Opening extract from

Do Try This At Home!

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Flight & Space

Birds think they're better than us because they can fly, but anything a bird can do we humans can do better.

Or so you'd think, but it turns out flying is actually quite hard to do. It's all well and good trying to copy birds by flapping your arms, but it won't get you off the ground. Humans don't have the necessary equipment. That's why people went about making clever things to help us fly. Lots of people just stuck feathers on their arms, which is not only rubbish but makes you look really silly – and, besides, you don't want to copy birds too much, otherwise we'll be living in nests and laying eggs before we know it.

So it was lucky that the first successful bit of flying didn't involve wings at all. Back in 1783 two French brothers, Joseph and Etienne Montgolfier, made the first hot-air balloon that could carry people. To honour that achievement we're going to have a go at making our own balloon later on in this chapter.

When we think of flight, we usually think of two pioneers: the Wright brothers.

The Wright brothers were the first people to do controlled powered flight, just like the planes that you see in the sky. Except that they only flew for 12 seconds and their plane was made out of bicycle parts, which doesn't sound great, but it was ages ago in 1903 and they did stay up for a bit longer later on.

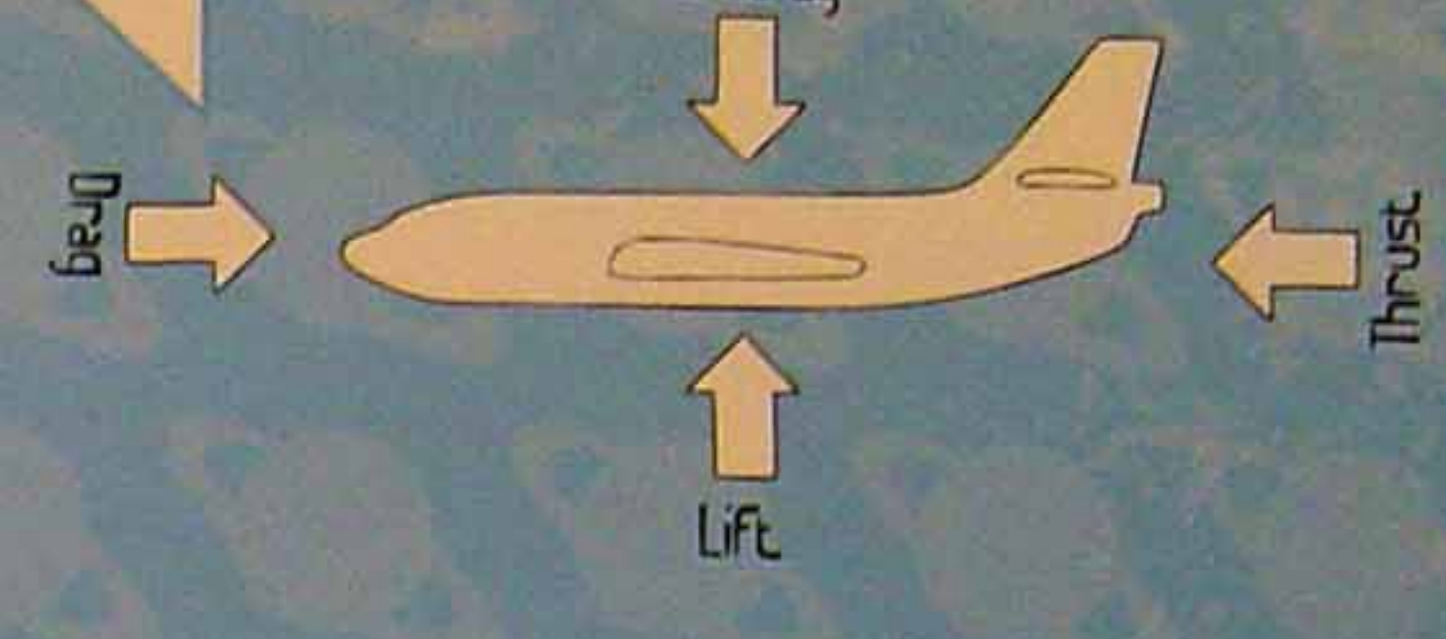
Flying is hard, especially having control of where you're going. There are four big things you have to deal with: Lift, Gravity, Thrust and Drag. Lift makes you go up, gravity pulls you down, thrust moves you forward and drag slows you down. Lift and gravity work against each other and so do thrust and drag. You have to balance all four in order to fly.

How do you get a baby astronaut to sleep?

Rock it

Lift

For an aeroplane to fly, you need lift. You get lift by air flowing over the wing. A wing is an aerofoil shape. It's got a curved top and a flatter bottom. Air moves faster over the top of the wing than under it, creating lower pressure above the wing than below it. This is what creates lift.



Thrust

Thrust is created by propellers or by jet engines. These push the plane forward, creating the airflow over the wing.

Drag

Drag is a bit of a drag. It slows you down when you want to go fast. Planes need to be streamlined to keep drag to a minimum.

Gravity

Gravity does what it always does. It's a force that pulls things together – in this case, our plane to the Earth.

Flying is good, but flying into space is better. Like the Punk Scientists we are, we've often dreamed of going further than just flying around the Earth. We want to go higher; we want to go into space. Other people have been there – in fact there was a bit of competition between Russia and the USA in the 1960s when manned space travel was getting started. Russia got up there first but the USA made it to the moon first, so we'll call it a draw.

We said flying was hard, but flying into space is even harder. You need more power, more fuel and once you're in space you need to be able to cope without air and in reduced gravity. We can't show you how to make a real spacecraft, but in this chapter we can show you how they work.

DO THIS AT TRY HOME!

Hot-air Balloon

If something is lighter than air it tends to want to float upwards. That's why gases that are lighter than air, like helium, are put in balloons. You don't need special gas to make our floating balloon, just some hot air. But not the sort of hot air that comes out of Brad's mouth – that's just boring and a little bit smelly.

Let's start making it.

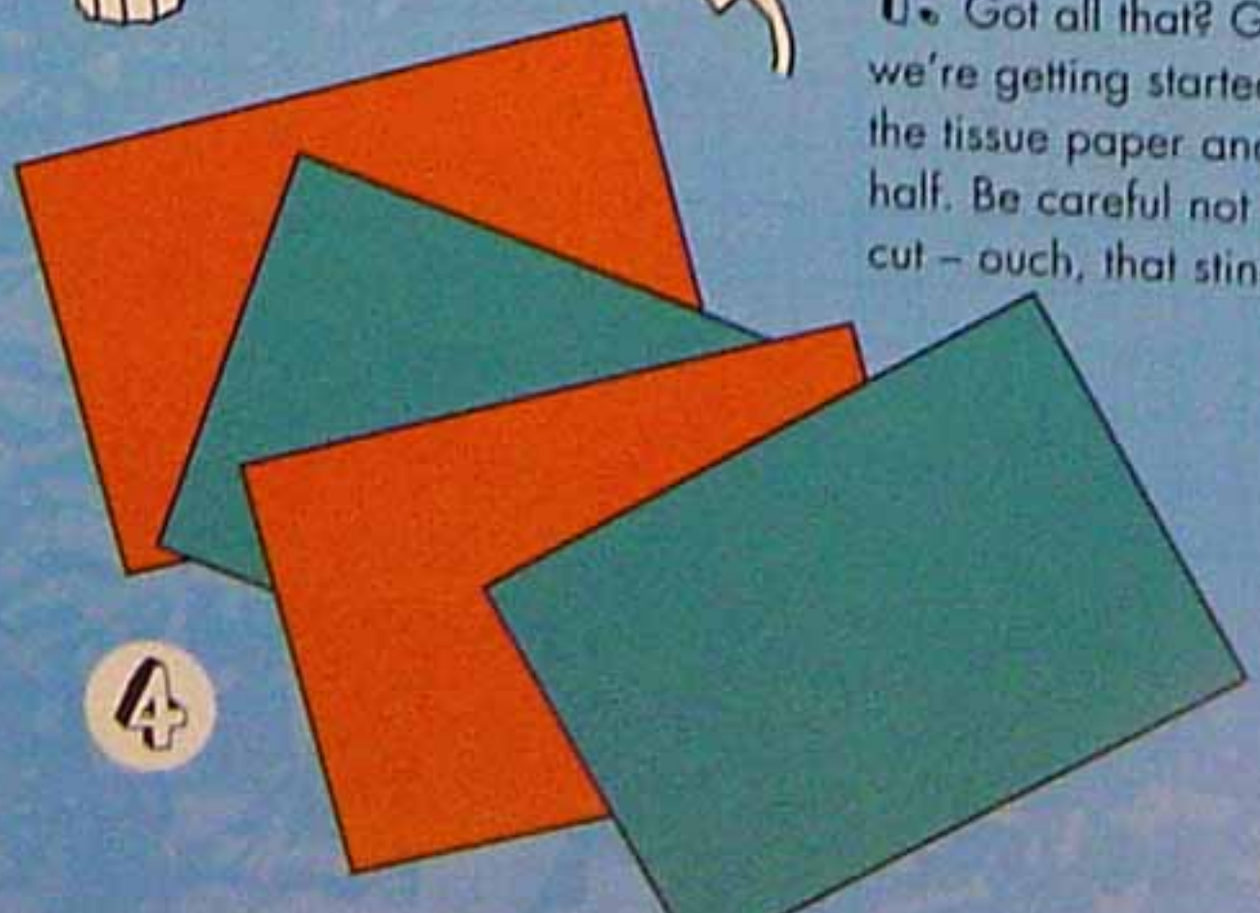
You'll need:

- 4 sheets of tissue paper
- Scissors
- Glue
- 4 paper clips
- A hairdryer

1. Got all that? Good. Because we're getting started. We've taken the tissue paper and folded it in half. Be careful not to get a paper cut – ouch, that stings.

2. Cut along the unfolded side to make curved edges.

3. Take each curved edge and glue it to another sheet's curved edge, until they are all completely joined with a gap in the bottom only.



Don't glue it like this!

4. Wait for the glue to dry and then carefully open up the balloon so you can fill it with air. Attach the paper clips to the bottom of the balloon to give it a little bit of weight.

5. Put the hairdryer underneath the balloon and blow hot air into it. The balloon will fill up with hot air and will float upwards.

What's happening?

This works because hot air is quite clever stuff. The hot air inside the balloon becomes less dense than the cool air outside the balloon. It's this difference that makes the balloon rise.

RATINGS

Difficulty

Messy

Grown-up helper

Time