

The Harmonograph



You might think that a pendulum is a simple thing, swinging back and forth in a predictable way, and if it had a pen attached to it, then it would produce nothing more than a straight line.

If however you could attach a second pendulum to your pen, swinging at right angles to the first pendulum then you start to produce beautiful and surprisingly complex drawings. Although patterns appear initially to repeat, as the energy stored in the swinging pendulums is expended in the bearings of the machine, the size of the pattern gradually decays, increasing the beauty and complexity of the figures and providing an extra dimension for learning.

These principles are realised in the Harmonograph, a Victorian invention that was a simple machine which, using two, three or four pendulums, created a breathtaking array of drawings. This exhibit will show off a working Harmonograph as well as the mathematics behind it and a computer simulation showing the huge range of drawings which a Harmonograph can produce.

Hopefully the Harmonograph will change your view of the humble pendulum forever.

The mathematics inherent in the function of many products, systems and phenomena is essentially invisible. The Harmonograph appears to be a simple structure but which is capable of producing complex patterns. However, it can be shown that the pendulums can be modelled mathematically and then simulated on a computer which can then produce very similar patterns. This again shows powerfully that the world is mathematical and many ideas are linked.