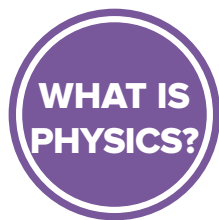


# 6 week STEM clubs

## PHYSICS



*Physics studies matter, its motion and behaviour through space and time, and the related entities of energy and force*



### BUT WHAT DOES THAT MEAN?

Physics looks at matter and energy and how they interact with each other. The energy involved in motion, light, electricity, radiation, gravity, just about anything, can be studied. Physics deals across a whole range of scales, from sub-atomic particles to stars and entire galaxies. Physics underpins Chemistry and Biology as it deals with both energy and matter, which both Biology and Chemistry depend on.

### BECOME A PHYSICIST

#### ACTIVITY 1



*Whereas Chemistry looks at the substances of which matter is composed, Physics looks at energy and how this*

*affects the materials we are using. We are going to look at energy in the next experiment, more specifically we are going to look at heat energy.*

#### EQUIPMENT:

- 2 litre fizzy drinks plastic bottle with lid
- Surgical spirit (available from pharmacies)

#### INSTRUCTIONS

- 1 Make sure the drinks bottle is clean and dry inside
- 2 Put a small amount (30ml) of surgical spirit into the bottle and swirl it around
- 3 Put the top onto the bottle to seal everything inside
- 4 Place the bottle on a firm surface and using your elbow or hand press as hard as is safe to do so on the lower half of the bottle to compress the gas inside
- 5 Keep pressing on the bottle as hard as is safe to do so and with your other hand quickly unscrew the top so that it is “popped” off the top
- 6 As the gas escapes quickly from the bottle you should see a cloud has formed inside the bottle



ACTIVITY 1: *ENHANCED*

*To make this experiment even more impressive, you can use the additional equipment:*

## EQUIPMENT:

- Foot pump
- Hot glue
- Bike inner tube valve

## INSTRUCTIONS

- a Drill a hole into the top of the bottle to the same diameter as the bike valve
- b Glue the bike valve in place on the inside of the lid so that you can seal the bottle
- c Fit the foot pump to the valve top
- d Once sealed, use the foot pump to increase the pressure inside the bottle
- e Disconnect the pump and then simply release the bottle top for the same, but better result

## SO WHAT?

While it is interesting that you have made a cloud appear inside the bottle, a physicist would ask why this happened.

Thinking about what you may already know about, firstly, the relationship between pressure and heat and, secondly, gas and liquid states, can you explain why the cloud appeared?

When we increase the pressure inside the bottle, we also increase the temperature slightly. When we release the compressed gas, it rapidly cools. This rapid cooling causes the water vapour inside to form together into water droplets which form the cloud we can see.

This experiment shows the relationship between pressure and temperature and we can use this knowledge to our advantage.

Can you think of anywhere in the home where we want it to always be cold?

Most of us store our fresh food in a fridge or freezer and these appliances use the relationship between pressure and temperature to keep the inside of our fridges cool. Take a look online to see if you can find out more about how this works

## FIND OUT MORE

The Institute of Physics (IoP) is the professional body for physicists in the UK. It has produced videos about physicists who work in very different environments, which you can watch here: [www.iop.org/careers-physics/your-future-with-physics/career-paths](http://www.iop.org/careers-physics/your-future-with-physics/career-paths)

Did you know that Physics had these kinds of applications?

Physics is used in so many different fields and is one of the core sciences that helps us develop theories and understand complex problems that help us imagine the futures we could have. Why not take a look at the courses on offer at Edge Hill University, which explore the new future you could be creating for our world.

[www.edgehill.ac.uk/courses/robotics-and-artificial-intelligence/](http://www.edgehill.ac.uk/courses/robotics-and-artificial-intelligence/)

## NEED HELP?

Why not chat live to the team at Shaping Futures to find out more about what is on offer, or to get further advice and guidance

[www.shaping-futures.org.uk/activities](http://www.shaping-futures.org.uk/activities)