

Pendulum Experiment

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The Pendulum Experiment is an experiment about gravity. Pendulums (or pendula if we are being exact!) are a fascinating scientific phenomenon.

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Pendulum Experiment

For many years they have been used for keeping time. If you pull back a pendulum and then let it go, the time it takes to swing over and then return back to its starting position is one period.

They follow some simple mathematical rules and we are going to find out how they work.

We are going to do a series of three experiments to see what effect changing things has on a pendulum.

Please note that this experiment is probably easier with more than one person.



EXPLORABLE

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Facts About Pendulums

- Pendulums have been around for thousands of years. The ancient Chinese used the pendulum principle to try and help predict earthquakes.

- [Galileo Galilei](#) [1] was the first European to really study pendulums and he discovered that their regularity could be used for keeping time, leading to the first clocks
- In 1656, the Dutch inventor and mathematician, Huygens, was the first man to successfully build an accurate clock.

What You Will Need for the Pendulum Experiment

- A long piece of string, at least 1 meter long.
- One piece of metal wire to bend into a hook.
- Some nuts from a toolbox - they must all be the same weight and must fit onto the hook.
- A large piece of paper to put behind the pendulum or a wall that nobody minds you drawing on.
- A pencil.
- Some tape.
- A stopwatch.

Initial Setting Up the Pendulum Experiment

To do this experiment requires a little building work but nothing too complicated.

1. The pencil should be firmly taped to the top of the table, leaving about 4cm hanging over the edge.
2. Next make a loop in your string to fit on the end of the pencil but do not make it too tight fitting.
3. At the other end of your string tie your hook and slide one of the nuts onto the hook.
4. Put your piece of card flat behind the pendulum and you are ready to go.
5. Before performing the [pendulum experiment](#) [2], make sure that everything swings freely without sticking.

Experiment One - Changing the Weight

In this experiment we are going to find out what effect changing the mass on the end of the string makes

1. Take your string back about 40 - 50 cm. You must make a mark on the wall or your piece of paper to make sure that you let it go from the same place every time.
2. As you let it go, start the stop-watch, and count the number of oscillations in one minute
3. Repeat the experiment 5 times and calculate an average
4. Put another weight on the hook
5. Release the weight from exactly the same place. Calculate the period as before.
6. Repeat 5 times and average the results
7. Try the same procedure with after adding another weight

You may be surprised by your results!

Experiment Two - Changing the Angle

1. Go back to just one weight on the string
You have the results from the first mark in your last experiment so you can use these results again.
2. Now, take the string back only about 20cm and make a mark as before
3. Let go and count the number of periods for one minute
4. Repeat 5 times and then work out an average
5. Try exactly the same thing but now let go from 10cm.

What difference does the angle of swing make?

Experiment Three - Changing the Length of the String

You already have your results from the first experiment and can use these again.

1. Take the string of the pendulum and cut off about 20cm. If you are really organized, you can use another length of string from the same roll to make a shorter one.
2. Take back to the same angle and let it fly.
3. Take another 20cm off the string, replace and try again.

What effect does changing the length of the string have on a pendulum?

Conclusion

As you can see from your results, changing a few things on a pendulum can have some unexpected effects.

There are still more questions about pendulums. What makes them slow down and stop? How does a pendulum in a grandfather clock keep swinging for a long time?

Maybe your next experiment could answer some of these questions.

Source URL: <https://verify.explorables.com/pendulum-experiment>

Links

[1] <https://verify.explorables.com/galileo-galilei>

[2] <http://electronics.howstuffworks.com/gadgets/clocks-watches/clock3.htm>