer. |
| 2c | 1 mark for name and 1 mark for correct identification.   * Optical * Inexpensive/reliable/robust/relatively large capacity * Magnetic * Store large capacity/commonly used making it possible to share compatibility/can be used to store operating system and other files and programs/reliable/cost-effective * Solid state * Flexible/Inexpensive/faster access to data/Can be used for portable devices/generally smaller in size/robust/easy to use/no setup requirements | 6 |  |
| 3a | Solid-state | 1 |  |
| 3b | 1 mark for point and 1 mark for expansion   * Fast access (1) Less delays when turning the device on. (1) * Robust. (1) Device can be moved/handled without it getting damaged. (1) * Small/light. (1) Fits in the barcode reader. (1) * More efficient (1) Uses less power to battery life. (1) |  | Must expand on original point to gain full marks. |
| 3c | 1 mark for correct type of storage  2 mark for appropriate justification  **Scenario 1**   * Optical (1) * Portable/Small/Lightweight (1) which makes it easy to put inside a magazine (1)   **Scenario 2**   * Magnetic (1) * High capacity (1) which allows the organisation to store a large volume of files (1) * Value for money/Low cost per MB (1) which allows the organisation to purchase multiple devices (1)   **Scenario 3**   * Solid-state (1) * Portable/Small/Lightweight (1) easy for the student to transfer files from camera to a computer. | 9 | Scenario 2:  Accept solid-state if a reasonable justification has been given. (e.g. loads files up quicker) |
| 3d | 1 mark for correct answer and 1 mark for correct working   * 3 \* 1 000 000 * 3 000 000/3m/**3 million** | 2 | Accept calculations by 1024. |
| 3e | |  |  | | --- | --- | | **Capacity** | **Storage type** | | Up to 4.7Gb | DVD | | Upto 800Mb | CD | | 200Gb to 1Tb | Hard disk | | 3 | 1 mark per row  Correct answer only |
| 3f | Cloud | 1 |  |
| 3g | Any two from:   * Data is available anywhere you have internet access and a browser. * Easy to share data with others. * Data is backed up for you. | 2 |  |
| 3h | Any one from:   * James has less control of his data as he does not know where it is stored. * He has trust that the organisation storing his data will keep it secure. * The online data storage may not be reliable. * Needs an internet connection to get access to data. | 1 |  |
| 4 | Portability  • Both devices….  • …. small/lightweight…  • …. easy to carry around  • …. Kerry is able to save documents to the device at home…  • ….and easily transport this device to school…  • ….and she can open her work there.  Durability  • Optical devices  • …not durable…  • …susceptible to being dropped, scratched/exposed to extreme conditions  • …surface of the optical device could get scratched…  • ….makes it unable to read the data  • ….Kerry may lose her work/get to school and files don’t load up  • ….a wallet/case would be needed to provide further protection.  • Solid-state devices  • …more durable than optical…  • …protected by plastic casing…  • …extra protection if dropped…  • ….uses flash memory which is solid-state storage…  • ….therefore no moving parts  • ….makes it difficult to break if dropped by accident.  • …Kerry could store this in her bag….  • …it will handle sudden movement in the bag before it’s used.  Capacity  • Optical storage…  • …CD’s can only store 700 MB…  • …Blu-ray discs could store more  • …this might not be enough to store the files Kerry needs to transfer to school  • …if files were large such as saving videos.  • Solid-state storage…  • …USB flash drives vary from 128MB to 256GB  • …should provide sufficient space for Kerry to save all her files…  • .... including large files.  • …enough capacity to be used for future projects/work from other subjects.  Cost  • Cost per GB  • Optical storage  • …CD’s are a cheap option but the capacity is small so cost per GB is high.  • …Kerry may only need one CD to store and transfer files  • …which outweighs the benefits a USB flash drive provides.  • Solid-state storage  • …USB flash drives more expensive (e.g. 16GB Is about £7)  • …cost per GB is low which represents value of money  • …could be a good long-term investment for Kerry...  • …if she intends to use it again in the future. | 12 | AO2  **Band 4: 10 – 12 marks**  An excellent explanation, which shows:   * thorough knowledge and understanding of optical and solid-state devices. * an excellent description of how it applies to Kerry. * Writing is very well structured and organised, using accurate grammar, punctuation and spelling. * A range of specialist terminology is used with accuracy.   **Band 3: 7-9 marks**  A good explanation, which shows:   * Generally secure knowledge and understanding of optical and solid-state devices. * A good description of how it applies to Kerry. * Writing is generally well structured and organised, using mainly accurate grammar, punctuation and spelling. * Specialist terminology is used with accuracy.   **Band 2: 4-6 marks**  A basic explanation, which shows:   * Some knowledge and understanding of optical and solid-state devices. * A basic description of how it applies to Kerry. * Writing shows some evidence of structure though some errors in grammar, punctuation and spelling affect meaning. * Basic use of specialist terminology.   **Band 1: 1-3 marks**  A limited explanation, which shows:   * Limited knowledge and understanding of optical and solid-state devices * A limited description of how it applies to Kerry. * Some errors in grammar, punctuation and spelling, which affect clarity of communication. * Limited use of specialist terminology.   **0 marks**   * Response not creditworthy or not attempted |