# Lesson 18 – Binary Representation of Sound

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| 40BThe Big picture – Why is This Relevant? | 41BLearning Objectives: |
| * This lesson builds in the previous one where students explored how text and images are represented in binary. Many students will listen to music on digital devices. In this lesson they will discover how this data is represented. | * To understand how sound is represented using binary data * To understand the impact that sample rate has on the size of the sound file and the quality of the playback |
| 42BEngagement – How Can I Engage Learners? | 43BAssessment for Learning |
| * Many students will have digital devices such as smartphones which they will use to listen to music. Others may play computer games which will also use sound. A sound wave is analog (continuous) and has to be converted into a number of discrete digital samples in order to be stored on a digital device. In this lesson they will discover how this happens. | **Expected progress:**   * Students will understand how a sound wave can be sampled so that it can be stored on a digital device   **Good progress:**   * Students will understand the impact that sample rate has on both the quality of the playback and the associated file size   **Exceptional progress:**   * Students will understand the impact that file size and sample resolution has on the quality of the sound file. They will independently explore the importance of compression |
| Links to KS3 Programme of Study | |
| * Understand how data of various types (including text, sounds and pictures) can be represented and manipulated digitally, in the form of binary digits | |
| 44BKey Concepts: | 45BKey Words: |
| * Analog sound waves are continuous. In order to be stored by a computer a number of discrete samples need to be taken * The analog sound is sampled by taking a number of measurements per second. This is measured in Hz * The more samples that are taken within a given period of time the closer the sample will be to the original analog sound. More samples will require more data to be stored which means that the size of the file will increase. | * Binary * Sample rate * Sample resolution * Sound wave * Sound sample * Analog |
| 46BDifferentiation: | 47BResources: |
| Most learners should understand how analogue sounds are sampled and the impact that a higher sample rate has on the file size. More capable students may wish to explore how sounds can be compressed for example, by removing sounds that are outside of the hearing range of a human being. | * Lesson 18 ppt * Sound file worksheet |
| Lesson Flow | |
| * Using the ppt introduce students to the concept of an analogue sound file. The term analog means continuous. In order for a computer to be able to store the sound it has to be sampled. The computer needs to the sound wave to be digital which means that a number of discrete samples have to be taken. * Show students the impact that increasing the sample rate has on how closely the bars match the original sound wave. Many will be surprised when they realise that an MP3 file takes 44,100 samples per second. * Students should then work through the sound worksheet where they will manually sample a sound wave and also create one from a set of data that they are given * Allow students who have access to micro:bit version 2 the opportunity to create a sound level monitor | |
| Making | |
| * There is no making activity in this lesson | |