Lakeview
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Kinetic artist Rubin Margolin, who makes wave generating machines, had always fascinated Phil Estrada and Mele Sato. In between other projects, Phil spent two years teaching himself to make gears similar to those in Margolin's sculptures. "I needed time to experience how to make these machines. I needed gears, resources to make prototypes, and exemplars," he said.

After making prototypes and exemplars, Phil realized how much he learned from the process of constructing, modifying, redesigning and creating a new version. He planned for students to go on a similar supported path that culminated in a machine of their own design to translate a circular motion into a wave form.

Students first made a frame and defined a formula for a sine wave to fit that frame. They had to be accurate in manipulating the variables of the frame and wave so that the physical product would match their graphs.

Students copied Phil's exemplar wave machine. They drew detailed pictures and plans based on this model, and then cut out all the parts and assembled it. Once they made a model, students documented what they learned and made plans for their next version.

All student groups modified their original model to make it more interesting to them. They used Richard Serra's verb list, a list of action words that he used in his sculptural practice and Margolin's website as inspiration. Their plans received critique from both teachers and peers. These modified prototypes were not required to be beautiful work.

Project Learning Goals

- To have a deep understanding of gear ratios.
- To value the prototyping process and for students to develop their process for future projects.
- To understand how revolutions per minute (RPMs) are translated into frequency.
- To learn how to use algebraic functions when working with real materials.