



The Carroll's Clock

The clock outside on the MOHAI Boeing Centennial Terrace was made by Seattle clockmakers Joseph Mayer and Sons. It stood for decades outside the entrance to Carroll's Fine Jewelry at 4th Ave and Pike St. Street clocks were popular in Seattle during the early 1900s and were often found in front of jewelry and watchmaking shops.

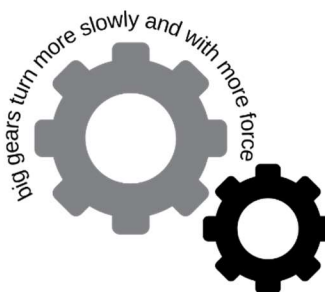
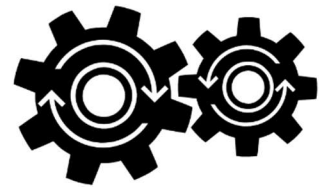
Mechanical clocks like this one may seem complex but rely on rather simple machines: **gears** and **pendulums**.



Street clock outside Carroll's Jewelers, Seattle, February 1975. MOHAI, Robert H. Miller Photographs, 2002.46.1358.22.

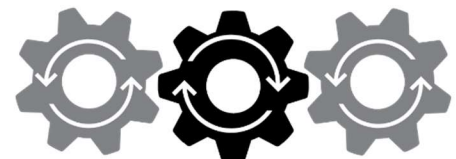
Gears can be used to...

... reverse the direction of rotation...



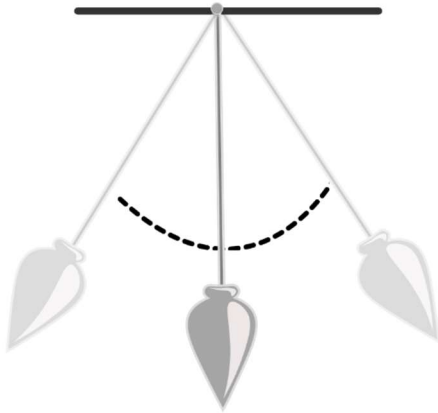
... increase/decrease the speed of rotation...

... keep rotations synchronized...



...or move rotation to a different axis.

A **pendulum** is a weight hung from a fixed point so it can swing freely back and forth.

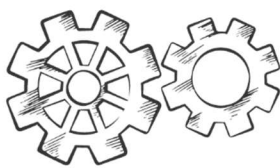


Period: the time it takes for the pendulum to go back and forth once

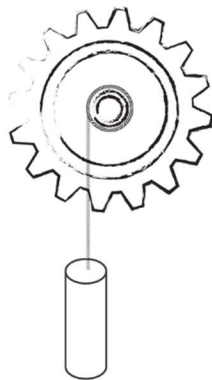
Amplitude: the angle or distance the pendulum is released from

The only two things that affect a pendulum's period are its length and gravity, which is constant.

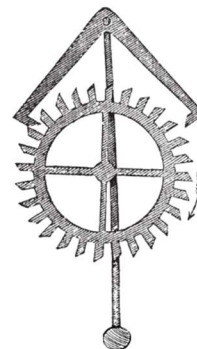
Together, pendulums and gears make a mechanical clock go tick-tock.



A gear train controls the clock hands.



Either a spring or a weight provide the energy to move the gears.



The steady swinging of a pendulum controls the "escapement" which releases the gear train.

Where have you seen gears and pendulums before?

Build a Painting Pendulum

Use everyday materials and the physics of pendulums to make an abstract painting! Watch the video introduction on the MOHAI YouTube Channel.



What you'll need:

- Somewhere to get messy (an easy to clean surface)
- Something to protect your painting area (garbage bag, tarp, etc.)
- Something to paint on – we recommend a thick/sturdy surface like canvas, cardboard, or watercolor paper
- Water-based paint (as many colors as you want)
- Water (for thinning your paint)
- String (however long you want your pendulum to be, plus extra for tying knots)
- Paper cup/squirt bottle (to be your pouring container)
- Extra cups/containers (for mixing and holding your paint)
- Scissors (for cutting string)
- Pencil, hole punch, and/or awl (for punching holes in your pouring container)
- Something to hang your pendulum from (Ex: two chairs and a broomstick)

What you'll do:



1. Set up your workspace – cover the surfaces you will be hanging your pendulum over with a non-porous, easily wipeable material and gather your supplies.



2. Build your pendulum

- If you are using a paper cup, use a pencil or other thin, pointed object to poke a hole in the center of the bottom of the cup.
- You can also use an old squirt bottle and cut the bottom off with a box cutter.
- Once you have a container with an open top and a small hole for the paint to drip from, poke/punch two holes across from each other near the top of your container.
- Next, take a long piece of string and tie a loose loop through the two holes so the container hangs nice and evenly. There should be a long tail.





3. Hang your pendulum

- Create a fixed point above your painting area for your pendulum to swing freely from.
- Figure out how long you want your pendulum swings to be (the longer the length the longer the period). Secure your pendulum to its fixed point at the length you like.

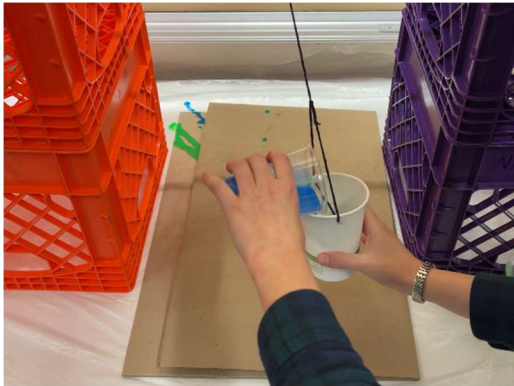


4. Prep your paints

- Thin your paint with water so it is a consistency that you like.
- How much water you add to the paint will depend on the paint's thickness, the volume of your pendulum container, and the size of the hole the paint will pass through
- In our at-home testing, a ratio of equal parts water and paint worked well, but for you it may be different – experiment!
- We recommend pre-mixing your paint in separate containers that are nearby and ready to pour into your painting pendulum



5. Lay down your “canvas” under your empty painting pendulum



6. Pour in your paint

- It's up to you whether you want to plug up the pendulum while you add in paint, and whether you clean out your paint container in-between colors



7. Let your pendulum swing!

- Pull it back, and let it go! Watch how the path of the pendulum shows up on your canvas.
- Repeat with as many directions of displacement and colors as you'd like!

Share your pendulum art on social media with us!



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