

Pendulum Painting

What's The Plan?

Learn about the physics behind pendulums as you create your very own painting with one!

What You'll Need:

Here's a list of everything you'll need! Don't have something exactly? *Get creative!* Some of our suggested swaps are listed in *Grey*.

- Pencil | *Skewer, scissors, or anything you can use to poke holes in cups*
- Paper Cup | *Other cups will also work as long as you can poke holes in them*
 - Blank pieces of paper
 - Any paint
 - String
- An empty paper towel roll, broom handle, or anything you can use to hang a cup from.
 - 2 chairs, boxes, or anything you can use to support a rod.

What To Do:

1. Poke a hole in the bottom of each cup
2. Poke 2 holes in the rim of each cup across from each other.
3. Cut a piece of string and loop it through the holes in the rim of your cup, and then tie the 2 ends of the string at the top of the cup so the cup is being held up by a loop. repeat this step for every cup.
4. Suspend the rod between two objects, and place a piece of paper underneath the rod.
5. Suspend your cup from its loop onto the rod, and test the loop it will make by pulling it back and letting it swing. watch it swing and make sure it doesn't go over the edge of your paper. if it does, add another paper so that the cup is always overtop of the paper.
6. When you are ready, fill your cup up with paint, pull it back and let it swing on your rod to make your pendulum painting.
7. Head to the next page and check out the experiment time to help you become a scientist while you finish your artwork!

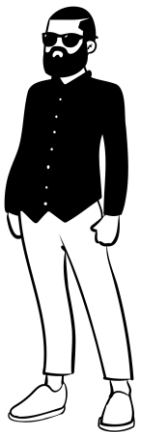
Experiment Time!

You will need to repeat the process of filling your cup with paint and letting it swing a few more times to finish your artwork! There are some scientists who have come to watch you finish the process, and they each have a *hypothesis* they are hoping to have answered by watching your artwork! Read their hypotheses, take a guess about if they are right or not, and then test it yourself as you finish the art!

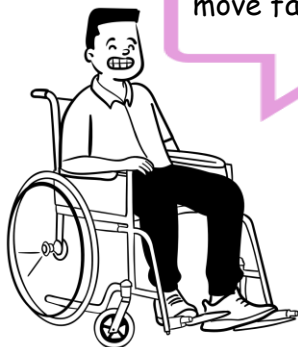


My hypothesis is that if you pull the cup back farther, it will swing for longer. Am I right?

My hypothesis is that if you add more paint to the cup, it will move slower. Am I right?



My Hypothesis is that if you make the strings holding the cup longer, it will make smaller circles. Am I right?



My hypothesis is that if you add more paint to the cup, it will move faster. Am I right?



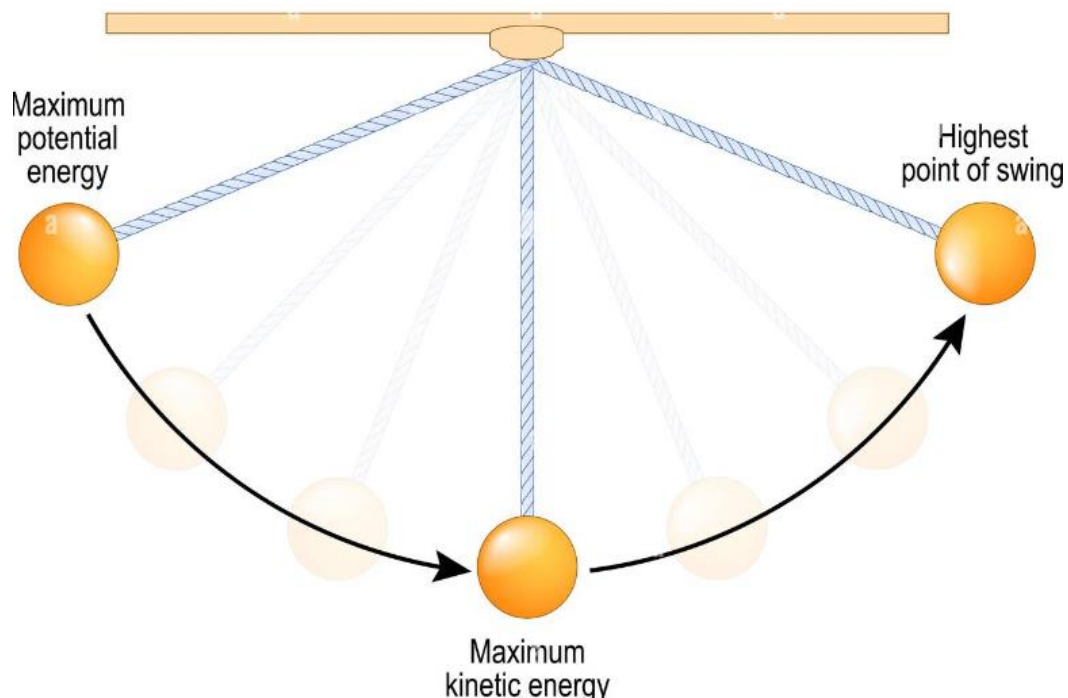
8. Adjust your paper under the pendulum, fill your cup up with a new paint color, change the setup to test one of the scientists' questions above, and repeat the process to add onto your pendulum.
9. Continue to change the position of the paper and add new paint colors into your pendulum until you get a picture you are happy with. Leave your pendulum painting to dry for a few hours and then hang it up somewhere you can admire it! Check out these cool examples of pendulum paintings below!



Why Did We Do It?

Here is a list of important words we use during the project!

- *Hypothesis:* When a scientist asks a question their hypothesis is their guess of what the answer to that question will be.
- *Potential Energy:* The energy stored in an object when it has the potential to do work, but isn't actively moving. Good examples of objects with potential energy are a ball on top of a hill that hasn't started rolling, or your cup when it has been pulled back but hasn't been released to start swinging yet.
- *Kinetic Energy:* The energy an object has when it is moving. A ball that is actively rolling down a hill, or your cup swinging as a pendulum, has kinetic energy.



- *Gravitational Energy*: The potential energy stored by an object because of its position relative to another object. Your pendulum has gravitational energy because it is above the ground, and has room to fall due to gravity. When your pendulum is being pulled back, it gets farther away from the ground and its gravitational energy increases. When it is hanging freely in the middle of the paper, it is closest to the ground and its gravitational energy is lowest.
- *Mass*: Mass is the amount of "stuff" that makes up an object. On earth, mass and weight are the exact same, but if we change the gravity, an object's weight will change but its mass will stay the same.
- *Weight*: Weight is how much force is applied to an object's mass due to gravity. Weight changes as gravity changes. For example, a person weighing 100 pounds on earth might weigh 38 pounds on Mars where the gravity is weaker, and would weigh 250 pounds on Jupiter where the gravity is stronger.
- *Velocity*: The scientific word for speed. Your pendulum has a high velocity when it has just been released and is moving fast, and a low velocity once it has been moving for a while and starts to slow down.
- *Momentum*: Mass x velocity. Momentum is how an object moves when we take into account both its speed, as well as its mass. A cup with more paint in it will have a higher mass and thus a higher momentum, and a pendulum that has only been pulled back a little bit will have a lower velocity and thus a lower momentum.
- *Force*: A push or pull on an object. Many different forces come together to create the motion of a pendulum. The force of you

pulling it back gives it lots of potential energy, which then causes the pendulum to swing in the opposite direction, and the force of gravity keeps the pendulum from swinging all the way around because it pulls it back towards the earth.

How Did It Go?

We'd love to hear about all the amazing STEM projects you're doing! Show us your finished projects on any of the following social media platforms by tagging us!

Twitter: @MyMindsInMotion
Facebook: @mindsinmotion2014 || @uactiveliving
Instagram: @ucalgaryactive



Let us know how you felt about the project! Please [click here](#) or scan the QR code above to fill out a short survey!