Oscilloscope Prelab

by

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The oscilloscope is a useful tool for observing different types of signals. It is important to understand your oscilloscope’s specifications to make sure you are accurately measuring your signal. Older oscilloscopes are analog while newer ones are usually digital. An analog oscilloscope shows the waveform in its original form whereas a digital oscilloscope converts the waveform into a digital format by sampling.1 The sample rate is given in samples per second and represents how often the oscilloscope takes a sample of the signal (like frames in a movie).2 The higher the sample rate, the better the resolution of the signal. For example, an ultrafast laser can have light pulses as short as a few femtoseconds. Digital oscilloscopes may not see those pulses if the sample rate is too low, and even then the pulse width cannot be accurately measured with an oscilloscope. The bandwidth of an oscilloscope is related to the frequency range of a signal that the oscilloscope can measure. If there is not enough bandwidth, then high frequency changes may not be detected or amplitude may be distorted.2

In the oscilloscope lab you are going to learn how to use the basic functions of an oscilloscope. You will learn how to use the trigger function which tells the oscilloscope when to look for a signal. You will learn how to use the vertical input (how large a signal to look for) and the horizontal input (the timescale of the signal).

Questions:

1. Given a graph as seen on an oscilloscope shown below, what is the peak to peak amplitude (voltage difference between the lowest point and highest point on the graph)?
2. Given a graph as seen on an oscilloscope shown below, what is the period of the signal (time to make one cycle)? Each little tick mark is 0.2 of the larger division of 10.0 μs.
References: