Quality of sound signal decreases each time we decrease the bit per sample.

For a 48000 sample/second sampling rate, bit rate is 48000\*8/1024=375 kbps.

If we tried to increase the precision of sampling (such as trying to sample amplitude of signals with floating point precision), more bits should have been stored.

For a song which we have taken 300 samples which is sampled with 44100 sample/second and a sinusoidal signal with the formula y=10sin(2π2t) :

Mean of error signal for 8 bit quantization for song is 3.01e-07 and for sine 0.0389.

Figure : Original, decoded and error signals for 8 bit quantization for song

Figure: Figure : Original, decoded and error signals for 8 bit quantization for sine

Mean of error signal for 6 bit quantization is 8.24e-07 for song and 0.1554 for sine.

Figure : Original, decoded and error signals for 6 bit quantization for song

Figure : Original, decoded and error signals for 6 bit quantization for sine

Mean of error signal for 4 bit quantization is 8.99e-06 for song and 0.6217 for sine.

Figure : Original , decoded and error signals for 4 bit quantization for song

Figure : Original , decoded and error signals for 4 bit quantization for sine

Resulting number of bits for the 5 seconds of same signal for the sampling rate of 48kHz is:

For 8 bit quantization : 48000\*5\*8= 1920000 bits

For 6 bit quantization : 48000\*5\*6= 1440000 bits

For 4 bit quantization : 48000\*5\*4= 960000 bits