The speed of sound in air

using a smartphone

Background

The speed of sound in air can be calculated using the formula

$$c = 4 f (\ell + 0.3 d)$$

when using resonance tubes, where c is the speed of sound, f is the resonant frequency, ℓ is the length of the tube and d is its diameter.

In this experiment you can use a straw which has such a small diameter that we can use the formula $c = f \lambda$ instead.

You will need...

- ✓ Smart phone
- ✓ a straw
- ✓ spectrum anaylser app.

Follow these steps

1. Download spectrum anaylser app (free or you can buy one with more features).
2. Open up the spectrum analyser.
3. Place the straw close to the microphone and blow across the top or the straw.
4. Note the frequency on your phone. (You might see the first and the second harmonic).

So what happened?

The spectrum anaylser picks up the fundamental frequency of the straw. As the straw is an open pipe then the length of the straw

$$\ell = \lambda / 2.$$

Using $c = f \lambda$ you can then calculate the speed of sound in air.

What next?

Change the length of the straw.