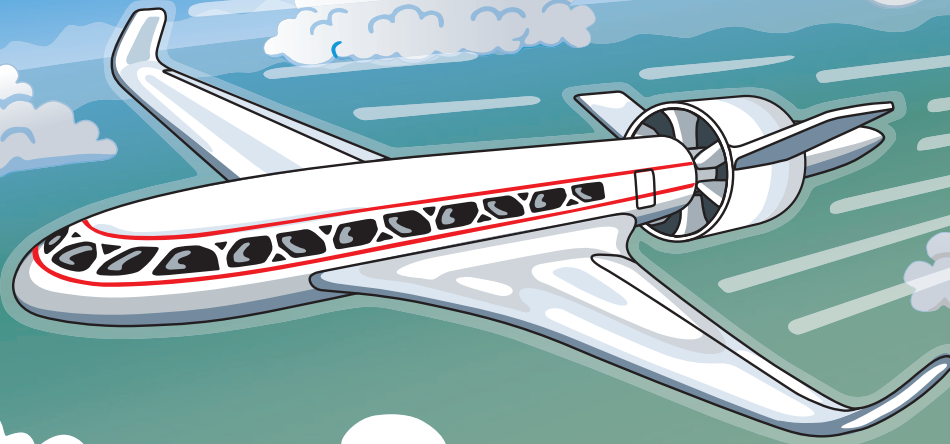




National
Museum of Flight
Scotland



Flying into the Future Trail

The Scottish Government have set challenging targets to reduce the negative impact of aviation by 2040. Engineers are working to make air travel less damaging to the environment. How might that happen?

Start at the Concorde Experience.

Using less fuel

Developing new technologies can reduce the amount of fuel engines use. Most aircraft run on fossil fuels that are running out and damage the environment. Concorde is the only passenger aeroplane that was able to successfully fly faster than sound (supersonic).

Can you find the Olympus engines in the Concorde exhibition?

These engines allowed Concorde to travel so fast but they used four times as much fuel as the average aeroplane engine at the time.

Now go to the engine display on the left of Concorde, towards its tail.

Number 5 is the RB211 – a more modern engine. It looks like the Olympus but with a big fan at the front. The fan moves more air more

slowly than in engines without one, making it quieter and more powerful. This design uses much less fuel. Concorde used 16 litres per passenger to travel 100 kilometres. A modern aeroplane with RB211 engines would only use 2.4 litres!

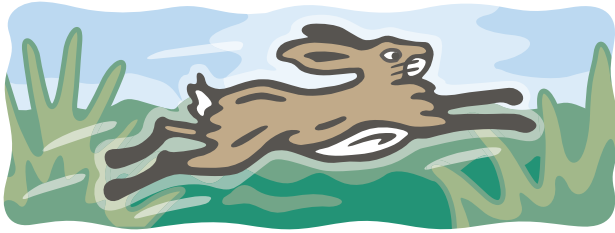
Can you draw the other half of the engine?



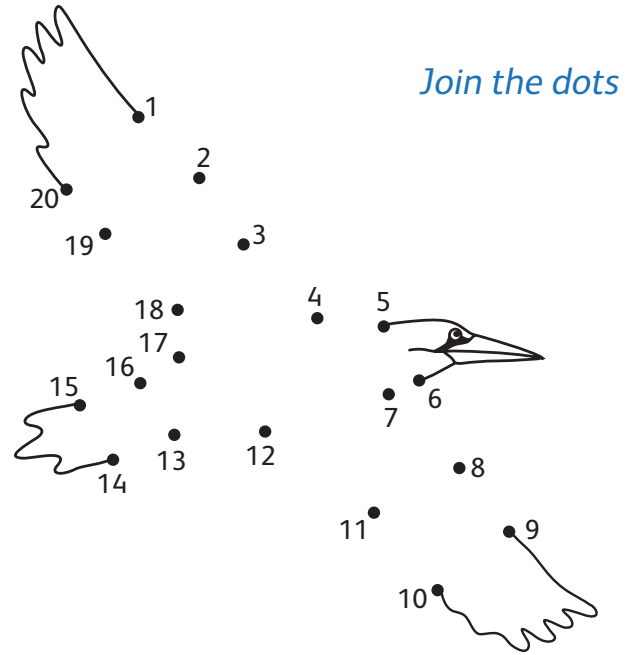
Next, go outside and walk towards the Civil Aviation Hangar.

Wildlife at the airfield

Airfields and airports are often habitats for wildlife. They can be noisy places but there are many large areas undisturbed by people. Brown hares like grasslands to feed in and even hide their young in scrapes or nests in the grass. You can often spot hares near the museum.



Did you know that up to 150,000 gannets have nested on the nearby Bass Rock each year since 1493? As the weather gets warmer, the birds follow shoals of fish to this safe place



to lay their eggs. When autumn comes they fly south again. This annual trip takes a lot of energy. Many humans also fly abroad for warmth and nice food, but to help the planet we should only do it once a year too!

New fuels

Some air travel is essential. On your right as you enter the hangar you will see a bright yellow aeroplane, the Islander. This provided vital ambulance services to the remote areas of Scotland.

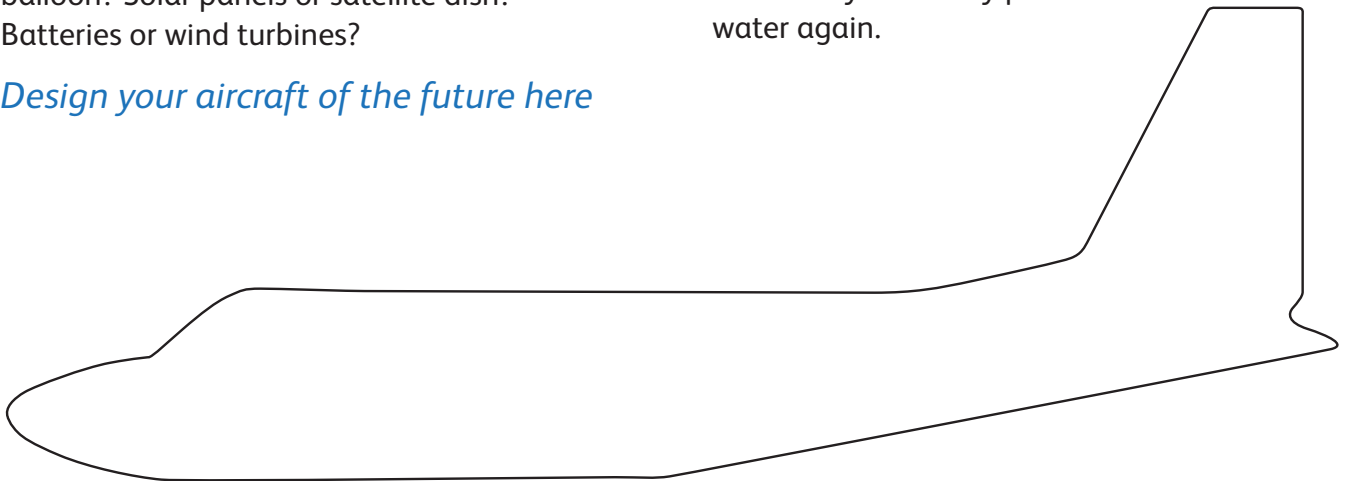
What would you put on an aircraft to make it more environmentally friendly?

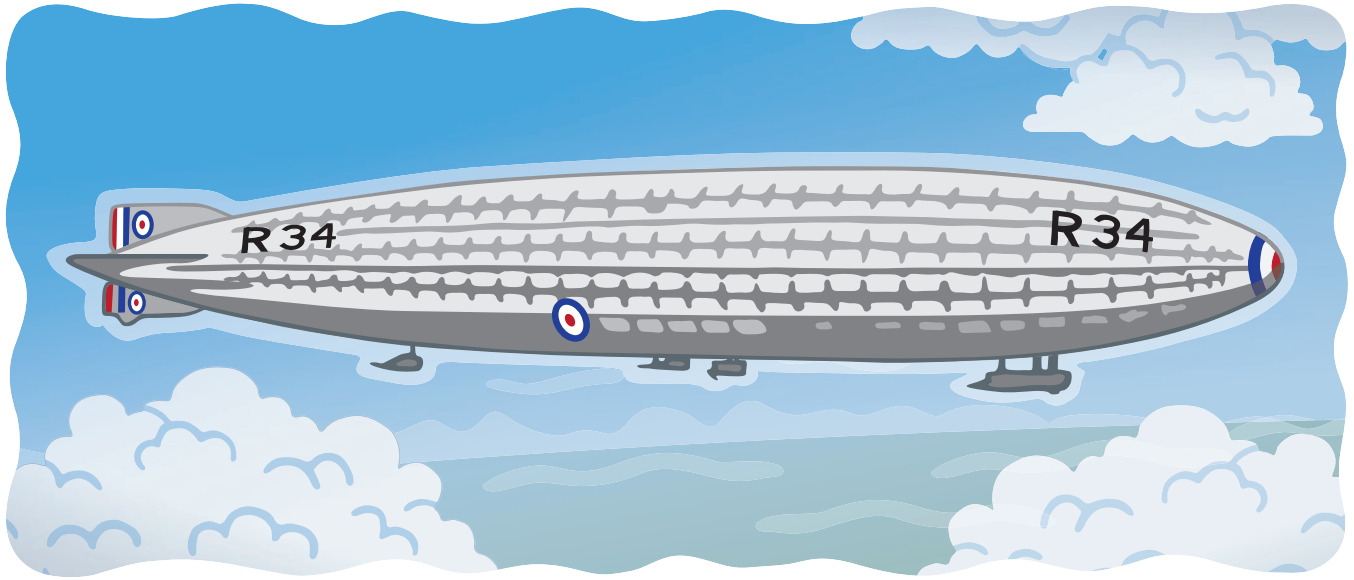
Wings or rotors? Petrol tanks or a hydrogen balloon? Solar panels or satellite dish? Batteries or wind turbines?

Design your aircraft of the future here

When an engine burns a fossil fuel like petrol, chemicals are released into the atmosphere that can be harmful to plants and animals. These include nitric oxide, as well as carbon dioxide which contributes to global warming.

In Scotland engineers are developing aeroplane technology to run on hydrogen or electricity instead. Electricity can be generated from wind and waves. Electricity can split water into hydrogen and oxygen. When they burn they produce water again.





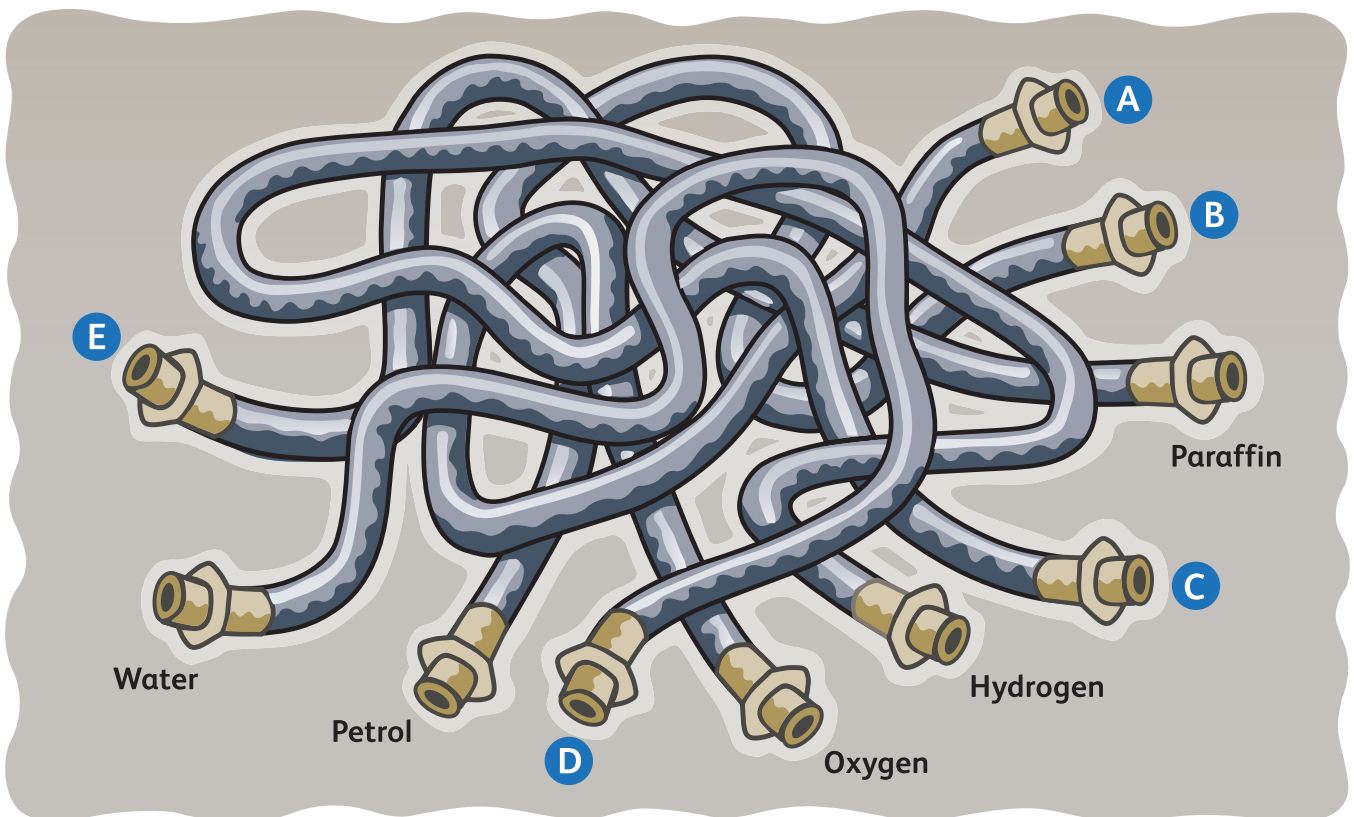
Next, find the plaque about the R.34 airship outside the Fortunes of War building.

Reusing old technology

Airships were popular between 1900 and the 1930s. They flew by using bags of gas that was

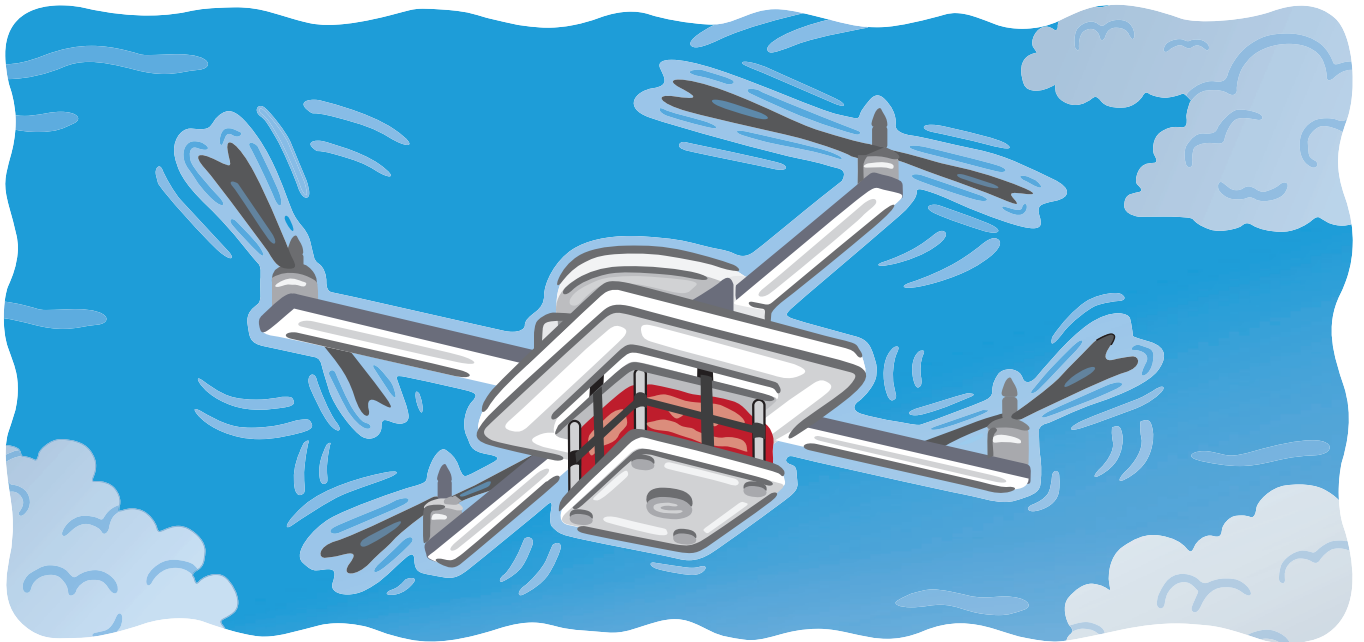
lighter than air. Accidents made some people think they were dangerous. Airships move more slowly than aeroplanes but use much less fuel, so they might be useful in the future to move heavy objects over long distances. Engineers are working to make them safer.

Find the right fuel



It's 2040. You need to fuel your aeroplane to fly a rescue mission to a remote island. The pipes in the airport's maintenance area are all tangled up.

Which tube do you need to fill your tank with hydrogen?



Finally, go into the Military Aviation Hangar.

Flying without pilots

Turn right and walk under the viewing platform to find the Jaguar aircraft. Above its tail you will see two drones or unmanned aerial vehicles (UAVs). Drones use less fuel than aeroplanes as they don't need seats, toilets or safety equipment for carrying people. They are used to deliver COVID-19 test kits to remote areas of Scotland.

Drone delivery

This drone can carry up to 5 kilograms (kg) of cargo, but there are lots of parcels waiting to go to a remote island. Which parcels would you deliver first and why? Don't go over 5kg!



Sweets for the police officer:

Kg.

0.5



Vaccines:

0.5



First aid kit for the school:

1.0



New football for the youth club:

1.0



Fancy shoes for the provost:

2.5



Fresh fruit:

2.0



Blood for transfusions:

0.5



Bird food:

0.5

Work out and explain your calculations here:

We love to see your drawings and photos. Share them with us at [#nmsflight](https://twitter.com/nmsflight)



Find out more at nms.ac.uk/national-museum-of-flight