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Seeing Sound: A Study of Cymatics in Two Dimensions

The purpose of this experiment was to illustrate the movement and interaction of sound on a two dimensional surface, and to mathematically calculate this movement and interaction.
This was done by using a function generator and a powerful speaker to run a pure sine wave tone through a metal sheet. When a frequency was used that caused the metal sheet to resonate, it created a standing wave. This standing wave formed complex geometrical patterns of nodes and anti-nodes. The sheet was sprinkled with sand to make these patterns visible.

My hypothesis was that I would be able to find equations to calculate what frequencies cause the sheet to resonate, and what patterns form, based off of the wavelengths of the sound waves and the dimensions of the plate. My hypothesis was supported by the data, even though I was unable to find equations purely from my data. This was because the frequencies that cause the sheet to resonate are not related arithmetically or exponentially. They are instead based off of a more complex pattern. Likewise, the patterns form from a very complicated process, beyond my current math understanding.

Even so, I found that the patterns formed are indeed based off of the wavelength of the sound wave. I also found that the frequencies that cause resonance are based off of the dimensions of the plate. Thus, there were calculable equations, but they were too complicated and advanced for me to formulate.