Now change the trigger input to your original triggering channel (CH 2 or EXT TRIG, whichever channel the Sync Out of the function generator is connected to on the oscilloscope). Note that the trigger will now remain constant regardless of the magnitude of the sinusoidal signal. This is the prime reason for the use of a sync output.

Beginning the Experiment

Change the mode of the function generator from sine to triangular and then square. Note each of these waveforms. The actual voltage levels can be measured by using the voltage cursor function of the scope. Selecting CURSOR and using the two upper left knobs, measure the Vpp amplitude of a sinusoidal wave, i.e. the peak-to-peak amplitude.

Using your digital multi-meter on the AC voltage settings, measure the voltage of the waveform. Compare the scope and multi-meter indicated voltages. Do this for sine, square, and triangular waves. The following are four sets of similar measurements, comparing the DMM to the oscilloscope. We will measure a low frequency (100 Hz) with 5 Vpp. We will then similarly measure a high frequency (25 kHz) with 5 Vpp.

A BNC T-connector will be useful so that the DMM can be used at the same time as an oscilloscope.

WORK SHEET HERE:

Wave Form	Scope Voltage (CURSOR)	Calc	Meter Voltage (RMS) DMM	Difference (%) Vs Calc DMM
100 Hz	~5 Vpp	Vrms	Vrms	%
Sine:	~5.1 Vpp	1.803	1.767	2.017
Triangle:	~5.1 Vpp	1.472	1.443	1.990
Square:	~5.1 Vpp	2.55	2.489	2.421

If there are differences, explain:

ANSWER HERE:

The differences seem to negligible; firstly, we measured Vpp by hand (with the cursor), so there is a source of human error there. Overall, the difference seems to be within an acceptable level of error. Also, the Vpp values fluctuated by about 0.1 V, which may have contributed to the slight percentage difference. To restate though, the percentage difference is quite small, so it doesn't invalidate our measurements.

WORK SHEET HERE:

Wave Form	Scope Voltage (CURSOR)	Calc	Meter Voltage (RMS) DMM	Difference (%) Vs Calc DMM
25 kHz	~5 Vpp	Vrms	Vrms	%
Sine:	5.1	2.55	0.436	141.59
Triangle:	5.1	1.472	0.353	122.63
Square:	5.2	2.6	0.568	128.28

If there are differences, explain:

ANSWER HERE:

The maximum frequency that these DMMs can read accurately is 1 kHz, according to Professor Briggs. The DMM filters current at 1 kHz or higher, to prevent that kind of high-frequency current from entering the inner circuitry of the DMM and damaging it (one damaging factor the professor mentioned was radiation). That said, we still pick up a voltage reading, because the filter isn't perfect, so some current still leaks to the inner circuitry, registering a low voltage.

Week 2 Lab End