



Sounds harmonious

Musical frequencies

JANICE

So what's this?

ALAN

That's a tuning fork. This particular tuning fork produces the pitch A, and a tuning fork produces a very pure note. If I were to strike it on the table and hold it against the table, have a look at the trace. [STRIKES TUNING FORK]

JANICE

Wow, you've got a perfect trace there, what was that?

ALAN

That's a sine curve, it shows the frequency of the tuning fork, and it shows it as a number of cycles per second, or the vibrations per second if you like. Now if I were to play the same note A on the whistle, have a look at the trace this time. [PLAYS NOTE ON WHISTLE]

JANICE

Similar, but slightly different though.

ALAN

That's right. The underlying shape is still a sine curve, but because of the characteristics of the whistle, it's just slightly different. Now if Sheila would play A on the fiddle. ...[PLAYS NOTE ON FIDDLE]

JANICE

It's very different isn't it, it's a lot messier.

ALAN

Yes, it's really all over the place. You can just about see the sine curve underneath, but the er string on a violin when stroked with a bow, produces a lot of secondary notes called harmonics, and that accounts for the very complicated pattern that it produces on the oscilloscope.

The tuning fork has two tines which vibrate when the fork is struck. This vibration can be linked to the formation of a sine curve. As the tines vibrate, they go through maximum and minimum displacements from their starting position. The displacements can be plotted against time.

Here the displacement is at a maximum. Then as the tines get closer together, the displacement decreases, until it reaches a minimum when the tines are closest together. And this cycle is repeated over and over.

Now let's stack the displacements on a horizontal axis. This gives a single cycle of the curve, but of course this vibration happened many times per second. The exact number depends on the frequency of the tuning fork. So a fork tuned to middle C and marked 256 hertz will vibrate 256 times per second, giving a continuous sequence of displacements and producing a sine curve.