

DIGITAL SOUND

1. How is sound converted into a digital signal for computers?
2. What is the process of measuring the sound wave at fixed intervals called?
3. What is the term for the number of samples recorded in any given period of time?
4. What ALWAYS occurs when digitising an analogue sound wave?
 - a) the digital file is always compressed
 - b) some sound data is always lost
 - c) the digital file is always longer than the original
 - d) the digital data is always encrypted
5. The space available to store data about each sample is known as? :
 - (a) Bit depth
 - (b) Sample rate
 - (c) Resolution
 - (d) File size
6. Explain how the sample rate impacts on the quality of the digital sound?
7. What does "bit depth" refer to in sound representation?
8. What is the formula for calculating the file size of a sound in bits?
9. How can a higher bit depth affect the quality of a sound recording?
10. What is being described here: the process of converting a continuous quantity (one that can have any value within a range) into a discrete quantity (one that can only have specific, separated values). For example, an analogue sound wave into digital sound.
 - (a) Quantisation
 - (b) Sampling
 - (c) Bit depth
 - (d) Compression

ANSWERS

1. Sound is captured using a microphone and then converted into a digital signal through an analogue-to-digital converter. Samples of the analogue sound wave are taken at a given time and amplitude and this data is stored as a binary number.
2. Sampling.
3. Sample rate – measured in Hz but usually shown as KHz (kilohertz) or MHz (megahertz)
4. B – some data is always lost.
5. A – bit depth. The more space (bits), the more data can be stored about each sample. The more data, the more detail.
6. The higher the sample rate, the closer to the original analogue sound the digital sound will be. This is because there will be a smaller sample interval and less of the original sound will be lost. The lower the sample rate, the more sound is not captured so the digital sound will sound less like the original than a digital sound sampled at a higher rate. NOTE: There is also a direct correlation between sample rate and file size.
7. Bit depth is the number of bits available to store data about each sample. The more bits (space available) the more detail can be stored about each sample.
8. To calculate file size of a sound in bits:
time (seconds) * sample rate (Hz) * bit depth
NOTE: a question may give you the time in minutes (* 60) and the sample rate in KHz or MHz.
Remember that there are 1000 Hz in a KHz and 1000 * 1000 Hz in a MHz.
9. Higher bit depth translates to more possible values, offering a wider range to represent the subtle variations in the original sound wave. With a low bit depth, certain sounds might be "rounded off" to the nearest available value, leading to a loss of detail.
10. A – Quantisation NOTE: this word has never been in an exam but is worth knowing just in case!