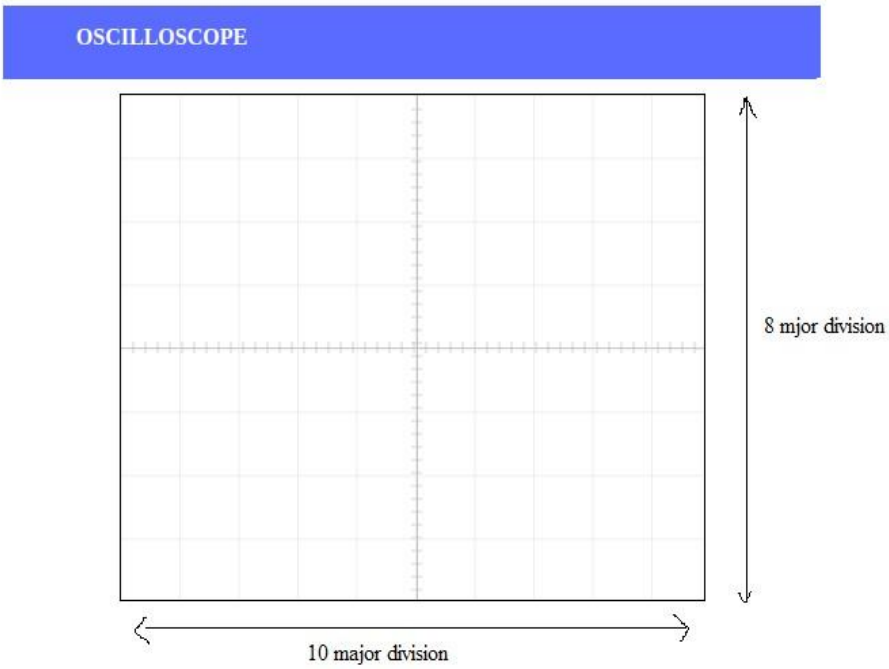
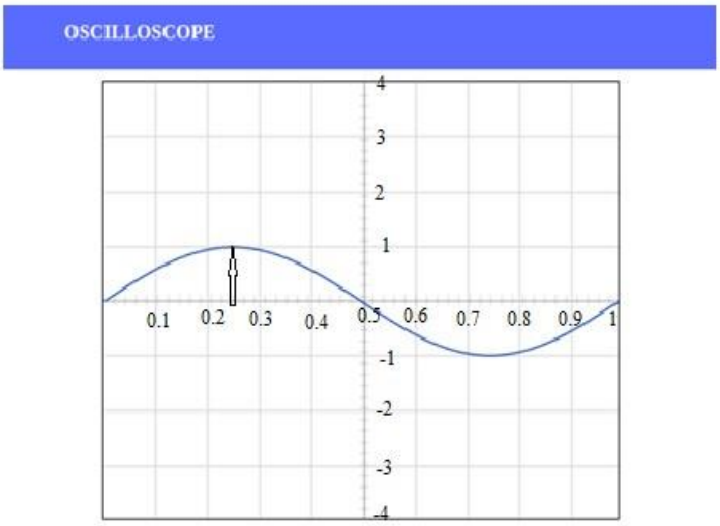
Virtual Oscilloscope Tutorial

In this experiment we consider 8x10 grid. The vertical grid is divided into 8 (major) divisions and the horizontal grid is divided into 10 major divisions. To improve the precision, each of these divisions is further broken up into 5 minor divisions. The horizontal axis (X-axis) represents time and the vertical axis (Y-axis) represents voltage.



volt/div= 1volt. (which means each major division is 1 volt, and each minor division is 0.2 volt)
time/div = 0.1ms/sec (which means each major division is 0.1ms, and each minor division is 0.02 ms)



Integrator using Op-amp

SET 1: Setting amplitude to 1 volt (2 Vp-p), frequency to 1000hz (default value)

Step 1: Double click on Square wave.

In right side 'Control tab', channel 1---> volt/div is set to 1 volt and amplitude of the input signal is 1 volt. Here, time/div is set to 0.1msec/div, the frequency is 1 kHz and its period is 1 msec. So the waveform will complete 1 cycle in 1msec. Figure 1 shows the same.

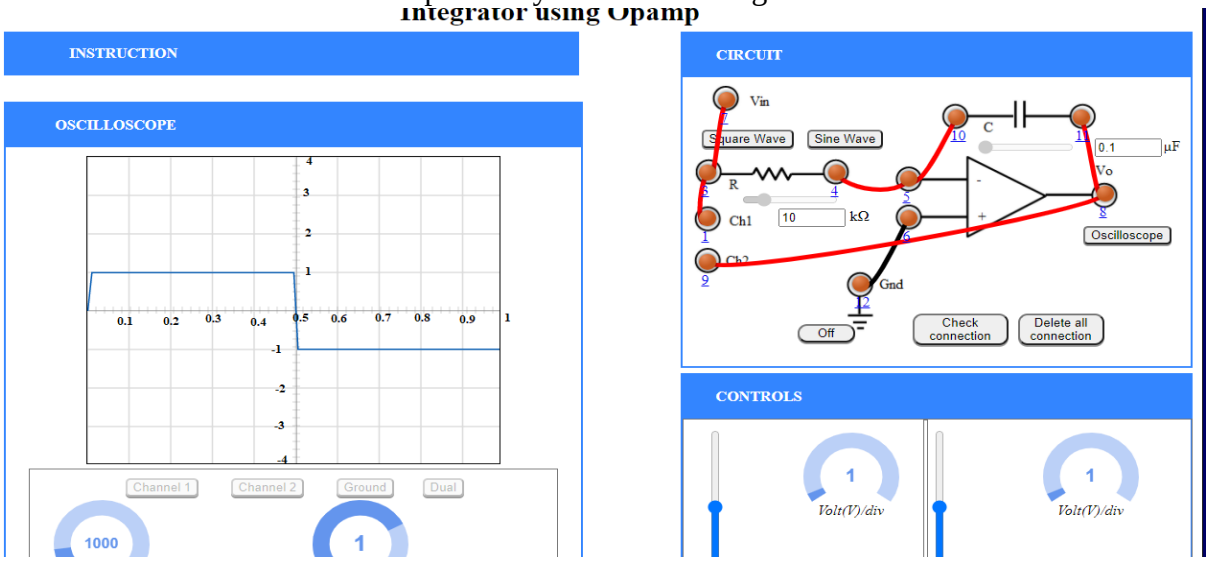


Fig. 1

Step 2: Click on oscilloscope.

Here as, channel 2---> volt/div is 1 volt and default amplitude is set to 1 volt, output signal shows integrated output in the oscilloscope screen. And time/div is 0.1ms/div. In the figure 2 shows the output signal.

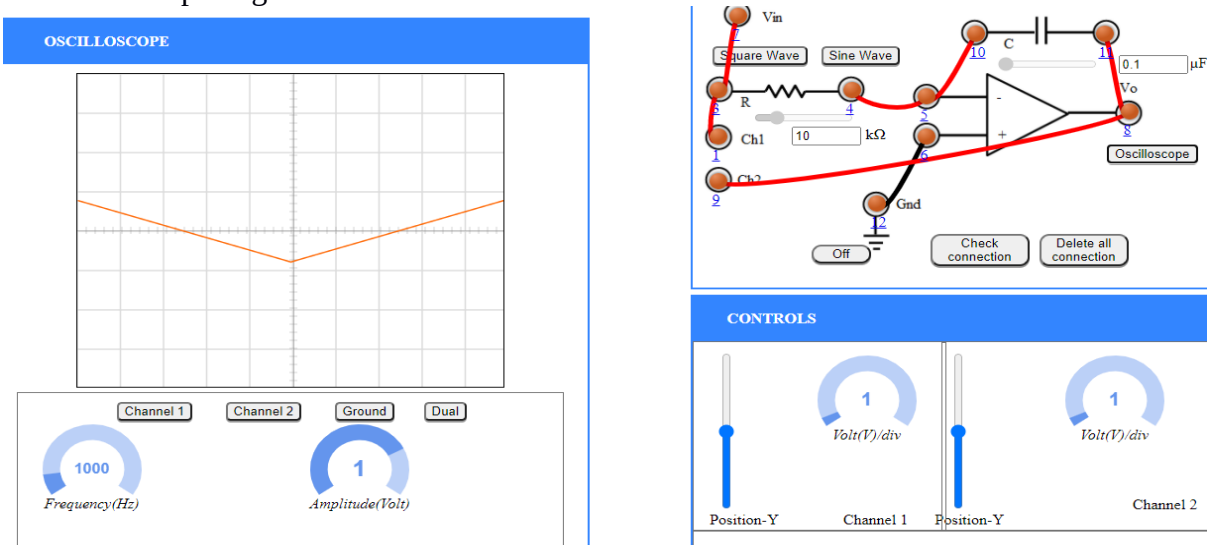


Fig. 2

Step 3: Click on dual function.

(Note: For dual output, channel 2 controller controls both the signals.)
Here as, channel 2 is used to set the volt/div---> volt/div is 1 volt. In the figure 3 shows the both signal. As frequency is 1000hz, and 0.1ms/div, therefore to complete 1 cycle it takes 1msec.

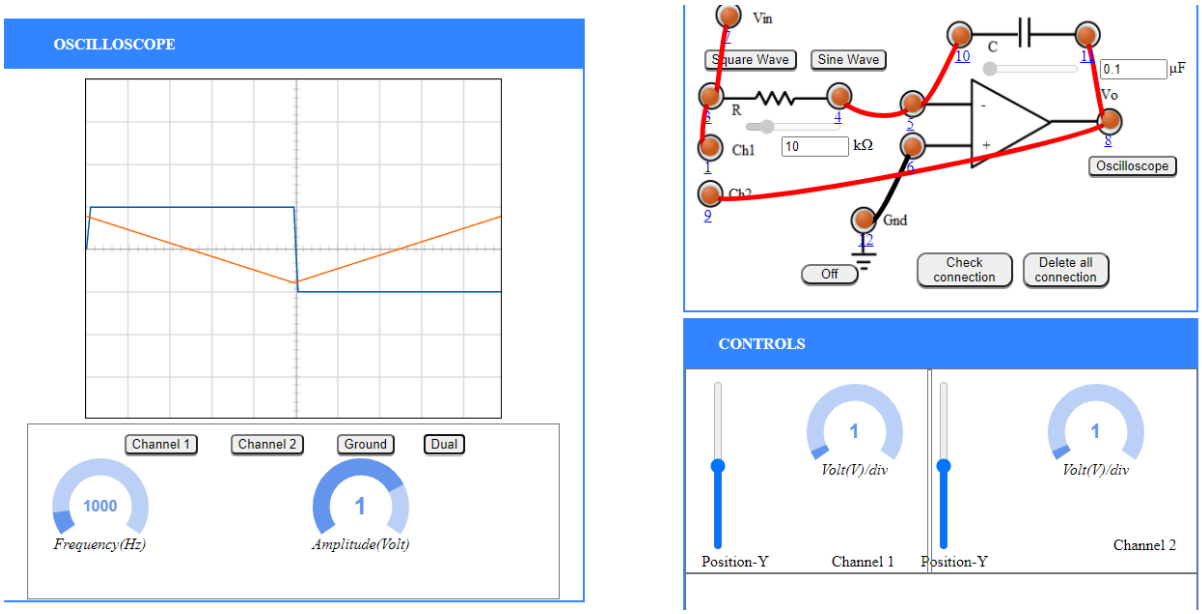
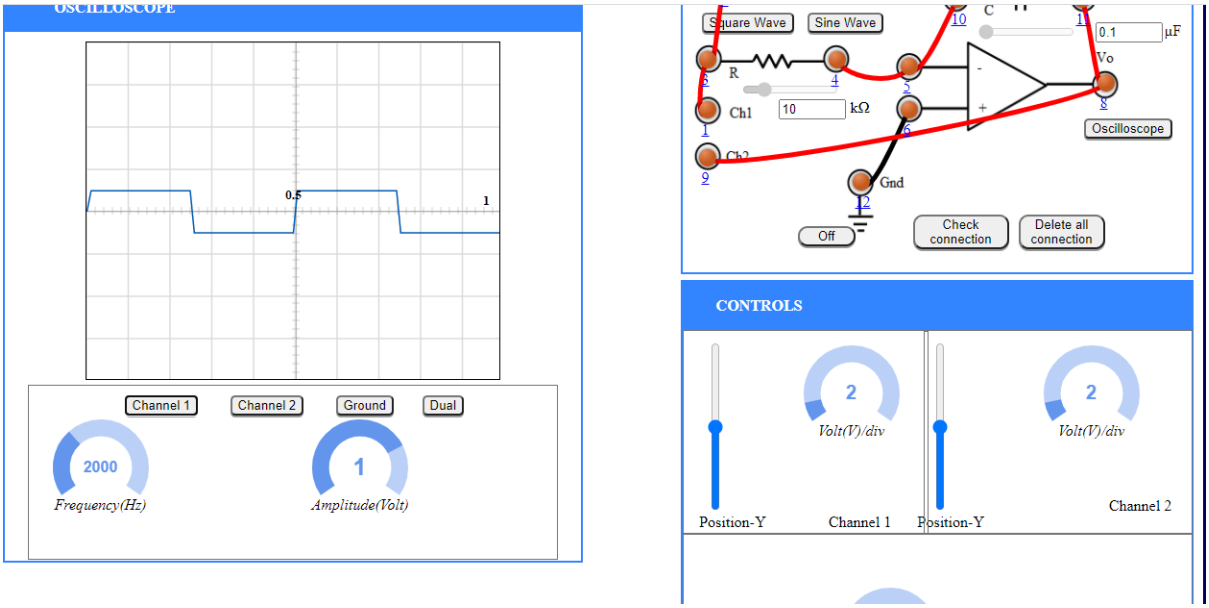


Fig. 3

Click on channel 1 button, and change the frequency to 2000 hz. (Note: double click on channel 1, if the waveform does not come accordingly**).**

As frequency is 2000hz, and time/div is 0.1ms/div,

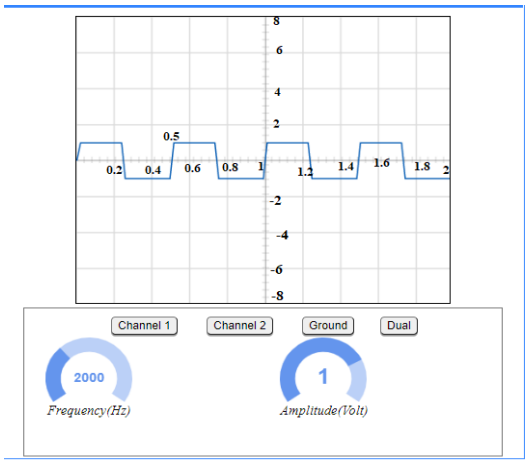
Frequency=(1/period)->Period=(1/frequency), which means period=(1/2000) i.e. 0.5msec. Therefore , in 0.5 msec it will complete 1 cycle, and in another 0.5 msec it will complete another cycle. So, in 2000Hz, 0.1msec/div it will complete 2 cycle.

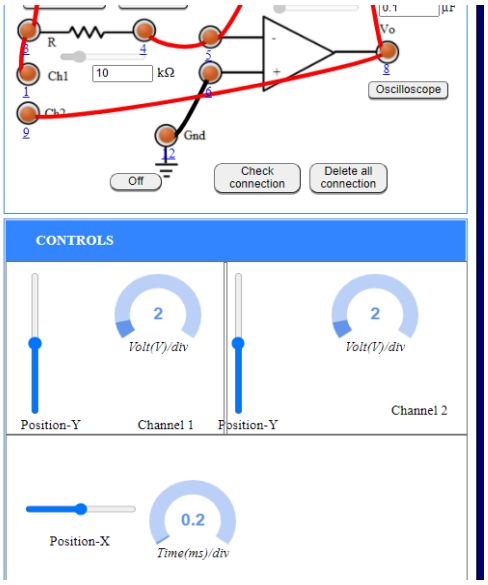


Change the time/div and set to 0.2 ms/div.
(Note: double click on channel 1, if the waveform does not come accordingly**).**

As frequency is 2000hz, and 0.2ms/div,
Frequency=(1/period)->Period=(1/frequency), which means period=(1/2000) i.e. 0.5msec. Therefore , in 0.5 msec it will complete 1 cycle, and in another 0.5 msec it will complete another cycle and so on. So, in 2000Hz, 0.2msec/div it will complete 4 cycle.

Here, channel 1→ volt/div is set to 2 volt/div. Which means, each major division is 2 volt.
(Note: double click on channel 1, if the waveform does not come accordingly**).**





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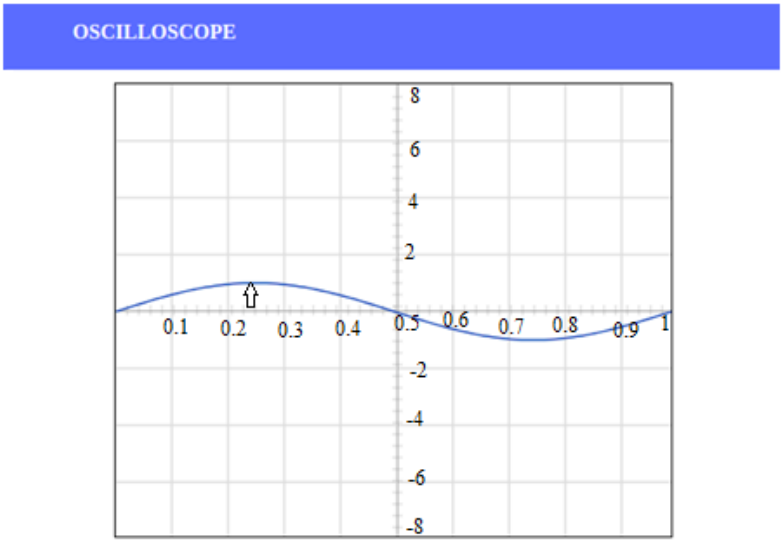
volt/div= 2volt. (which means each major division is 2 volt, and each minor division is 0.5 volt)
time/div = 0.1ms/sec (which means each major division is 0.1ms, and each minor division is 0.02 ms)

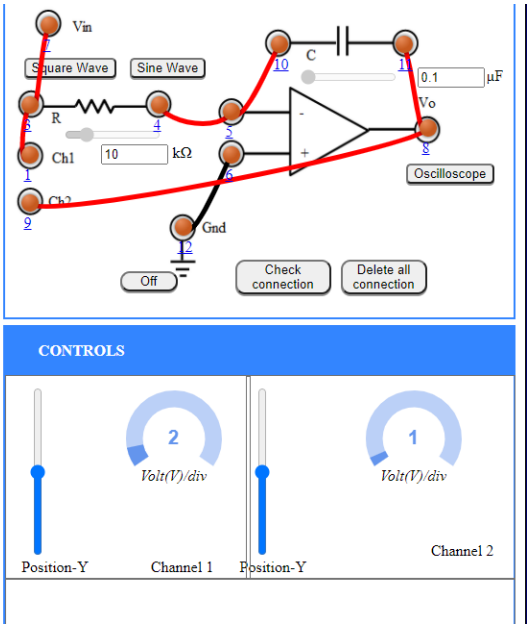


SET 2: Setting amplitude to 1 volt, frequency to 1000hz (default)

Step 1: Click on channel 1

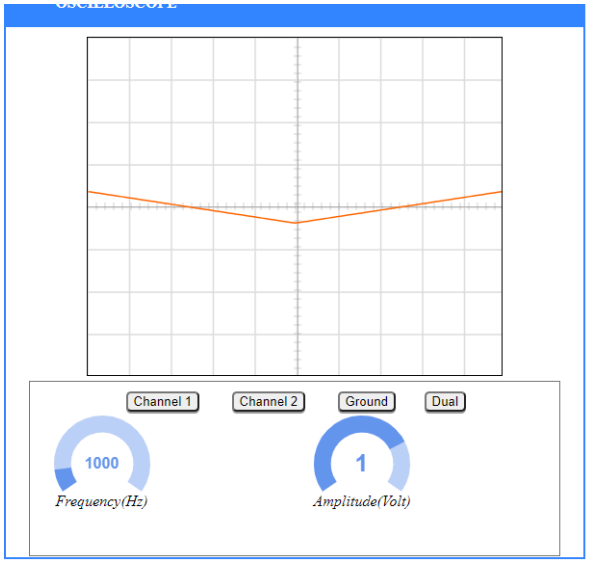
Set Channel 1-- volt/div=2volt, then double click on channel 1 .

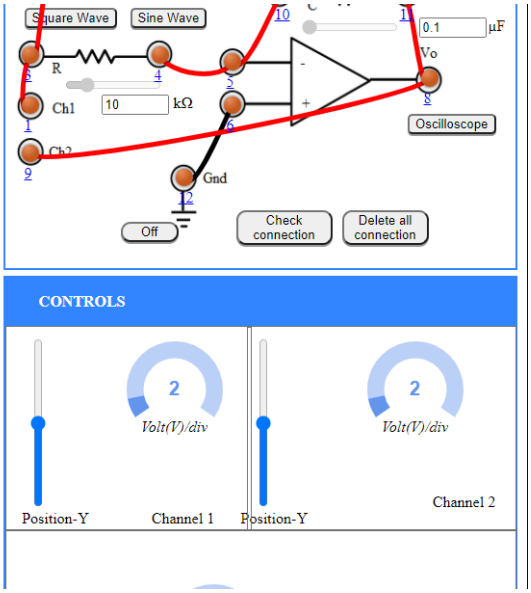
As, channel 1 ---> volt/div is 2volt. Each major division is 2 volt. In figure below shows the same.



Step 2: Click on channel 2

Change the volt/div of channel 2--> volt/div is 2 volt and amplitude is 1 volt. The output signal shows the same.

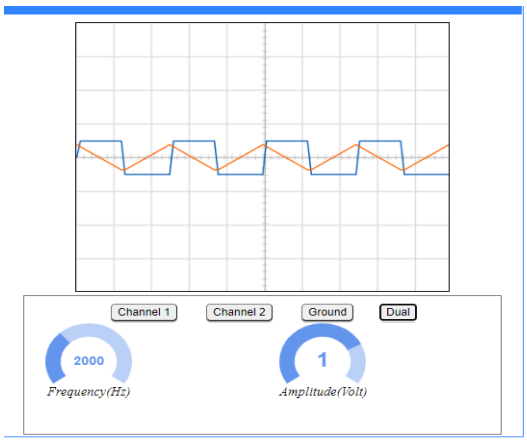


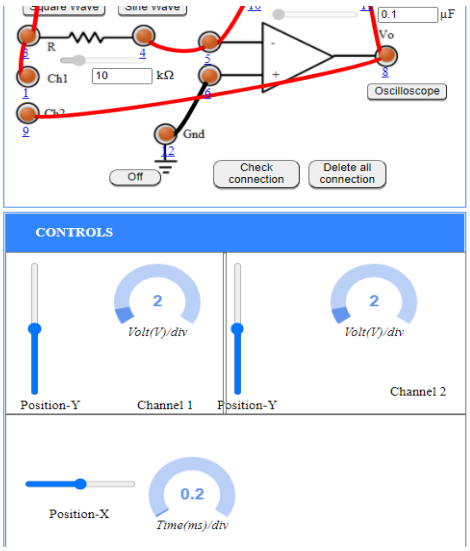


********** Some other values of the oscilloscope control **********

Amplitude is set to 1 volt (2 Vpp), Frequency is set to 2000 hz (2 kHz)

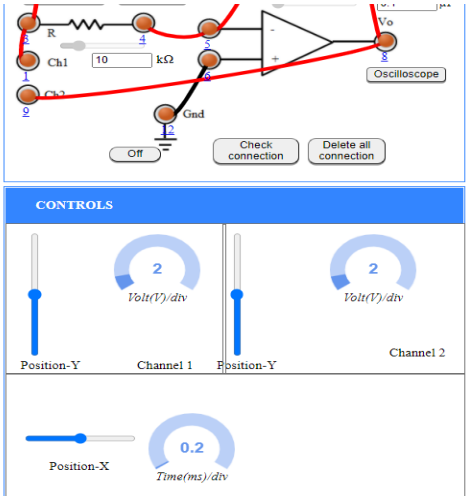
Time/div is 0.2 ms/div. Channel 1—volt/div is 2 volt/div. Channel 2 --- volt/div is 2 volt/div. Click on dual button.





Amplitude is set to 2 volt (4 Vpp), Frequency is set to 2000 hz (2 kHz)

Time/div is 0.2 ms/div. Channel 1—volt/div is 2 volt/div. Channel 2 --- volt/div is 2 volt/div. Click on dual button.



Note 1: If you set the Volts/Div too low, you'll clip the signal. Similarly, setting it too high, and you'll won't find the signal, i.e. the signal will be flat.
Increasing the Timebase will display more cycles of a periodic signal. Conversely, reducing the Timebase, fewer cycles will be displayed.

Note 2: Sometimes due to delay or cache, the graph may not come exact at one click. So it is better to double click on the channel-1 function or channel-2 function or dual function or ground function according to users choice to get the respective signals.

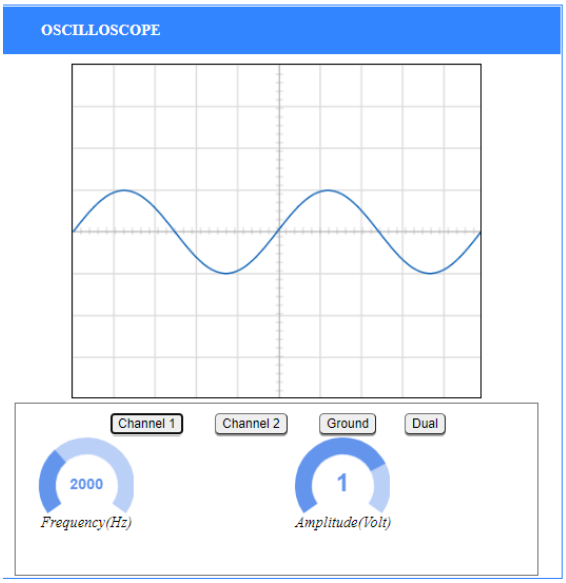
** Same way sine wave input will give cosine as output wave.

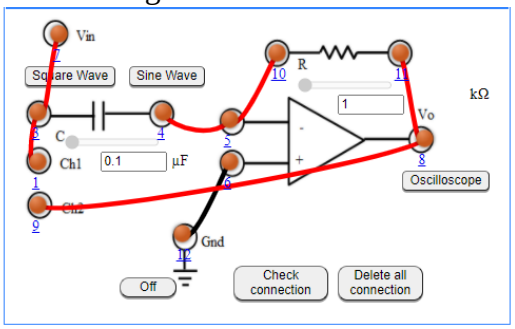
Differentiator using Op-amp

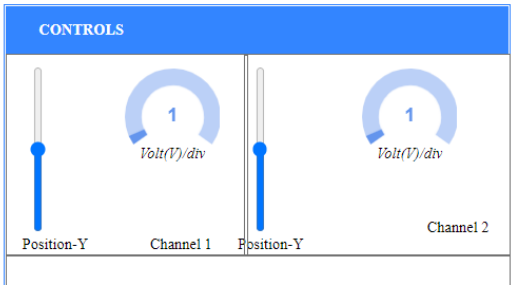
SET 1: Setting amplitude to 1 volt (2 Vp-p), frequency to 2000hz (default value)

Step 1: Double click on Sine wave.

In right side 'Control tab', channel 1---> volt/div is set to 1 volt and amplitude of the input signal is 1 volt. Here, time/div is set to 0.1msec/div, the frequency is 2 kHz and its period is 0.5 msec. So the waveform will complete 2 cycle in 1msec. Figure below shows the same.

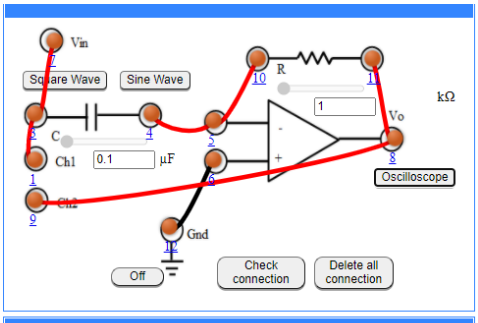


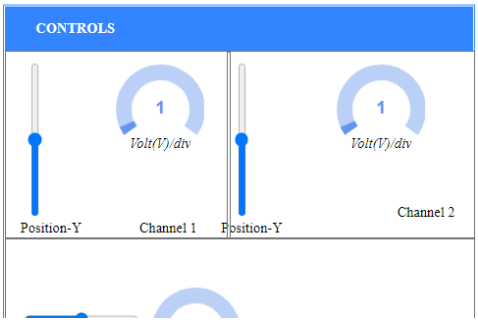




Step 2: Click on oscilloscope.

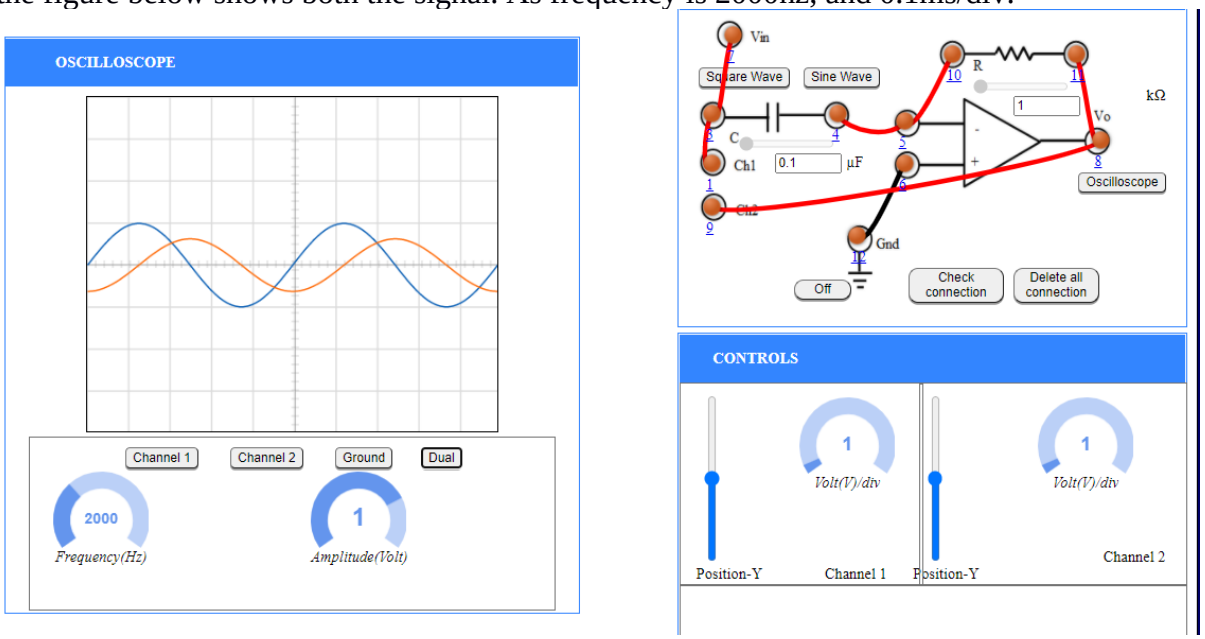
Here as, channel 2---> volt/div is 1 volt and default amplitude is set to 1 volt, output signal shows differentiated output in the oscilloscope screen. And time/div is 0.1ms/div. In the figure below shows the output signal.





Step 3: Click on dual function.

(Note: For dual output, channel 2 controller controls both the signals.)
Here as, channel 2 is used to set the volt/div---> volt/div is 1 volt. In
the figure below shows both the signal. As frequency is 2000hz, and 0.1ms/div.



Note 1: If you set the Volts/Div too low, you'll clip the signal. Similarly, setting it too high, and you'll won't find the signal, i.e. the signal will be flat.
Increasing the Timebase will display more cycles of a periodic signal. Conversely, reducing the Timebase, fewer cycles will be displayed.

Note 2: Sometimes due to delay or cache, the graph may not come exact at one click. So it is better to double click on the channel-1 function or channel-2 function or dual function or ground function after changing the volt/div or time/div or other controllers to get respective signals.

** Same way square wave input will give spike as output wave.