

Gliding into the Stratosphere

Do you know about gliding?

Do you know what a glider can do? It's an awesome way to fly, and glider pilots fly hundreds of kilometres at high speed, and climb higher than airliners just using renewable energy from the sun and the wind.

Your challenge: to show that air has weight which creates air pressure, and to learn what this means for pilots flying high.

What you need:

- Balloons, string, pins and a bamboo cane or similar rod around 60cm long. Optionally an accurate electronic balance/scales.
- A clear 2l plastic drinks bottle with the top cut off and a skewer, knitting needle or similar to make small holes in the drinks bottle
- Water... AND... a sink or washing up bowl to contain the water!!

Experiment 1 – demonstrate that air has weight

How might you measure the weight of air?

1. Weigh the balloon. Inflate the balloon and weigh it on the accurate scales. POP the balloon and reweigh it to confirm empty weight.
2. Rod balance method
 - a. Pick two balloons roughly the same size and shape and inflate them both to the same size. Create a balance apparatus by attaching them to each end of a balance rod and suspend the rod with string in the centre so that it is balanced nicely. Use a stand if you have one, otherwise attach it beneath a table top or just hold the string steady.
 - b. Pop one of the balloons!! – Observe and record what happens. Check that the popped balloon is all in one piece, and if not, balance any exploded bits back on the apparatus. Does it still balance?



What happened.....

Why do you think that happened?.....

Experiment 2 – show that air pressure decreases with height

Look up! There's a lot of air overhead – this is the **earth's atmosphere**. Now we know that air has weight, we can demonstrate that the more air overhead, the greater the weight and higher the pressure it causes on the earth. Because we don't have a glider in the classroom, and we can't run up the nearest mountain, we'll use water and a drinks bottle to show this. Liquids, for example water, work the same way as gases to create pressure as they both flow freely.

1. Cut the top off the drinks bottle. Using the skewer, make a hole 2cm above the base and further holes at 5cm intervals above this. Make sure all the holes are the same size. Ask if you need help to do this – some bottles are easy, some more difficult!!
2. Put a piece of sticky tape over the holes with a tag on the end so that you can easily peel it off later.
3. Put your bottle in the sink or somewhere to contain the water that flows out. Fill the bottle with water to just below the top.
4. Remove the sticky tape and observe what happens. How far is the water squirted out of each hole? Does this change over time?

Record what happened:

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Discuss your results with your teacher and then watch the video to see what this means in practice for pilots who want to fly high! Can you think of other ways that you could maintain enough oxygen to breathe as you get higher? List them here:

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We hope you had fun demonstrating that air has weight and creates air pressure!

Find out more about GLIDING at the addresses below, and all types of AVIATION at <https://stem.caa.co.uk/> & www.airleague.co.uk

We hope to see you on an airfield soon!