AIMING FOR AWESOME

1918 2018

Aircraft design

Student's Guide

ROYAL ACADEMY OF ENGINEERING

RAF 100

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?

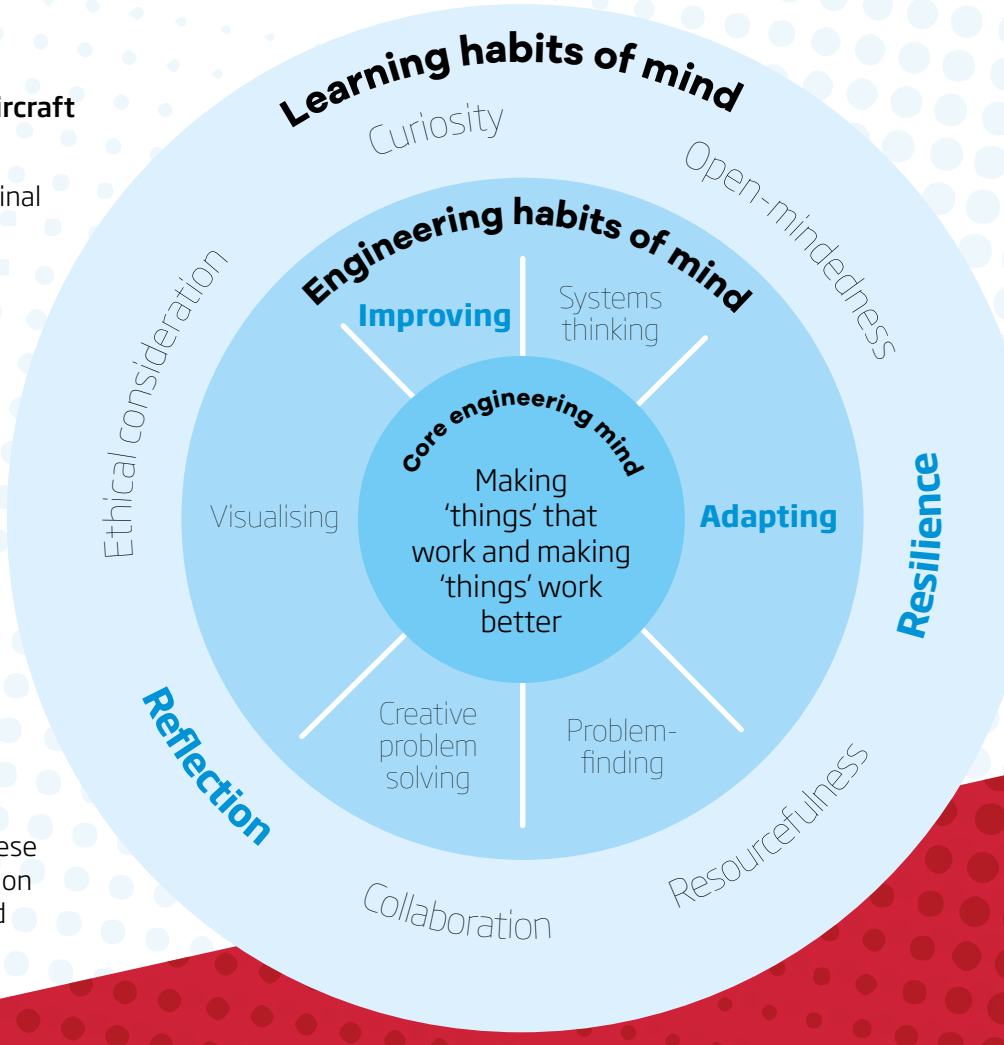
Which aircraft travelled further? Why do you think this is?

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

Royal Academy of Engineering

As the UK's national academy for engineering, we bring together the most successful and talented engineers for a shared purpose: to advance and promote excellence in engineering.

We have four strategic challenges:

Make the UK the leading nation for engineering innovation

Supporting the development of successful engineering innovation and businesses in the UK in order to create wealth, employment and benefit for the nation.

Address the engineering skills crisis

Meeting the UK's needs by inspiring a generation of young people from all backgrounds and equipping them with the high quality skills they need for a rewarding career in engineering.

Position engineering at the heart of society

Improving public awareness and recognition of the crucial role of engineers everywhere.

Lead the profession

Harnessing the expertise, energy and capacity of the profession to provide strategic direction for engineering and collaborate on solutions to engineering grand challenges.

RAF 100

The RAF 100 Youth & STEM programme has been 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 using our centenary celebrations to extend opportunity to all and to encourage greater diversity in this critical area of national skills shortages.

Royal Academy of Engineering
Prince Philip House, 3 Carlton House Terrace, London SW1Y 5DG
Tel: +44 (0)20 7766 0600
www.raeng.org.uk
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