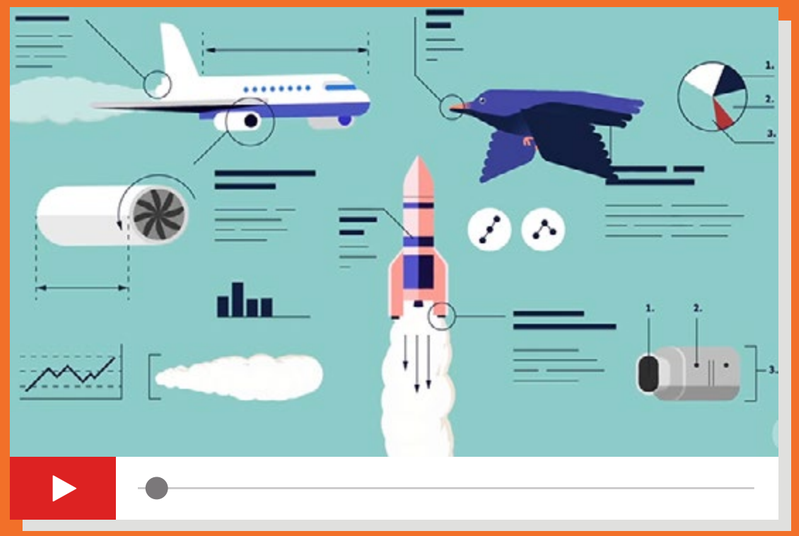
SCIENCE OF FLIGHT

AIRBUS FOUNDATION

DISCOVERY SPACE

AMBASSADOR TOOLKIT

in partnership with AUTODESK.



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Welcome to **Discovery Space!**

At Airbus, we believe that education is one of the most powerful vehicles for progress. This is why, through the Airbus Foundation, we strive to use the fascinating power of aerospace to inspire the next generation into the fields of Science, Technology, Engineering, and Mathematics.

As a highly skilled, global company, we have the duty to promote equitable education and a lifelong learning opportunity, which means ensuring our future workforce has the relevant skills to face tomorrow's challenges.

With our platform, Discovery Space, our goal has been to create a fun place for kids to practice their critical thinking, problem solving, and collaboration skills and to empower them to drive and shape both their future and ours.

We believe that using the passion and knowledge of fellow Airbus employees is one of the most powerful ways to accelerate the path to realising this vision.

We realise that stepping into a classroom or a science club can feel like a daunting task. With that in mind, we created this toolkit to help make your presentation fun for kids AND easy for you.

GET STARTED!

How to Use
This Toolkit

The Airbus Foundation Discovery Space Toolkit was designed to give you the freedom and flexibility to create the presentation, activity, or demo that works best for you and your particular audience.

With our first theme, “Mission to the Moon,” you will help students think about solutions to overcome the challenges we will face on the Moon.

If you are more of an Aviation Geek, no worries! Our second theme on Flight Physics was made for you. With Flight Physics, you will be able to take students on a journey through the sky and dig deeper into how things fly!

You will also find different ways to engage with your audience. Whether you choose to complete the web games, watch the animations, answer the suggested questions, or 3D design a space rocket and export it to Minecraft, make sure you follow the pre-visit checklist before leaving!

Every year, starting in April and October, we will host a competition in partnership with Autodesk that will reward the best designs with many prizes to win!

Free Online Design Resources

Autodesk offers a wide range of free software and online resources for designers, thinkers, and makers of all ages to help build 3D design skills inside the classroom and beyond.

Instructables

An online tool built for the maker community that helps you explore, document, and share your creations.

Instructables.com

Tinkercad

A free, easy-to-use online 3D CAD design tool for anyone to use to create fun, simple designs from scratch.

Tinkercad.com

Fusion 360

The first 3D CAD, CAM, and CAE tool of its kind that connects your entire product development process in one cloud-based platform.

Autodesk.com/Fusion360Edu

Pre-Visit **Checklist**

Being prepared is one critical element to a successful presentation. Here is a pre-visit checklist you can use as a guide to get ready for your event.

- ☑ To use the web games, you need to have an Internet connection. Please note that the web games work best on the latest version of Google Chrome.
- ☑ If you are planning on watching the animations, make sure to download them ahead of time. The videos are also available on YouTube.
- ☑ If you are planning to use Tinkercad, you need to have an Internet connection. Please note that Tinkercad works best on the latest version of Google Chrome or Mozilla Firefox.

Presentation or Activity:

- How many students will attend? (For printouts, materials, etc.)
- Will you need a projector? Is one available in the room?
- Will you need Wi-Fi? Is it available?
- Will there be any participants with special needs to accommodate for?

Online Activities:

- How many students will attend? (For printouts, materials, etc.)
- What product will you be using?
- Are there sufficient desktop computers (each with a mouse) for all students to participate?
- Will you need a projector? Is one available in the room?
- Will you need Wi-Fi? Is it available?
- Will there be any participants with special needs to accommodate for?

SCIENCE OF FLIGHT

LESSON #1

Things that Fly

LESSON #2

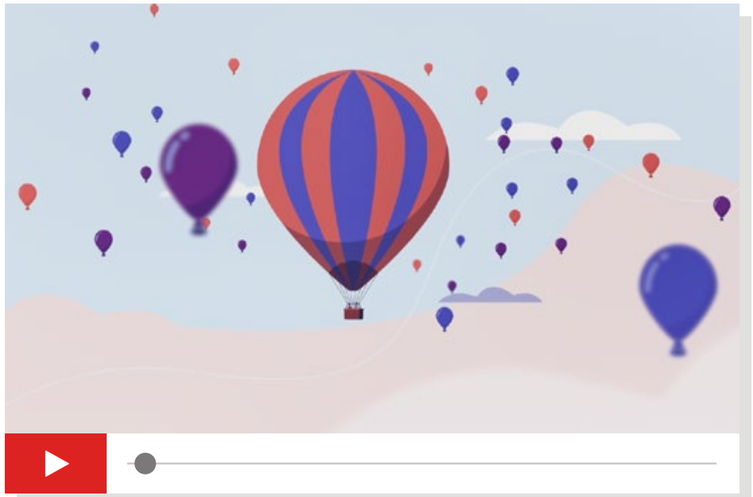
10,000 Airplanes Up in the Sky!

LESSON #3

Finding Your Way Through the Clouds – How We Get from A to B

THINGS THAT FLY

There are loads of things in the sky: balloons, birds, airplanes, helicopters. Did you know they all fly in a different way? Watch the videos to find out how they reach the skies!



Balloons: The First Thing in the Sky

Balloons are the first thing we've ever put in the sky. But why do they float? And what is the difference between the big balloons and the small ones?

QUESTIONS FOR YOUR AUDIENCE:

Beginner:
Q: How does a big balloon go up?
A: With hot air.

Intermediate:
Q: Why isn't a small balloon warm, like a big one?
A: Because it has helium inside, not hot air.

Advanced:
Q: Why does hot air go up?
A: Because the density of hot air is lower than normal air.

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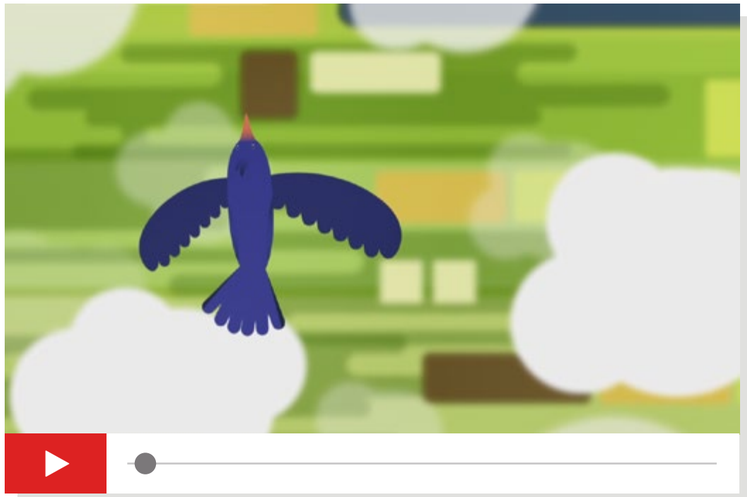

Why Birds Are the Perfect Flying Machine

The three reasons why birds can fly and we can't. And no, it's not just because they have wings! Although they do help a lot.

QUESTIONS FOR YOUR AUDIENCE:

Beginner:
Q: Why is a bird lighter than us?
A: They have hollow bones.

Intermediate:
Q: Why can birds fly but we can't?
A: Because they're stronger, lighter and have wings.

Advanced:
Q: How much of a bird's weight is wing muscle?
A: 1/6

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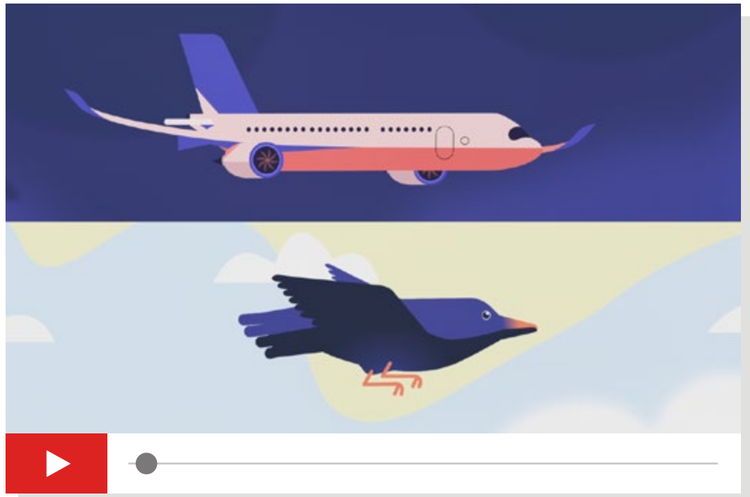

How Do Airplanes Reach the Clouds?

Airplanes don't flap their wings like a bird, but they still manage to fly. How is that even possible?

QUESTIONS FOR YOUR AUDIENCE:

Beginner:
Q: What do you need to do to make a kite fly?
A: You need to run!

Intermediate:
Q: What does an airplane engine have?
A: Tons of tiny wings.

Advanced:
Q: What does a plane need to fly?
A: The right angle of the wings and speed; Lift.

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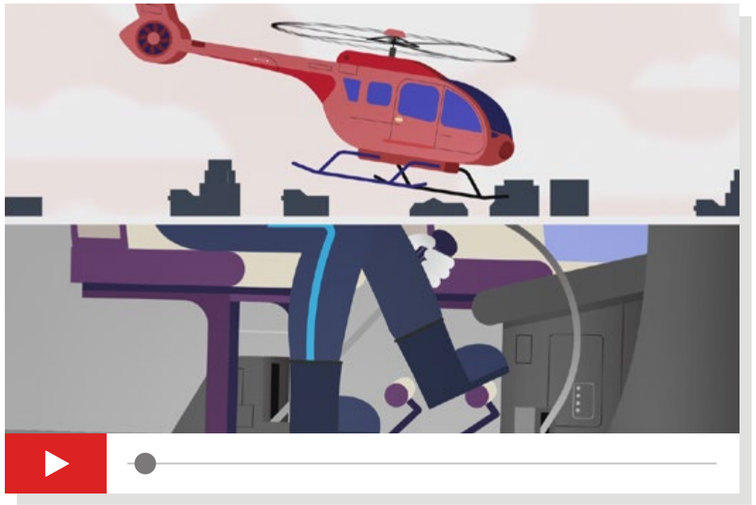

Flying A Helicopter is No Picnic!

A helicopter has no wings, but still manages to fly. And you need three different controls to do it! See how it all works!

QUESTIONS FOR YOUR AUDIENCE:

Beginner:
Q: How many different controls does a helicopter need to fly?
A: Three.

Intermediate:
Q: Why don't helicopter pilots get really dizzy?
A: Thanks to the tiny blades of the tail rotor.

Advanced:
Q: How does a helicopter go left or right?
A: By changing the tilt of the blades on one side.

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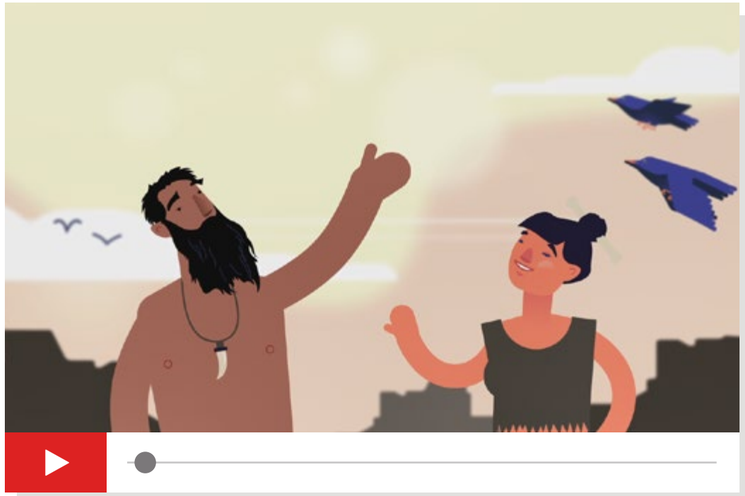
10,000 AIRPLANES UP IN THE SKY

There are tons of planes in the sky right now! But it took a lot of hard work to get them there. Discover how we invent, power, and design those flying machines!



The History of Flying and Falling

The history of flight is about flying and falling. It started by pretending we're birds, but soon we found better ways to fly!

QUESTIONS FOR YOUR AUDIENCE:

Beginner:
Q: Who got the first idea of how we could fly?
A: Leonardo Da Vinci

Intermediate:
Q: What aircraft can carry up to 800 people?
A: The Airbus A380

Advanced:
Q: How fast did the Concorde fly from Paris to New York?
A: In 3 hours.

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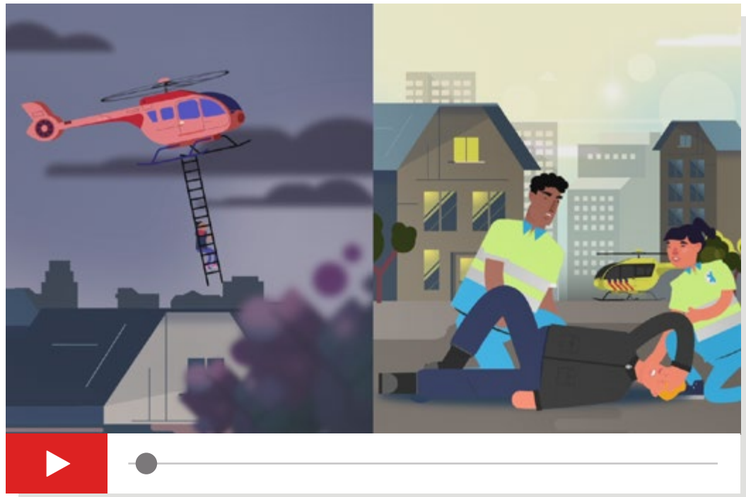

Choose Your Mission in the Sky!

For each sky mission you need the right aircraft. How fast do you want to go, where will you fly and what will you carry? What aircraft will you choose?

QUESTIONS FOR YOUR AUDIENCE:

Beginner:
Q: How many passenger airplanes are there in the sky at the moment?
A: About 15,000.

Intermediate:
Q: What kind of plane goes super-fast?
A: A jet airplane!

Advanced:
Q: What's your next sky mission?
A: *(Open-ended question)*

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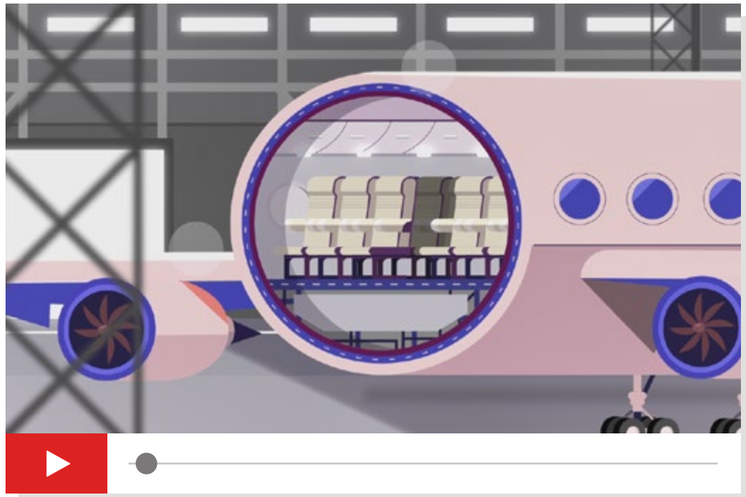

How to Design an Airplane

When designing an airplane, we want to make sure that it's light. But, how about safety? Learn how they build the planes we fly today!

QUESTIONS FOR YOUR AUDIENCE:

Beginner:
Q: What do you have to keep in mind when designing an airplane?
A: Weight and safety.

Intermediate:
Q: How do we make sure a plane is safe?
A: By testing it a thousand times in any situation.

Advanced:
Q: How much does every extra color of paint weigh?
A: 500 kilos, or 6 people.

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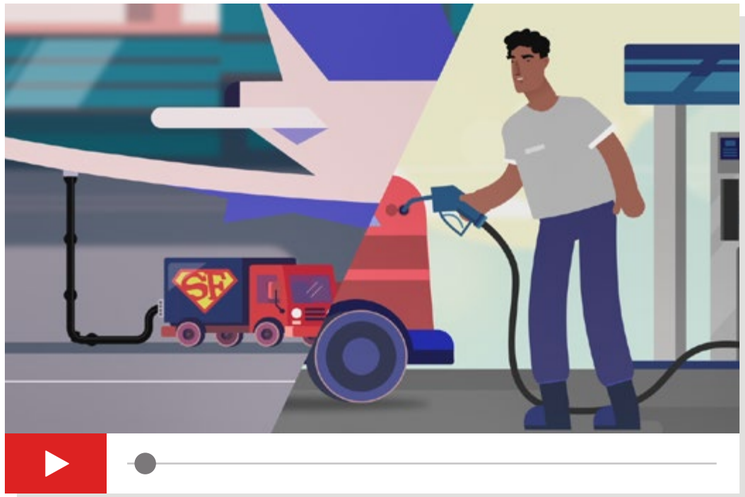

What Fuel Do Planes Fly With?

There are different kinds of fuel airplanes can fly with. Oil is one, but there are alternatives that give planes the energy to fly.

QUESTIONS FOR YOUR AUDIENCE:

Beginner:
Q: What color is the fuel for big airplanes?
A: Pale yellow.

Intermediate:
Q: What else can we make oil from?
A: Olives, coconuts and algae.

Advanced:
Q: What will you use to power your plane?
A: *(Open-ended question)*

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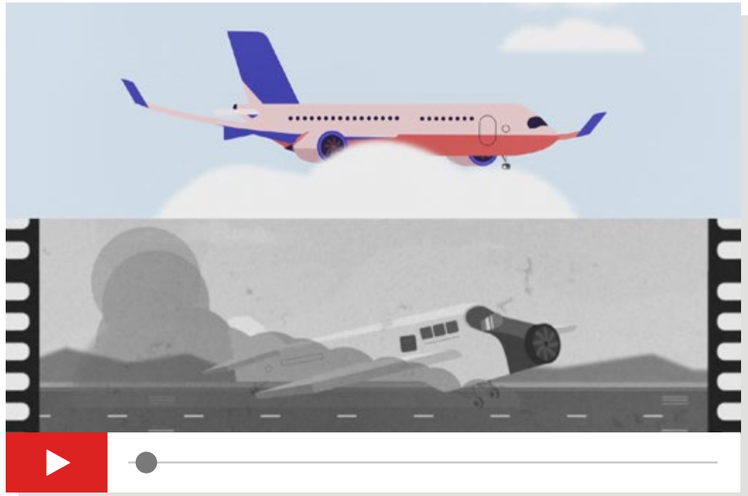

Airplanes: Evolving for the Planet

When we started flying years ago, it wasn't very nice for our planet. Planes were loud and smelly. But that has changed a lot today!

QUESTIONS FOR YOUR AUDIENCE:

Beginner:
Q: How loud were old airplanes?
A: As loud as a rock concert!

Intermediate:
Q: What else can we do to make our planet happy?
A: Re-use old parts of engines.

Advanced:
Q: What kind of gas does an airplane emit?
A: CO_2.

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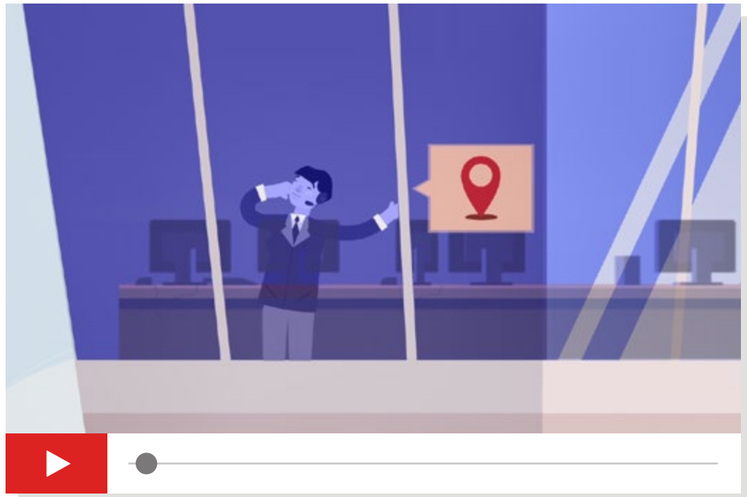

Airports: The Perfect Home of the Plane

An airport is the home of airplanes. Learn about the air traffic control tower, super tugs and more!

QUESTIONS FOR YOUR AUDIENCE:

Beginner:
Q: How is luggage moved in the airport?
A: With a luggage rollercoaster!

Intermediate:
Q: Where does an airplane go to get repaired?
A: It goes to the hangar at the airport.

Advanced:
Q: What does the Air Traffic Control tower do?
A: Tells aircrafts where to land, instructs everyone on the ground and aircrafts in the sky.

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FINDING YOUR WAY THROUGH THE CLOUDS

Ever wondered how airplanes get from one place to another? You'll need invisible highways, engines that spin the other way, and chewing gum. The videos will explain everything!

Getting Ready for Take-Off!

Getting an airplane to take off is no easy thing. A lot of work is done before it's time to start the engines and fly in the sky.

QUESTIONS FOR YOUR AUDIENCE:

Beginner:
Q: What is taxiing?
A: Driving to the runway.

Intermediate:
Q: How many liters of fuel does a plane use per kilometer?
A: 12 liters.

Advanced:
Q: What do flaps and slats do?
A: They help the plane lift up!

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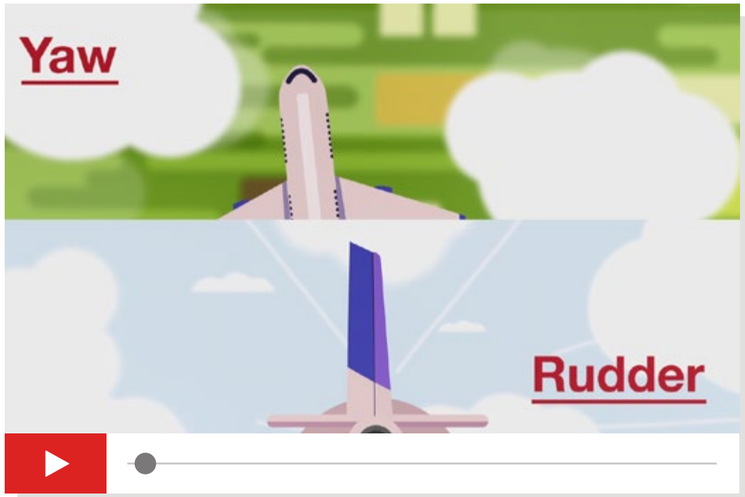

The Three Ways an Airplane Can Turn

How do you turn in the sky? There's no ground, no wheels and the wings can't move. So how do they do it?

QUESTIONS FOR YOUR AUDIENCE:

Beginner:
Q: How many steering wheels do you need to fly an airplane?
A: 3.

Intermediate:
Q: What are Ailerons?
A: Little parts on the back of the wings.

Advanced:
Q: What are the three ways of turning called?
A: Roll, pitch and yaw.

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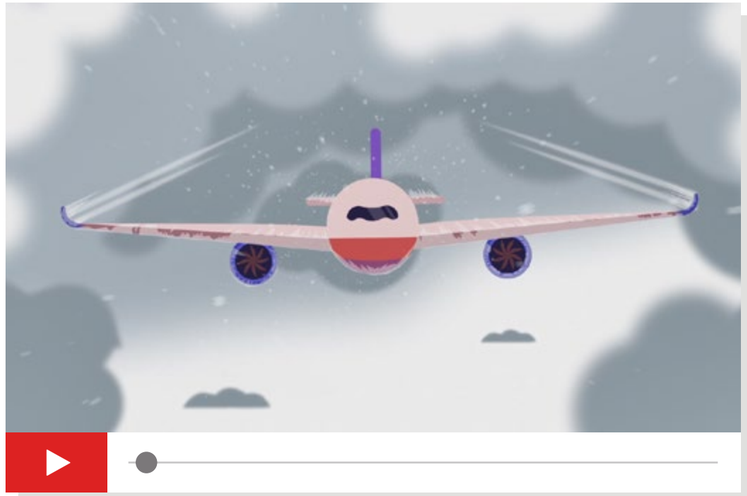

Why Airplanes Don't Mind Bad Weather

In the sky there's no umbrella protecting airplanes from the rain. So how do they fly in the sky in any weather?

QUESTIONS FOR YOUR AUDIENCE:

Beginner:
Q: What materials are airplanes made of?
A: Metal, like aluminum.

Intermediate:
Q: What happens when lightning strikes an airplane?
A: It guides the electricity off the plane and protects the place where we sit.

Advanced:
Q: What does Bleed air do?
A: It heats up the wings and melts the ice.

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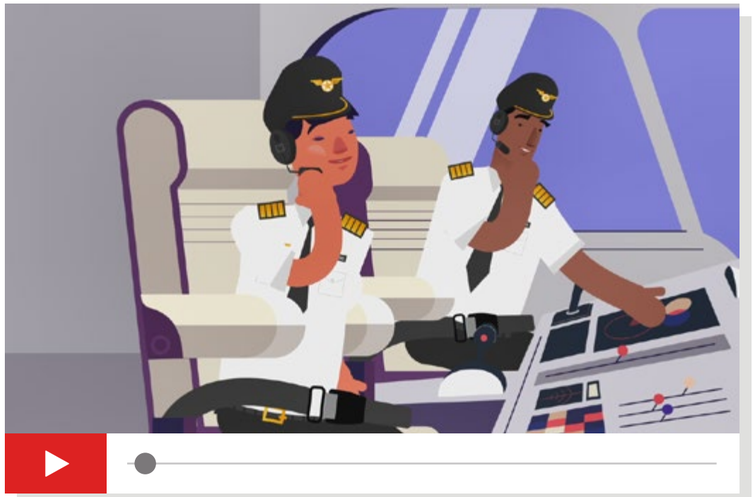

The Invisible Highways in the Sky

How do airplanes find their way in the sky? Without any signs, roads or GPS navigation like we have in the car?

QUESTIONS FOR YOUR AUDIENCE:

Beginner:
Q: What is DIDOS?
A: A name of a waypoint.

Intermediate:
Q: How wide is an airway?
A: 19 kilometers.

Advanced:
Q: What does a pilot do when the autopilot is on?
A: Check the weather or talk to air traffic control (or area control centers).

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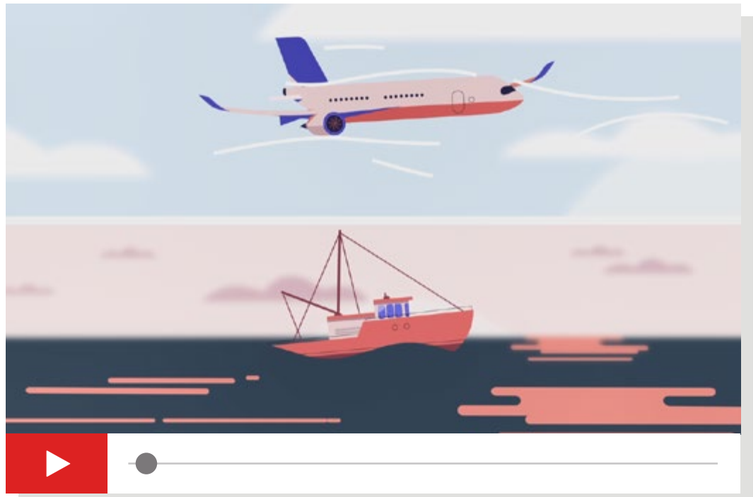

What Can You Expect on a Flying Adventure!

Flying is quite the adventure! You'll hear sounds and experience things you've never experienced before. So… what's happening?

QUESTIONS FOR YOUR AUDIENCE:

Beginner:
Q: What do you do when your ears feel funny?
A: Just pop in some chewing gum.

Intermediate:
Q: Why is there a tiny hole in airplane windows?
A: It helps them get used to the different air.

Advanced:
Q: What is turbulence?
A: The air moves all the time and/or the plane rides the winds.

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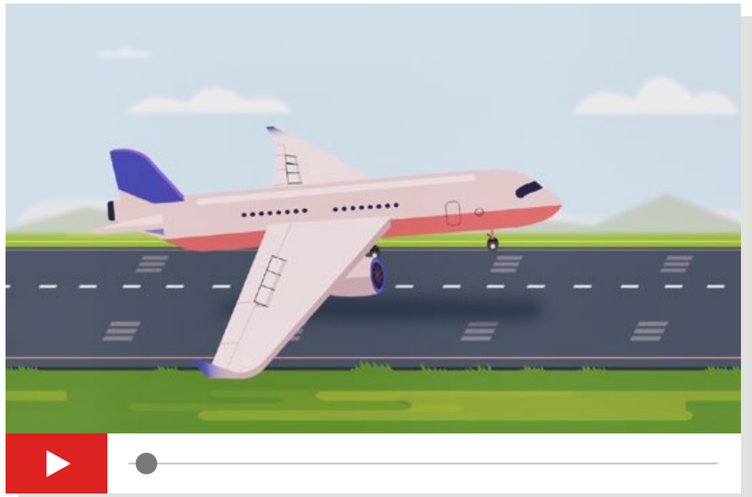

How to Land an Airplane

Landing an airplane is all about braking. Going from 900 kilometers in the sky to standing still on the ground is not easy!

QUESTIONS FOR YOUR AUDIENCE:

Beginner:
Q: How fast does an airplane go?
A: 900 kilometers per hour.

Intermediate:
Q: What happens when the wheels touch the ground?
A: The engines start spinning the other way.

Advanced:
Q: What do pilots do first when they want to land?
A: They open up the flaps and slats.

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How to Export Your **Designs on Minecraft**

Planning to meet with Minecraft addicts? Follow the tutorials and show them how to go from 3D design to their favourite online world!

FROM TINKERCAD >

FROM FUSION 360 >

Get Involved!

We are always looking for fellow passionate Airbus employees at the Foundation!

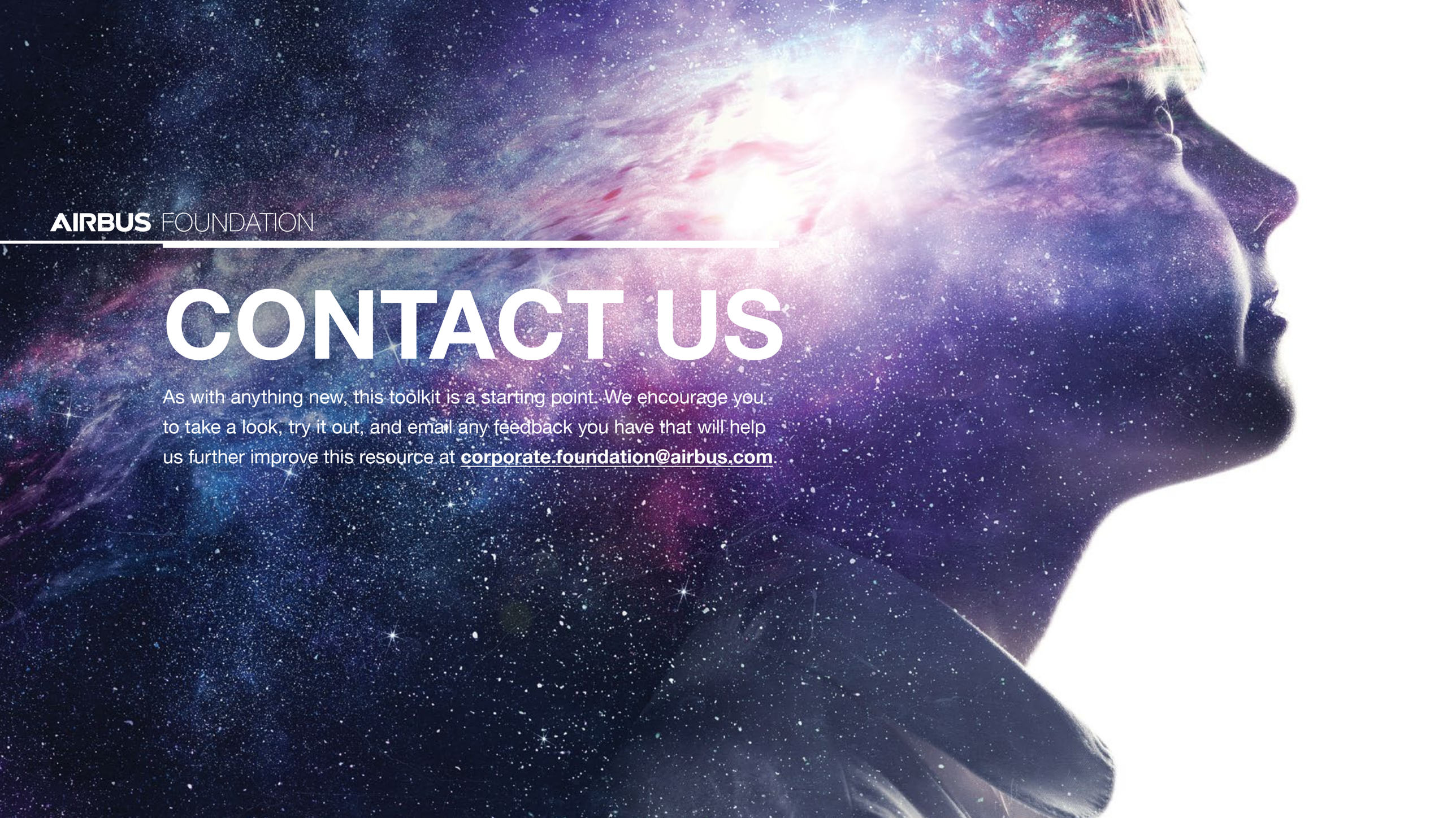
Here are some of the many ways you can help:

- Organise a workshop at a school around you
- Become an ambassador and join our extended team
- Help us localise the initiative by translating our content
- Use the platform in one of the Airbus Flying Challenge sessions if you are a mentor
- Volunteer to become one of our content experts

We are creating the following content and would appreciate your support. Email us if you are an expert in some of these topics or have other content suggestions:

- Satellites
- Flight Physics
- Urban Air Mobility

Ready to get started? Send us a note at **corporate.foundation@airbus.com**.



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CONTACT US

As with anything new, this toolkit is a starting point. We encourage you to take a look, try it out, and email any feedback you have that will help us further improve this resource at **corporate.foundation@airbus.com**.