Introduction to Military Aviation

Session Time: One, 50-minute session

DESIRED RESULTS

ESSENTIAL UNDERSTANDINGS

Understand the operational differences between general, commercial, and military aviation as well as how these differences influence the modern aviation/aerospace industry. (EU2)

Develop interest in one or more aviation/aerospace career pathways and learn what is required to pursue future employment in the industry. (EU3)

ESSENTIAL QUESTIONS

1. How does military aviation compare to other segments of aviation in the United States?
2. What roles and missions are a function of military aviation?
3. What kinds of challenges and opportunities does military aviation face now and what challenges will it face in the future?

LEARNING GOALS

Students Will Know

- The characteristics of military aviation and its various missions
- Careers available in military aviation

Students Will Be Able To

- *Identify* and *explain* military aviation (DOK-L2)
- *Explain* and *analyze* the important roles played by military aviation (DOK-L3, L4)
- *Compare* and *contrast* the roles and function of various military aircraft (DOK-L3)

ASSESSMENT EVIDENCE

Warm-up
Students provide a written response to a question about the role of the military in securing U.S. airspace.

Formative Assessment
Using a map of the United States, students will identify locations where it would be most critical that military secure the airspace. They will provide reasons for their answers.

Summative Assessment
Students write answers to questions about the types of military missions, types of military aircraft and military career options.

LESSON PREPARATION

MATERIALS/RESOURCES

- Introduction to Military Aviation Presentation
- Introduction to Military Aviation Student Activity 1
- Introduction to Military Aviation Student Activity 2
- Introduction to Military Aviation Student Activity 3
- Introduction to Military Aviation Teacher Notes

LESSON SUMMARY

Lesson 1: Introduction to Commercial Aviation
Lesson 2: Introduction to Military Aviation
Lesson 3: Introduction to General Aviation

This lesson introduces the characteristics of military aviation and the concept of airpower. To begin the class, teachers will hold a discussion with students about the importance of securing the airspace over the United States. A class discussion will define military aviation, its scope, and its primary missions. Students will then complete an activity that refers to a list of missions that military aviation must accomplish and identify the types of aircraft that might be used in those missions. Students will also learn about several military career options.

As a formative assessment, students will use a map of the United States to identify locations where it would be most critical that military secure the airspace. They will provide reasons for their answers.

This lesson is intended as a baseline introduction to military aviation. This topic will receive more in-depth coverage later in the year.

BACKGROUND

In the United States, aviation is divided into three distinct categories: commercial, military, and general aviation.

Military aviation is used to defend the nation and its interests, and consists of the aircraft that enable or conduct aerial warfare. This lesson focuses on the main categories of military aircraft: bomber/attack, fighter, reconnaissance, and transport/tanker.

These aircraft are used in the exercise of airpower, which is defined as the application of military strategy to the realm of aerial warfare. Aerial military applications were realized as early as the 18th century when the French Republic used a balloon as a means of observation in the Battle of Fleurus. The modern day idea of airpower emerged in the early 20th century as powered flight first became practical. The impact of airpower can be observed as early as World War I when powered, heavier-than-air aircraft were used initially for reconnaissance. Rapid advancements expanded the application of the new faster and stronger aircraft supporting bomber/attack and fighter roles. As advancements continued, airpower became a deciding factor in determining the results of global conflicts, from World War II to the present day.

MISCONCEPTIONS

Military aviation is not only used offensively but also a defense, protecting the U.S. mainland in the case of unapproved aerial incursion.

DIFFERENTIATION

To promote vocabulary development, review this lesson to identify words that may not be familiar to students, such as reconnaissance. Use vocabulary techniques such as displaying unfamiliar words and definitions on a word wall or modeling how the word is used in the proper context.

To promote goal setting in the discussion about military aviation careers, encourage students to document their goals for future employment in the aviation industry and a plan to achieve them.

LEARNING PLAN

ENGAGE

Teacher Material: Introduction to Military Aviation Presentation

Use the presentation to define military aviation, its scope and its primary missions.

Slides 1-3: Introduce the topic and learning objectives for today's lesson.

Slide 4: Conduct the **Warm-Up.**

Before collecting student papers, ask for volunteers to share their responses with the class. This assessment is worth 5 points. [DOK 2; infer, summarize]

Possible Answer: Aircraft have a faster response time to potential threats than any ground unit; They have superior reconnaissance value given the elevated position where they are able to see for miles.

Warm-Up

Pose the following questions to students and ask them to write their responses on their own paper.

- What are two major reasons why it is important for military aviation to play a role in securing airspace over the United States?

EXPLORE

Teacher Material: Introduction to Military Aviation Presentation

In this lesson, students will gain an understanding of what military aviation is, the types of missions it flies, and the aircraft it uses. Use **Introduction to Military Aviation Presentation** to define military aviation, its scope and its primary missions.

Slides 5-8: Introduce the concept of military aviation and how much of the U.S. aircraft fleet is classified as military.

Inform students that today's discussion will address one category of aviation, military aviation. Lesson 1 addressed commercial aviation. Lesson 3 will address general aviation.

General definitions of the three categories of aviation are:

- Commercial aviation consists of scheduled (daily, posted flights) and non-scheduled (custom scheduled to meet customer's needs) flights that carry passengers and cargo for compensation.
- Military aviation is used to defend the nation and its interests, and consists of the aircraft that enable or conduct aerial warfare.

- General Aviation is comprised of the operations that do not fall into commercial air carrier, or military operations: Flight instruction, corporate/business aviation, survey and inspection, law enforcement.

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These aircraft are used in the exercise of airpower, which is defined as the application of military strategy to the realm of aerial warfare. Aerial military applications were realizes as early as the 18th century when the French Republic used a balloon as a means of observation in the Battle of Fleurus. The modern day idea of airpower emerged in the early 20th century as powered flight first became practical. The impact of airpower can be observed as early as WWI when powered, heavier-than-air aircraft were used initially for reconnaissance. Rapid advancements expanded the application of the new faster and stronger aircraft supporting bomber/attack and fighter roles.

EXPLAIN

Teacher Material: Introduction to Military Aviation Presentation, Introduction to Military Aviation Teacher Notes

Student Material: Introduction to Military Aviation Student Activity 1

Provide students with Introduction to **Military Aviation Student Activity 1**. As you are presenting the slides, guide students through the process of filling out the activity. Refer to the Introduction to **Military Aviation Teacher Notes** for answers.

Slides 9-18: Explain to students that the military missions listed on slide 9 are the types of missions that military aircraft perform. The following slides will discuss the types of aircraft in the U.S. fleet that can carry out these types of missions.

Explain that all of these military aircraft are used in the exercise of airpower, which is defined as the application of military strategy from air and space in order to achieve a specific objective, such as preventing enemy aircraft from entering airspace over the U.S. or using aircraft to take out an enemy target on the ground. The idea of airpower emerged in the early 20th century as powered flight first became practical.

Fighters keep enemy aircraft out of the sky and destroy the enemy's ability to wage war.

Reconnaissance aircraft find out where the enemy is and what they are doing. Emphasize to students that a reconnaissance aircraft can be either a traditional aircraft or a drone. Show students a video of a reconnaissance airplane in action.

- Inside a U.S. Spy Plane (Length 2:39)
  http://video.link/w/WEJd

Teaching Tips

Vocabulary Check

Ensure that students fully understand the term, reconnaissance which is the act of acquiring information about an area for military purposes.

Bombers and Attack aircraft destroy the enemy's ability to wage war.

Transport and Tanker aircraft move supplies and troops. They also extend the range of other aircraft by refueling them. Show students a video of an in-air refueling mission.

- Boeing KC-46A Tanker: Refuels Military Aircraft Using 3D

  http://video.link/w/ZEJd

Slides 19: Present several career options available in military aviation.

- Air Traffic Control - Controls airspace and air traffic flow at military installations domestically and abroad.
- Unmanned aircraft systems
  - Pilot - Remote pilots unmanned systems across the globe via satellite control
  - Sensor/Weapons operators - Controls the sensors, cameras, and weapons on board remotely piloted systems.
- Aircrew
  - Pilots - Fly and navigate military aircraft.
  - Systems specialists - Operate and manage the complex auxiliary equipment on board (sensors, weapons, payloads, and refueling booms).
- Ground Support
  - Maintenance - Airframe, powerplant, avionics, and systems maintainers all work together to ensure aircraft are fully functional.
  - Weapons and Armament - Specialists ensure that the offensive and defensive weapons are working and loaded for the mission.
- Special Operations - Highly trained teams including pilots and specialist who have specific and complex missions including search and rescue, insertion, and extraction.

Have the students discuss which of these or other careers in military aviation that interest them.

EXTEND

Teacher Material: Introduction to Military Aviation Presentation

Student Material: Introduction to Military Aviation Student Activity 2

Slide 20: Conduct the **Formative Assessment.**

In the presentation, we discussed the various types of aircraft and how they help the United States accomplish missions. Remind students of the missions and answer any questions they may have.

- Keep enemy aircraft out of the sky
- Find out where the enemy is and what they're doing
- Destroy the enemy's ability to wage war
- Move supplies and troops
- Extend range by keeping aircraft fueled

Give students 10 minutes to complete the worksheet. Before collecting the worksheet, ask volunteers to share their work with the class. This assessment is worth 10 points. [DOK3; hypothesize, explain]

Possible answers to **Military Aviation Student Activity 2** are below:

Regions that may be circled: Borders, large cities, Washington DC, major cities on the west coast and east coast.

Reasons include: More vulnerable to enemies than the middle of the United States, large cities have larger populations and are often hubs of business, industry, and government. Washington DC is the capital, providing an important target for enemies. The coasts offer quicker escapes to potential enemies.

Types of military aircraft securing these locations: Fighter could be involved close to Washington DC or large cities to take down potential threats. Reconnaissance aircraft may patrol borders or coasts. Tankers may be flown near a coast.

Formative Assessment

Provide each student Introduction to **Military Aviation Student Activity 2**.Ask students to circle regions on the map where they think military aviation would be most involved in securing. For each region circled, they should briefly explain why they think military aviation would be most involved in securing those regions. For each region students should name the types of military aircraft that would be involved in securing those locations.

EVALUATE

Teacher Material: Introduction to Military Aviation Presentation
Student Material: Introduction to Military Aviation Student Activity 3

Slide 21: Conduct the **Summative Assessment.**

Provide students with the opportunity to ask questions that they have before completing the summative assessment. Collect the assessments from the students at the end of class. This assessment is worth 10 points. [DOK 1; recall, DOK 2; summarize]

Possible Answers to Summative Assessment:

What are two kinds of missions that military aviation must conduct? Briefly explain each.

Missions that the military conducts are: Keep enemy aircraft out of the sky, find out where the enemy is and what they are doing, destroy the enemy's ability to wage war, move supplies and troops, and extend range by keeping aircraft fueled.

What are three kinds of military aircraft and what kinds of missions do they perform?

Bomber/attack: Destroy the enemy's ability to wage war.
Fighter: Keep enemy aircraft out of the sky.
Reconnaissance: Find out where the enemy is and what they are doing.
Transport: Move supplies and troops.
Tanker: Extend range by keeping aircraft fueled.

What career options are there in military aviation? List three.

Air Traffic Control - Controls airspace and air traffic flow at military installations domestically and abroad.

UAS - Remote pilots fly unmanned systems across the globe via satellite control.

UAS - Sensor/ weapons operators control the sensors, cameras, and weapons on board remotely piloted systems.

Aircrew - Pilots fly and navigate military aircraft.

Aircrew - Systems specialists operate and manage the complex auxiliary equipment on board (sensors, weapons, payloads, and refueling booms).

Ground Support - Maintenance - Airframe, powerplant, avionics, and systems maintainers all work together to ensure aircraft are fully functional.

Ground Support - Weapons and Armament - Specialists ensure that the offensive and defensive weapons are working and loaded for the mission.

Special Operations - Highly trained teams including pilots and specialist who have specific and complex missions including search and rescue, insertion, and extraction.

Summative Assessment

Provide each student with Introduction to **Military Aviation Student Activity 3.** Allow students to use their notes to complete the assessment.

GOING FURTHER

Gauge student interest in the various types of aircraft and give them the opportunity to learn more about some of the top military planes in use and their capabilities. Use this opportunity to allow students to classify these types of aircraft according to the categories discussed in the lesson. Show the following video:

- Top 10 Military Planes (Length 9:06)

  http://video.link/w/qNKd

STANDARDS ALIGNMENT

NGSS STANDARDS

Three-dimensional Learning

- **HS-ETS1-1** - Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.
  - Science and Engineering Practices
    - Asking Questions and Defining Problems
    - Constructing Explanations and Designing Solutions
  - Disciplinary Core Ideas
    - ETS1.A: Defining and Delimiting Engineering Problems
  - Crosscutting Concepts
    - Systems and System Models
    - Influence of Science, Engineering, and Technology on Society and the Natural World
- **HS-ETS1-3** - Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics as well as possible social, cultural, and environmental impacts.

- Science and Engineering Practices
  - Constructing Explanations and Designing Solutions
- Disciplinary Core Ideas
  - ETS1.B: Developing Possible Solutions
- Crosscutting Concepts
  - Influence of Science, Engineering, and Technology on Society and the Natural World

COMMON CORE STATE STANDARDS

- **RST.9-10.2** - Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.
- **RST.9-10.4** - Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 texts and topics.
- **WHST.9-10.2** - Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.
- **WHST.9-10.6** - Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.
- **WHST.9-10.8** - Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation.
- **WHST.9-10.9** - Draw evidence from informational texts to support analysis, reflection, and research.

REFERENCES

http://www.lockheedmartin.com/us/what-we-do/aerospace-defense.html
http://www.boeing.com/defense/
http://www.military.com/equipment/military-aircraft
http://index.heritage.org/military/2017/assessments/us-military-power/u-s-air-force https://www.airforce.com/careers/browse-careers/aircraft-flight.