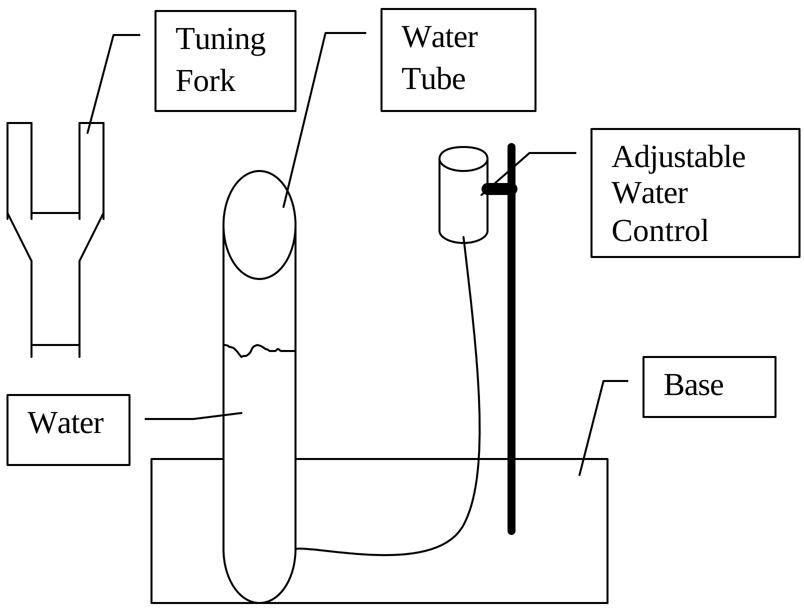
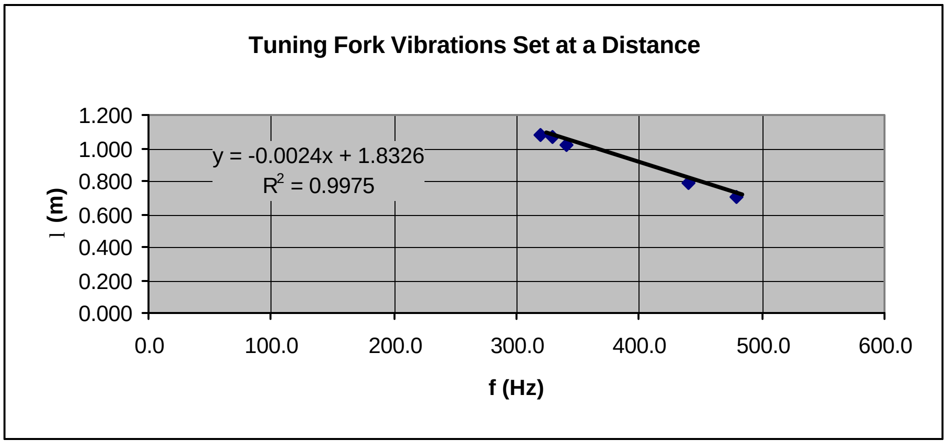
Scott Greenberg

THE VELOCITY OF SOUND
Thursday, September 7, 2000

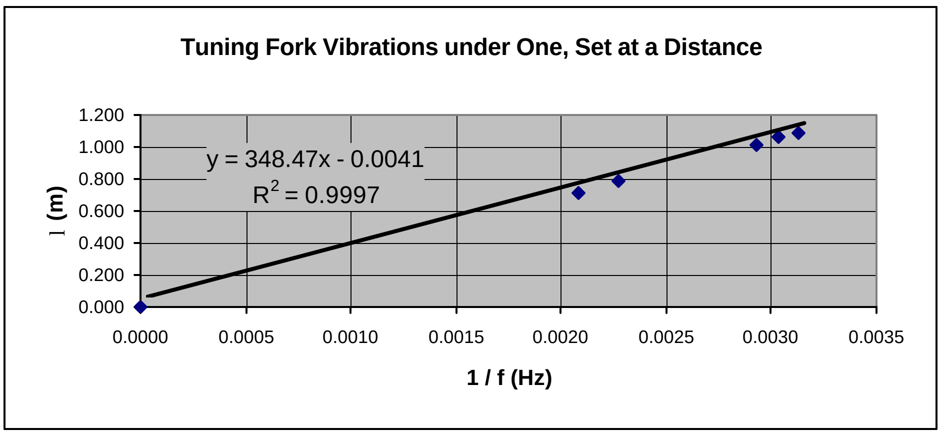


[redacted]

f (hz)	l (m)
	+/- 0.02
440.0	0.789
329.6	1.062
480.0	0.708
341.3	1.017
320.0	1.085



1 / f (hz)	l (m)
	+/- 0.02
0.0000	0.000
0.0023	0.789
0.0030	1.062
0.0021	0.708
0.0029	1.017
0.0031	1.085



	slope
	348.465
+/-	3.22842

	V (m/s)
+	351.694
-	345.237

T = 24 ºC
V_t = 332 + 0.6 T
V_t = 346.4 m/s

The speed of sound varies in different mediums, dependent on the temperature. The speed of sound in air is inversely proportional to the square root of the molecular mass, but this equation is complicated and we will not be using it. Instead we will use the equation $v = (331 + 0.6T_c)$ m/s, where T_c is the air temperature in degrees Celsius. We also know that wavelength is related to the speed of the wave, hence the equation $v = \lambda f$. We determine the wavelength with the help of standing waves and we know the frequency by using designated tuning forks. We will be able to compare these two equation to prove that velocity = wavelength * frequency.

We used a tube of water with varying highs to find were the standing wave is of a particle frequency of a particle tuning fork. By finding the difference in height of the water from one standing wave to the other we are able to find the wavelength. From the results, we plotted "Tuning Fork Vibrations Set at a Distance" graph and "Tuning Fork Vibrations under One Set at a Distance." The empirical equation for the linear graph is $y = m x + b$, this compare to the theoretical equation is velocity = wavelength * frequency. The LINEST was done on the "Tuning Fork Vibrations Under One Set At A Distance" graph and not the "Tuning Fork Vibrations Set At A Distance" graph because it was found to have the R^2 value closest to one. The value of the slope is between 351.694 $^{M}/_{s}$ and 345.237 $^{M}/_{s}$. This is our calculated experimental value for the velocity of air at 24 °C. We then calculate the theoretical result and find it to be 346.4 $^{M}/_{s}$. Although there is a small discrepancy between our experimental results and theoretical results it is not significant, because we have a value for the speed of sound in air that falls within range of our plus, minus results. We thus have proven that $v = \lambda f$ is a valid equation for finding the velocity of speed in air.