Examples of maths problems for Science of Music IL016

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Wavelength of a sound wave λ is speed of its propagation divided by the vibration frequency: *λ=v/f.* Find the frequency *f* if the speed of sound is 350m/s and wavelength is 7m. *(Answer 50Hz)*

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$$\text{Frequency of string} = \frac{0.5}{\text{length}} \sqrt{\frac{\text{tension on string}}{\text{line density}}}$$

Find tension that is needed to put on a piano string with length of 80cm and line density of 0.0059 kg/m, so it produces frequency 262Hz (middle C). *(Answer* 1036 *N – this is equivalent to putting an over 100kg weight to stretch it!)*

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Bit depth refers to the number of binary (0 or 1) bits used to record sound waveforms. For a bit depth of *n* each sampled amplitude is mapped on to one of 2^n possible values. How many amplitude levels can be distinguished by an 8 bit system? *(Answer 2^8 = 256)*

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