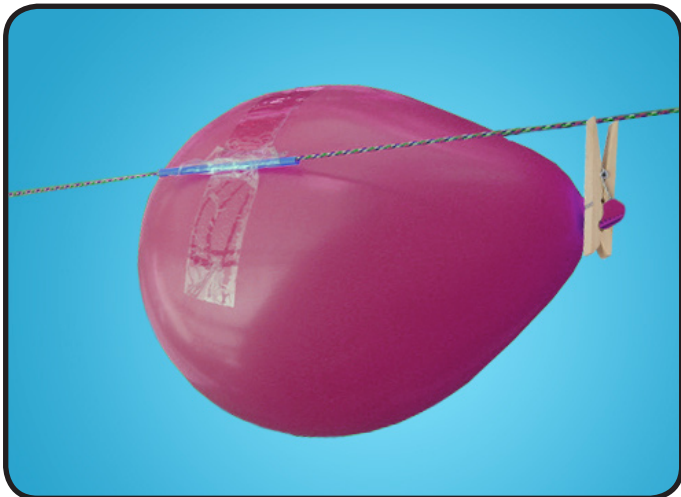


Science with Zoe & Cogs - Experiment 10

## Jet Balloon Rocket

What is “lift”, “thrust” and “drag”? And what is Newton’s law of motion?



### Things you need:

- Balloon
- Straw
- Sticky tape
- String
- Scissors
- A peg
- Things to tie the string to, like chairs, table or trees

### What to do:

- 1 Stretch the string between two objects, making sure it's tightly stretched. When you know how much string you need, cut the string and tie it tightly at one end.
- 2 Thread the straw through the string, and then secure the other side. You should now have a tightly-stretched string with a straw that can move freely from one end to the other.
- 3 Now blow up your balloon, but don't tie off the end. You can twist the balloon slightly and use a peg to stop it from deflating. If you like, you can decorate your balloon with coloured markers to look like a rocket.
- 4 Tape the balloon to the straw using a couple of pieces of sticky tape so that the balloon is parallel to your string.
- 5 Take the jet balloon rocket to one end of the string (the end facing the balloon opening). Release the peg and let fly!

Science with Zoe & Cogs - Experiment 10

## Jet Balloon Rocket



### What's going on?

The air rushes out of the balloon, forcing the balloon to 'fly' along the string. Isaac Newton would be pleased! He was the famous scientist who in 1686 stated that every action must have an equal and opposite reaction (or words to that effect).

The flow of compressed air from the balloon is forced out as the peg on the mouth of the balloon is released, and the balloon is forced in the opposite direction with equal thrust.

Rocket engines work on the same principle. As the material flowing from the engine pushes backwards, the engine itself (and the attached rocket) is pushed forwards.

Aircraft manufacturers need to consider four things to get their craft to fly; their weight, the effects of drag (the resistance the craft experiences due to its movement through air), and the ability to get enough lift and thrust to fly.

Lift works on Newton's same principle, known as his third law of motion. Airflow is deflected down by the curved shape of the wing, which in turn forces the wing upwards.

### What else do you see?

Use this space to write about, and draw anything else you noticed while doing this experiment.

### Sailing with light

Even a very small amount of thrust can have a big effect in space. Solar sails are spacecraft that use the pressure exerted by light to push giant reflective sails into space without relying on expensive and heavy fuel like hydrogen and oxygen. So far, none have made it far into space, mostly due to launch failures, such as NASA's failed August 2008 to launch the solar sail spacecraft NanoSail-D.