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AEROSPACE IN CLASS LEARNING SCENARIO

Future of the Skies: Future of Commercial Aviation

European Schoolnet

Funded by the **Airbus Foundation** and coordinated by **European Schoolnet** (EUN – the network of 34 European Ministries of Education), the **Aerospace in Class Project** is about piloting STEM resources from the **Airbus Foundation Discovery Space**, a digital portal for aerospace exploration, connecting students, parents and educators across the globe with professionals in the field, bringing today's research and technology to life. The creation of this Learning Scenario is supported the **STEM Alliance** (an initiative that brings together industries, Ministries of Education, and education stakeholders to promote STEM education and careers to young Europeans) and by **Scientix**, funded from the European Union's H2020 research and innovation programme – project Scientix 4 (Grant agreement N. 101000063). The content of the document is the sole responsibility of the organizer and does not represent the opinion of the European Commission (EC), nor is the EC responsible for any use that might be made of the information contained.

Future of the Skies: Future of Commercial Aviation

By Natalija Budinski

Abstract

This Learning Scenario introduces students to aircraft constructions through mathematical content, particularly geometry. Students will put mathematics in real-life context and through creativity express their vision about the future of aircrafts. They will use paper folding, Minecraft, and creative scientific writing to explore ideas and learn the basics of aircraft constructions.

Keywords

Mathematics, Geometrical Shapes, Aircraft, Paper Folding, Scientific Writing

Table of summary	
Subject	*Mathematics, Science, Technology*
Topic	*Geometry*
Age of students	*9-10 years old*
Preparation time	*Ca. 30 minutes*
Teaching time	*50 minutes*
Online teaching material	*Airbus Foundation Discovery Space videos* *Minecraft (https://www.minecraft.net/en-us/)*
Offline teaching material	*Paper, scissors, colour pencils, posters* *Option to use a toy plane to discuss which parts a plane consists of.*
Airbus Foundation Discovery Space resources used	*Future of Aviation* *The History of Flying*

Integration into the curriculum

This lesson can be used in maths classes for teaching basic geometrical shapes and measurements. Students learn about squares, triangles and the square diagonal while designing their airplanes by paper folding. They also learn about measurements and comparison of the measurements, for example, how big an object is.

Aim of the lesson

- Basic geometrical shapes
- To connect a real-life situation and objects, such as airplanes, with mathematics
- To connect mathematics, art and design
- Creative and critical thinking

Outcome of the lesson

- Knowledge of geometrical shapes
- Knowledge of measurements for length
- Knowledge in scientific literacy
- Information about designing a plane
- Presentation of students' ideas about future planes (stories, paper models, Minecraft models, 3D printed models)

Trends

- **Project-based learning**: students get fact-based tasks, problems to solve and they work in groups
- **Student-centred learning**: students and their needs are at the centre of the learning process
- **Edutainment**: playful learning while having fun

21st century skills

- **Critical thinking**
- **Creativity**
- **Communication**

The learning scenario will support **critical thinking** while students learn how to connect geometry and real life as well as plane creations. Students will learn what is the most important about plane construction, in particular, safety and weight. To conclude more about plane construction, students need to critically think about scientific facts such as the weight of materials or the shape of the plane. The activities will also support **creativity**, since students will explore their ideas about what planes will look like in the future. They need to employ their imagination and creatively express themselves. During the whole process, especially in the part of expressing their ideas, students need to **communicate** and use and develop their language abilities to present their ideas and connections to the real-life situation.

Activities

Activity	Procedure	Time
Introduction	Students watch the video: "Future of Aviation". The video offers information on what planes might look like in the future. In case the students do not speak English well, the teacher can prepare a poster presentation that follows the video in the students' mother tongue.	5 min
Observing plane measurements	In order to work on students' ideas about future planes, the teacher can also bring a toy plane, so that students can discuss which parts a plane consists of, such as engines, wings and wheels (see Parts of a Plane). The teacher shows the students the measurements and sizes of the plane (see Annex 1 – Measurements of a Plane). For example, how much are 30 meters in comparison to the size of objects they can see, like the classroom or the school. In this part, students also take into account mathematics, such as measurements. Students need to understand, for example, what is one meter and that a plane can be up to 70 meters long.	5 min
Folding a plane	Students will receive a template to fold a plane from paper. The origami techniques will help students to better	10 min

Activity	Procedure	Time
	understand basic geometrical shapes, such as squares, diagonals, the length of the square side, triangles as well as left or right sides. A summary sheet on geometrical shapes can be found in Annex 2. There will be two kinds of templates provided to the students: easy and advanced (see Annex 3 and Annex 4), depending on the students' manual skills. Annex 5 offers a step-by-step template following photographic images instead of diagrams, if students find it easier to follow.	
Designing a plane for the future	Students will use their paper models and discuss what should be added to the planes in the future to improve plane design. Working in groups, they create possible planes of the future. Students can colour their paper planes or glue additional parts to them. At the end of this part, students will exhibit their work and describe how planes would look in the future. While describing, students need to refer to geometrical shapes and measurements. This is the way to practice and connect science knowledge with literacy.	25 min
Final part and homework[1]	If there is the possibility, the teacher can give the homework for students to design planes in Minecraft or another design programme (see Annex 6 for a possible solution). If a 3D printer is available, students can create models for a 3D printer together with the teacher and then 3D print in the next lesson. 3D modelling could be applied trough one or two models, depends on possibilities.	5 min

About the Aerospace in Class Project

The "Aerospace in Class" Project is about integrating STEM resources from the Airbus Foundation Discovery Space in classes for 8- to 12-year-old students. The project is funded by the **Airbus Foundation** which is committed to bringing together the products and people of the global aerospace company Airbus to help address the challenges of today's society. Youth development is one of the pillars upon which the Airbus Foundation is built, empowering young people for the challenges of tomorrow. The **Airbus Foundation Discovery Space** is a digital portal for aerospace exploration, connecting students, parents and educators across the globe with professionals in the field, bringing today's research and technology to life. **European Schoolnet** is coordinating this project. EUN is the network of 34 European Ministries of Education, based in Brussels, which aims to bring innovation in teaching and learning to its key stakeholders: Ministries of Education, schools, teachers, researchers, and industry partners.

The "Aerospace in Class" Project has also been supported by the STE(A)M Partnerships programme of Scientix, funded from the European Union's H2020 research and innovation programme – project Scientix 4 (Grant Agreement N. 101000063), coordinated by European Schoolnet (EUN). The content of the document is the sole responsibility of the organizer and it does not represent the opinion of the European Commission (EC), and the EC is not responsible for any use that might be made of information contained.

[1] There is a possibility that younger students might need more time to implement this L.S., especially if they have never encountered before similar activities.

Annex 1: Measurements of a Plane

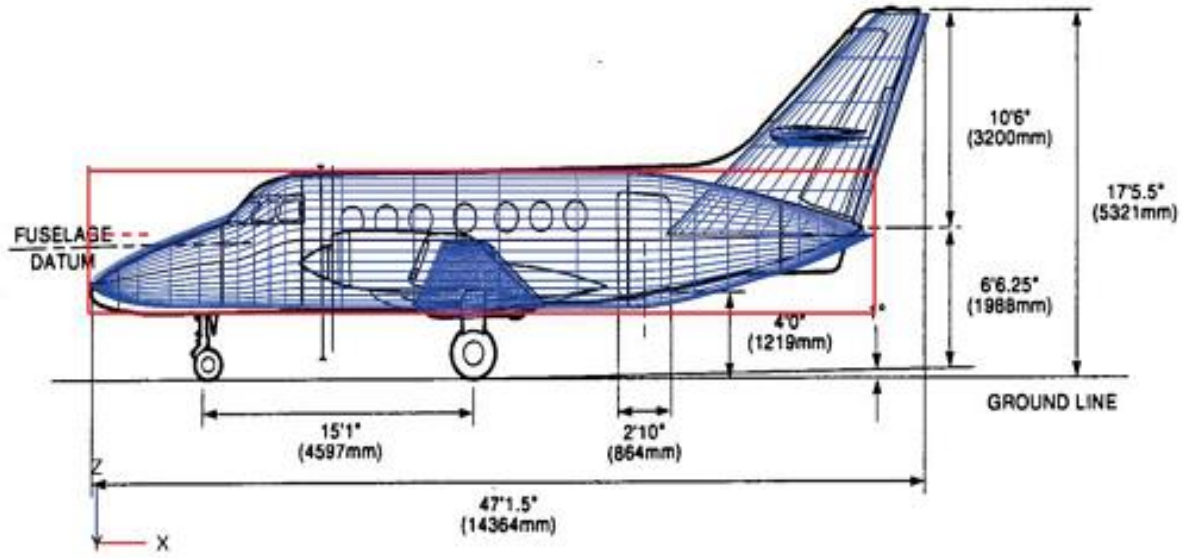
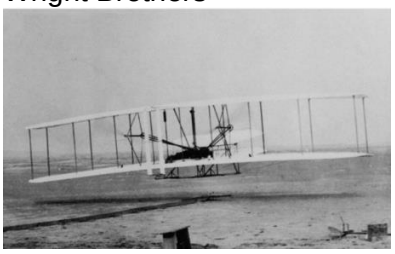
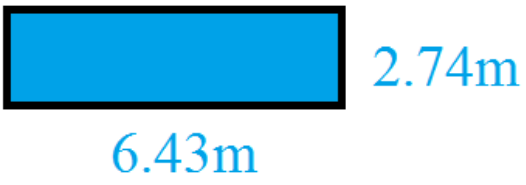
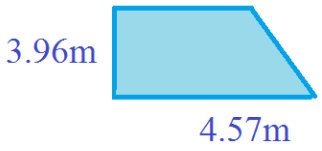
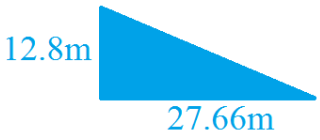
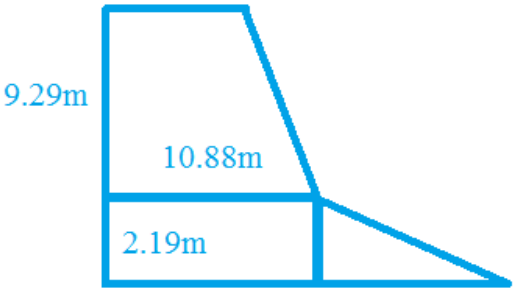


Figure 1: British Aerospace. Jetstream 31 Maintenance Manual; British Aerospace: Farnborough, UK, 1982 See https://www.mdpi.com/2226-4310/6/10/107/htm

Annex 2: Geometrical Shapes of Planes

AEROPLANE	Geometrical Shapes of Wing	Shape
Wright Brothers 	Rectangle	
Blue Angel F-18 	Trapezoid	
Concord 	Right angle triangle	
Space Shuttle 	Compound	

Pictures source: https://commons.wikimedia.org/

Annex 3: Paper Plane Folding Instructions (Easy)

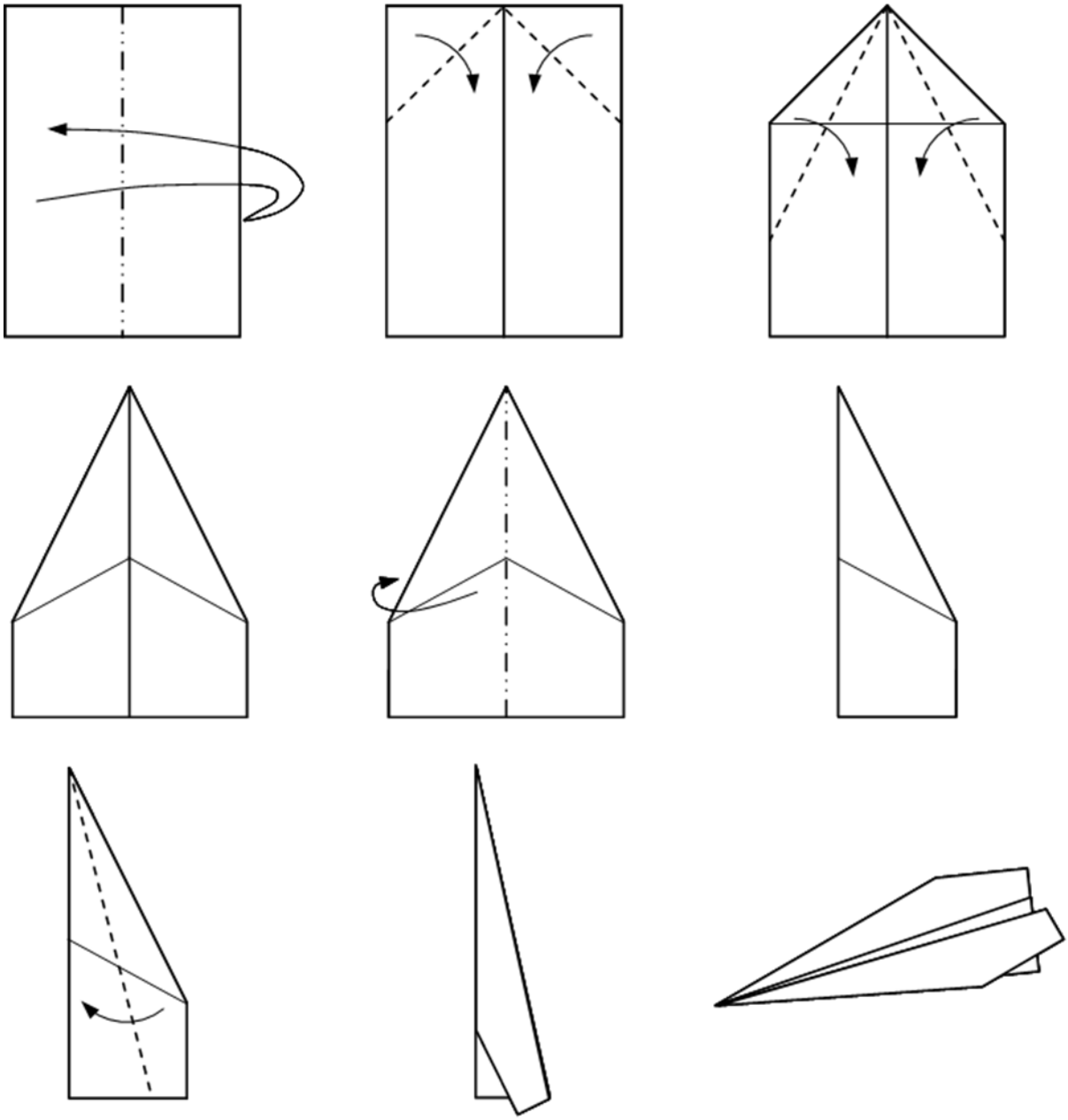


Figure 2: Ushakaron / CC0

Annex 4: Paper Plane Folding Instructions (Advanced)

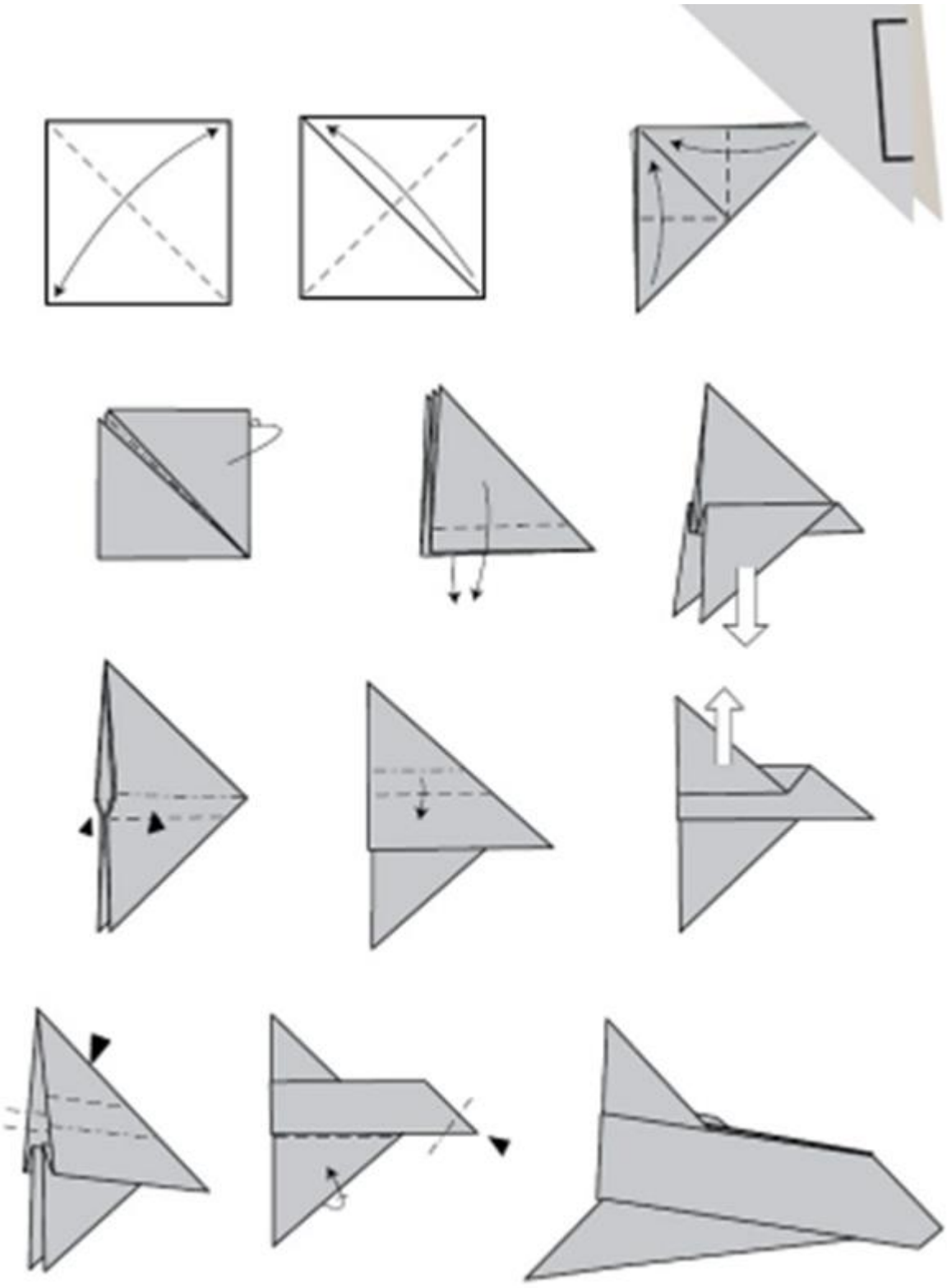


Figure 3: Source: http://www.aviationexplorer.com/paper_airplanes.html

Annex 5: Paper Plane Folding Instructions with Photos Instead of Diagrams

Folding instructions

Step 1

Step 2

Step 3

Step 4

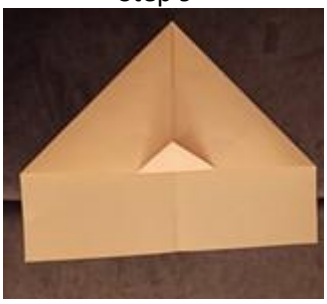
Step 5

Step 6

Step 7

Step 8

Step 9



Step 10

Step 11

Step 12

Credits: Natalija Budinski CC-BY

Annex 6: Possible Minecraft solution of a plane of the future

Figure 4: Credit Budinski CC-BY