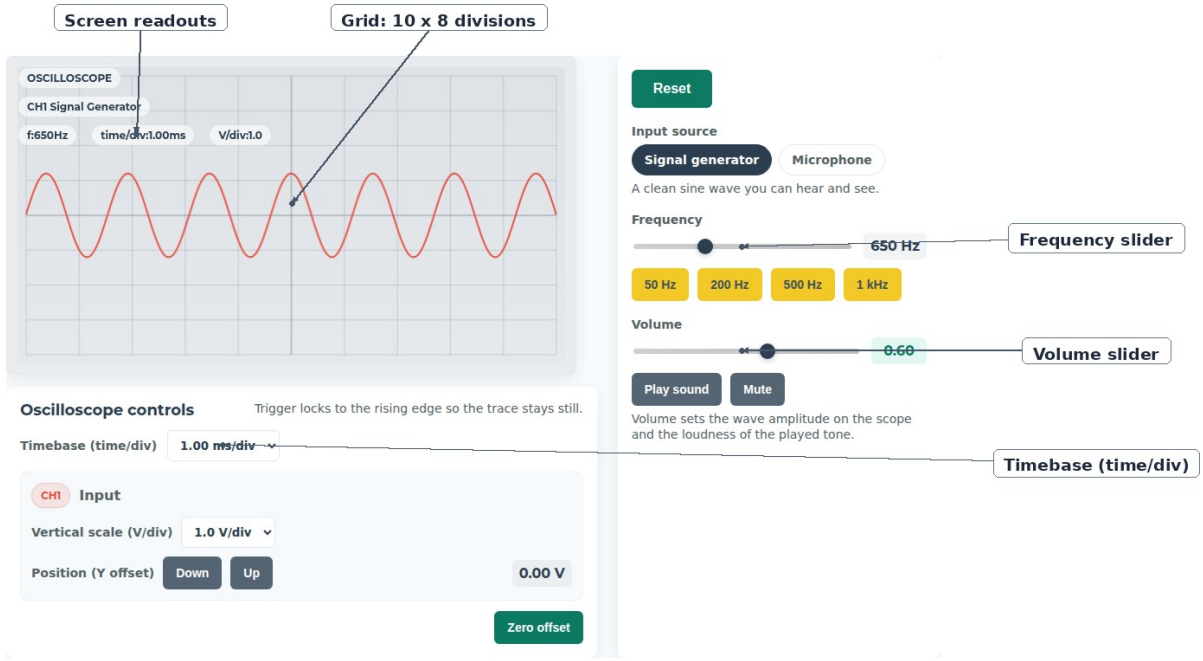
Reading an Oscilloscope Trace

Frequency, Timebase and Volume

Aim:

You are investigating how an oscilloscope trace changes with the frequency and volume of a sound.



Method:

1. Leave the input source set to Signal generator. Set the frequency to 200 Hz using the 200 Hz preset button and the timebase (time/div) to 2.00 ms/div.
2. Count the number of complete wave cycles shown across the full width of the screen (10 divisions). Read the timebase value from the time/div dropdown.
3. Calculate the total time shown on screen: total time (s) = 10 × time/div. Divide this by the number of complete cycles you counted to find the period T of one cycle.
4. Record the frequency f (from the on-screen f: readout), the timebase, the number of cycles counted, and your calculated period T in your results table. Also calculate 1/T.
5. Repeat using the 50 Hz, 500 Hz and 1 kHz preset buttons. Each time, adjust the timebase so that between 2 and 6 complete cycles are visible on screen, then repeat your counting and calculations.
6. Repeat for at least two more frequencies of your choice using the Frequency slider, again choosing a timebase that keeps a countable number of cycles on screen.

Prediction:

Keeping the timebase fixed, what do you predict will happen to the number of complete cycles shown on screen as you increase the frequency?

Test this using the Frequency slider before you complete your results table.

Results:

frequency f (Hz)	timebase (ms/div)	complete cycles shown	period T (s)	1/T (Hz)

Analysis:

For each row, compare your calculated 1/T value with the on-screen frequency f readout. What do you notice?

Keeping the timebase fixed, what happened to the number of complete cycles shown as frequency increased?

Keeping frequency and timebase fixed, increase then decrease the Volume slider. Which feature of the trace changes as you do this, and which feature stays the same?

Switch the input source to Microphone, allow access, and speak or play a sound near your device. Adjust the input gain so the trace is clearly visible. Compare the trace from your voice with the sine wave from the generator — describe one similarity and one difference.

Explaining why:

Using your results table, explain how you could find the frequency of an unknown sound from an oscilloscope trace, using only the timebase setting and the number of complete cycles you count on screen.