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FLIGHT CONSIDERATIONS

| SuperNOVA | 1 Hour | Grade 7-8

OVERVIEW

Description
Participants will learn about the main types of Aviation fuel, evaluating each on a variety of criteria.

Learning Outcomes
- Understanding traditional aviation fuel properties
- Understanding the benefits and properties of SAF
- Critically comparing SAF to traditional fuels

Outline *(with time indications/estimations)*
1. Introduction (**10 minutes**)
    a. Discuss types of aviation fuel
    b. Introduce sustainable aviation fuel (SAF)
    c. Importance of sustainability
2. Group: comparing fuels (**20 minutes**)
    a. Read fuel fact sheets
    b. Fill in fuel comparison table
3. Discussion (**10 minutes**)
    a. Ask guiding questions on the groups findings
4. Reflection (**15 minutes**)
5. Debrief (**5 minutes**)

Materials

Item (*be very descriptive*)	**Quantity Per Child** (*with units*)	**Quantity Per Class** (*with units*)
• Fuels fact sheet (Display)	• N/A	• 1
• Lined paper	• 1	• N/A
• Pencil	• 1	• N/A

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SAFETY CONSIDERATIONS

- Precautions for Instructor and Participants.
- Please use caution, and explain each safety measure to the participants. Ensure any incidents are reported appropriately.
- Indicate with an 'x' next to the items that apply to this activity.

Material/Chemical Safety	
	SDS Required (*attach in write up)*
	Electrical Components
	Food &/or Potential Allergens
	Other:
Equipment Precautions	
	Sharp Objects: Scissors/ Staplers/ Scalpel
	Burn Risk: Glue Guns/ Hot Plate/ Flame
	Tools
	Other:

Digital Safety [ ] Yes [ ] No	
Special Clean-up Required? (indicate below)	
Safety Equipment or Protection	
	Goggles/ Gloves
	Lab Coat
	Fire Extinguisher
	Other:
Other Safety Precautions? (indicate below)	

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KEY INFORMATION

Information on the activity topic(s) that is necessary for the Instructor to be familiar with. ***(Suggested 300 words)***

Topic 1: Jet fuel is a type of fuel used in airplanes to power their engines and keep them flying. It's similar to the gasoline cars use, but it's specifically designed for high-performance engines that need to work at very high speeds and altitudes. Jet fuel is made from refined oil, and it's much more stable than regular fuel, meaning it can handle extreme temperatures, both hot and cold, that planes experience during flights. There are different types of jet fuel, with the most common being Jet A-1, which is used in commercial planes. This fuel is critical for long-distance flights and air travel, as it provides the energy needed for planes to take off, cruise, and land safely. It's also an important part of the aviation industry's efforts to become more sustainable by finding ways to reduce emissions and use cleaner energy sources, like Sustainable Aviation Fuel (SAF).

Topic 2: Jet Fuel A, A-1, and B are all types of aviation fuels, but with key differences. Jet Fuel A is a kerosene-based fuel primarily used by the U.S. military, with a lower freezing point (-40°C) compared to Jet A, but it's less common in commercial aviation. Jet Fuel A-1 is the most widely used jet fuel in commercial aviation, offering a lower freezing point (-47°C) for better performance at high altitudes and colder temperatures, and it meets international fuel standards. In contrast, Jet Fuel B is a blend of kerosene and gasoline, designed for extreme cold-weather operations, with a freezing point as low as -60°C, but it is more volatile and hazardous to handle, making it suitable mainly for military and specialized applications.

Topic 3: Sustainable Aviation Fuel (SAF) is a type of biofuel made from renewable resources, designed to replace traditional jet fuel and reduce the environmental impact of aviation. SAF can be produced from various feedstocks, including plant oils, algae, and waste materials like used cooking oil. It is chemically similar to conventional jet fuel but has a much lower carbon footprint, as it can reduce greenhouse gas emissions by up to 80% over its lifecycle. SAF is important because the aviation industry is a significant source of carbon emissions, and using SAF can help reduce these emissions while still supporting the growth and demands of air travel. It plays a key role in efforts to decarbonize aviation and meet global climate goals, as the industry seeks alternatives to fossil fuels for more sustainable operations.

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LESSON PLAN AND PROCEDURE

- *Should reflect Overview-Outline.*
- *Include any necessary inclusion and/or adaptation information.*
- *Refrain from including additional background information on the topic, instead refer back to the Key Information section, where necessary.*
- *Make note if anything needs to be prepared beforehand.*

Title

1. Introduction
    a. Discuss types of aviation fuel
    b. Introduce sustainable aviation fuel (SAF)
    c. Importance of sustainability
2. Group: Comparing Fuels
    a. Hand out a pencil and a piece of lined paper to every student.
    b. Have students in groups of 4 make Table 1 (found in Appendix)
    c. Have participants read the fuel factsheet and as a class or in groups of 4, fill in the remainder of the table.
3. Discussion
    a. Have each group present their key findings about SAF compared to traditional jet fuel
    b. As a class ask these questions, to be answered by raised hands
        i. What fuel type is best in the coldest climate?
        ii. What fuel is the most expensive?
        iii. Why is SAF considered to be a more environmentally friendly choice?
4. Reflection
    a. Hand out a piece of lined paper to every student.
    b. On the paper, give students 15 minutes to answer this prompt
        i. If you were the CEO of an airline company, would you implement SAF into your airline? Why or why not?
5. Debrief
    a. Recap introduction information
    b. Ask student if anyone would like to share their reflection

Debrief

- *Any concluding remarks and/or points of reflection*
- *Recap or review of material relating to key learning outcomes*
- *Application/ 'further connections' questions*

SuperNOTE

One sentence summary of activity, including basic learning outcomes.

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REFERENCES & RESOURCES

Topic A

- https://jettly.com/post/types-of-jet-fuel
- https://en.wikipedia.org/wiki/Jet_fuel
- https://skynrg.com/sustainable-aviation-fuel/#:~:text=Is%20there%20enough%20sustainable%20aviation,compared%20to%20traditional%20jet%20fuel.

Topic B

- Link a

DOCUMENT TITLE NAMING CONVENTION

Title

Be concise, but descriptive. The Title *must* reflect the title in the write up document itself, the SuperNOTE, and the camp schedule.

Table 1:

Properties	Jet A	Jet A-1	Jet B	SAF
Safety Considerations				
Environmental Impact				
Freezing Point (°C)				
Flash Point (°C)				
Cost ($)				
Availability				