AIMING FOR AWESOME

1918 2018

Aircraft design

Student Booklet

Royal Academy of Engineering

THIS IS ENGINEERING

ROYAL AIR FORCE Youth STEM

The aim of this resource is to give students the opportunity to investigate the impact of science technology, engineering and mathematics (STEM) on aircraft design.

Aircraft Design

The 1920s and 30s were the 'golden age of aviation' when aircraft changed from slow, wood and wired-framed, and fabric-covered biplanes to faster sleek, all-metal monoplanes.

R J Mitchell CBE FRAeS was born at 1895. After leaving Hanley High School, a co-educational grammar school in Stoke-on-Trent, at the age of 16, he gained an apprenticeship at Kerr Stuart & Co. of Fenton, a locomotive engineering works. At the end of his apprenticeship R J Mitchell worked in the drawing office at Kerr Stuart and studied engineering and mathematics at night school.

R J Mitchell designed of the Supermarine S.6B which helped the Royal Air Force win the famous Schnieder Trophy Air Race for seaplanes and flying boats.

In 1931 the Air Ministry issued a requirement to the aircraft companies of the UK for a fighter aircraft to replace the aging Gloster Gauntlet. The Gauntlet was a Bi-plane that first flew only two years earlier in January 1929.

During the 1930s, there was an increase in the need for a fast fighter that could defend the country against any expected attack. R J Mitchell understood this need, and designed one of the most iconic aircraft ever, the Supermarine Spitfire.

TIME TO THINK

What forces are acting on this aircraft when it is in flight?

Draw arrows to show these forces on the picture

STRETCH AND CHALLENGE

Draw arrows to show the direction and magnitude of the forces on aircraft in flight when it is:

1. Moving at constant speed
2. Accelerating
3. Decelerating

Model Aircraft

Part 1

Make a paper aircraft to be launched through the paper aircraft launcher.

What do you notice about the aircraft that went furthest?

Part 2

Use what you have seen from the first launch to design and make an improved paper aircraft. Launch this second aircraft.

Did your aircraft go further than the first attempt?

What are the differences between your first and second design?

Part 3

Use the templates to make a paper aircraft and launch the aircraft.

How is this aircraft different to your original designs?

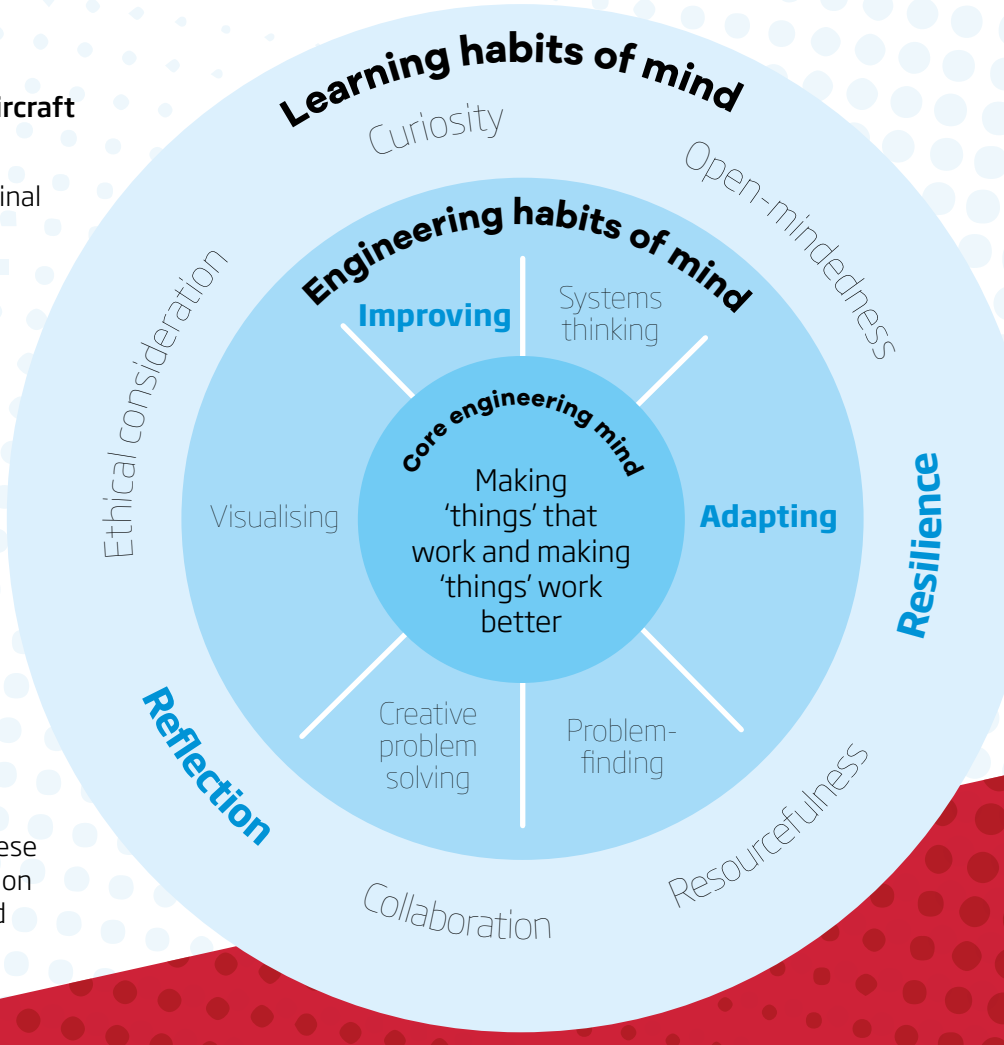
Which aircraft travelled further? Why do you think this is?

Iterative Design

This is the iterative design process that engineers go through to solve problems such as building an aircraft.

By building and testing a prototype, engineers are able to look at what worked and what didn't.

They then use what they learnt from these tests to develop a second and third version that improves each time, just like you did with the paper aircraft.



Royal Academy of Engineering

The Royal Academy of Engineering is harnessing the power of engineering to build a sustainable society and an inclusive economy that works for everyone.

In collaboration with our Fellows and partners, we're growing talent and developing skills for the future, driving innovation and building global partnerships, and influencing policy and engaging the public.

Together we're working to tackle the greatest challenges of our age.

What we do

Talent & diversity

We're growing talent by training, supporting, mentoring and funding the most talented and creative researchers, innovators and leaders from across the engineering profession.

We're developing skills for the future by identifying the challenges of an ever-changing world and developing the skills and approaches we need to build a resilient and diverse engineering profession.

Innovation

We're driving innovation by investing in some of the country's most creative and exciting engineering ideas and businesses.

We're building global partnerships that bring the world's best engineers from industry, entrepreneurship and academia together to collaborate on creative innovations that address the greatest global challenges of our age.

Policy & engagement

We're influencing policy through the National Engineering Policy Centre – providing independent expert support to policymakers on issues of importance.

We're engaging the public by opening their eyes to the wonders of engineering and inspiring young people to become the next generation of engineers.

ROYAL AIR FORCE Youth STEM

The RAF Youth STEM programme is designed to engage and inspire young people by building their interest in engineering and technical career pathways.

From cyber specialists to aerospace, aviation, electronics, and mechanical disciplines, the RAF is committed to widening participation in STEM, extending opportunities to all, and encouraging greater diversity in this critical area of national skills shortages.

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