Lesson Plan 4: Aviation Maintenance Technicians

Title: I Can Fix That!

Aerospace Workforce Educator Program lessons are designed to help students build the foundational skills needed for aviation careers while gaining early awareness of the many professions that support our aviation system. Each lesson introduces core concepts—such as navigation, communication, safety, design, or problem-solving—and connects them directly to the real work of pilots, air traffic controllers, drone operators, maintenance technicians, airport specialists, and other aviation professionals. By making these connections visible and age-appropriate, educators can help students see how classroom learning links to real careers and inspires interest in fields they may not yet know exist.

Grade Level: Varies
Primary STEM Skill Focus Area: Inquiry Skills
NextGen Science Standards: 3-5-ETS1 Engineering Design

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1. Lesson Objectives

Students will be able to:

- Describe how Aviation Maintenance Technicians use inquiry and other STEM skills in their jobs
- Explain why aircraft maintenance is important to safety
- Describe key Aviation Maintenance Technicians' responsibilities
- Identify some of the tools and technologies that Aviation Maintenance Technicians use on the job

2. Overview

This lesson introduces students to the careers and responsibilities of Aviation Maintenance Technicians. In addition, the lesson reviews why aircraft maintenance is important, describes the different aircraft systems that technicians work on, and talks about the tools and skills technicians use to keep aircraft safe.

The presenter, an Educator, will engage the students in a two-way discussion on the important safety tasks that technicians perform, and discuss which systems must be inspected and maintained to maintain safety.

The Educator will also review the newer field of avionics, the role it plays in aircraft maintenance, and discuss how advanced technologies like artificial intelligence (AI), augmented reality (AR), and machine learning help technicians predict failures and address them before they cause issues.

3. Resources

This section includes resources for the Educator to review before the lesson.

Table 1 lists key terms.

Table 2 includes resources to help Educators get up to speed on the topic. These are intended to serve as background information.

Table 3 lists possible resources to share with students as part of the lesson. Educators should review the resources and links in advance of the lessons to ensure the content is consistent with school policies and security protocols before presenting them to students.

Table 1. Terms to Know

Term	Definition
Aircraft	An airplane, helicopter, airship, and other machines that can fly through the air.

Term	Definition
Airframe	The mechanical structures of an aircraft that include wings, fuselage, landing gear, and all control surfaces.
Aviation or Aircraft Maintenance	The use of an aviation maintenance technician's skills to maintain and repair aircraft.
Airworthiness	The aircraft that conforms to its design and is in good condition for safe operation and flying.
Avionics	Avionics are the electronic systems used on aircraft, artificial satellites, and spacecraft.
Flight Control	Flight control includes flight control surfaces, cockpit control, related linkages and the essential operating mechanism to switch an aircraft's track or maneuver in flight and on the ground.
Hydraulics (Landing Gear)	Hydraulic systems are used on aircraft to move landing gear, flaps, and brakes.
Logbook	The record of information about the work done during the maintenance, completed by the maintenance technician every time they work on the aircraft.
Aircraft Engine	An engine that is used or intended to be used for propelling aircraft.

Table 2. Potential Materials for Use During the Lesson

Video Title	Length	Source	Platform	Description
1. FAA TV: Helping Students Take Off with a Great Career in Aviation	11:34	FAA	FAA Website	The FAA gives an inside look at the many opportunities available in the field of aviation maintenance.
2. Dirty Dozen - Common Causes of Mistakes in the Aviation Workplace	N/A	FAA	FAA Website	Pamphlet that identifies the 12 Common Causes of Mistakes in the Aviation Workplace
3. Maintenance Dirty Dozen Quiz	N/A	FAA	FAA Website	Short quiz on page 30 of the Jan/Feb 2021 edition of the FAA Safety Briefing
4. Aviation High School - An FAA Certified CTE Aircraft Maintenance High School	3:01	Aviation High School	YouTube	FAA Certified Part 147 Aviation Maintenance Technician School.
5. Become an Aviation Mechanic | Federal Aviation Administration	N/A	FAA	FAA Website	Learn about becoming an FA Aviation Mechanic.

4. Activate Prior Knowledge (5 minutes)

The questions below are suggested prompts to introduce the lesson. Educators should modify these questions to align with their audience, community, and personal experiences.

- Who would you ask for help in fixing a car if it broke down?
- Why do airplanes need maintenance just like cars?
- Who do you think fixes aircraft or keeps them safe before they break down?

- Why is it important for aircraft to have regular inspections?
- What types of tools and technologies do technicians use on an aircraft?

5. Instructional Sections

The lesson sections listed below provide talking points to help Educators deliver a consistent message about the career paths of aviation maintenance technicians.

Educators should modify these sections and the suggested timing to align with the audience, their community, and their personal experience. The section also includes links back to some of the items listed in the Resources Section.

5.1 Why Are Aviation Safety and Maintenance Important? (10 minutes)

- Aviation safety ensures that aircraft are safe to fly
- Airlines and all aircraft manufacturers follow safety rules created by the government when designing and building airplanes
- The Federal Aviation Administration creates rules and standards for manufacturing, operating, and maintaining aircraft
- The people working at the FAA think aviation safety is the most important part of their job
- They develop rules for maintenance and inspection for aircraft that fly in our airspace
- Aircraft undergo different levels of inspection and follow an aircraft maintenance schedule
- This is what makes them airworthy or "safe to fly."
- For this reason, the aviation industry needs skilled mechanics, also called technicians and Aviation Maintenance Technicians or AMTs
- AMTs focus on aircraft maintenance – let's talk about some of the skills that would make a good aviation maintenance technician

- Problem solving
    - There are always problems to solve, so it is just important to think logically, have a step-by-step process, and come up with the best solution to the problem
    - There may be multiple ways to fix an aircraft that is malfunctioning, but it is important to work through a checklist, make sure everything is reviewed, and find a proper solution to the problem
- A willingness to learn
    - Aviation is an ever-changing industry
    - New technology is constantly emerging, and Aviation Maintenance Technicians must be willing to learn about what's new
    - After all, there is value in hands-on training, especially on the job
- Attention to detail
    - Aviation Maintenance Technicians have to pay attention to every detail, looking for signs of weakness, like cracks in parts

- Even the smallest parts can break or come undone when an aircraft moves, which may ground the aircraft and delay your flight
- Attention to detail is crucial to make a good Aviation Maintenance Technician
- When reading manuals on the job, every detail must be considered to maintain, repair, or even inspect an aircraft

— Collaboration

- Being an Aircraft Maintenance Technician means being a part of a team
- No one aircraft maintenance technician can conduct all of the maintenance needed for an aircraft on their own in a timely manner. So, it is imperative that aircraft maintenance technicians work together.
- Part of being a great team member is being a great communicator. Those seen as good team players and team leaders are those who speak clearly and concisely, and are rarely misunderstood

— Communication skills

- One of the most important skills in aviation maintenance is communication, and not just the verbal kind
- Any inspections, repairs, maintenance, etc., are documented (usually in a maintenance logbook), and that means the technician writes down and records all their work
- Suppose an Aviation Maintenance Technician is not a good communicator; in that case, important information could be missing from reports and documents, leading to problems

— Reliability

- A good technician is reliable
- Knowing that an Aviation Maintenance Technician is on time and can do the work in a quality manner makes a huge difference for companies
- A reliable technician also means being 100% aligned with the company and safety procedures
- A good Aircraft Maintenance Technician completes the work thoroughly from start to finish

— Competence

- The aviation maintenance technician field is all about hands-on tasks, ensuring aircraft are maintained, inspected, and repaired correctly
- Are you someone who likes working with your hands and taking things apart?
- If so, that kind of interest can produce a passion for working directly on aircraft!

Suggested Visual:
Show slides highlighting different AMT skills along with photos of AMTs using some choice tools in action.

5.2 What Does an Aviation Maintenance Technician Do? (10 minutes)

— FAA TV: Helping Students Take Off with a Great Career in Aviation (0:00-3:24)

- Aviation Maintenance Technicians make sure that aircraft and all of their parts operate safely
- Aviation Maintenance Technicians have an enormous amount of responsibility for maintaining and inspecting aircraft for service and meeting FAA safety standards
- They must meet all deadlines to maintain flight schedules and safety standards

— Airlines, government, private companies, and the military hire aircraft technicians to repair and perform maintenance on all types of aircraft

— Aircraft technicians perform many duties, for example:

- Examine aircraft and parts for defects
- Investigate mechanical, structural, or electrical problems
- Inspect parts for wear, using all kinds of instruments and tools
- Read maintenance manuals to identify methods of repair
- Repair wings, brakes, electrical systems, and replace defective parts
- Test aircraft parts with gauges and other diagnostic equipment
- Inspect completed work to ensure that it meets the FAA's safety standards
- Keep records of maintenance and repairs

— You can see highlights of the news technologies and hands-on skills that Aviation Maintenance Technicians use here: FAA Tech Positions

— Where do Aviation Maintenance Technicians work?

- Most Aviation Maintenance Technicians work at or near airports
- They may work outside, near the terminal, on the airfield, or in the hangars

— Aviation Maintenance Technicians need specific knowledge and very particular skills to do their jobs correctly

— They also use equipment and very specialized tools to evaluate parts and perform repairs

— Here are some of the tools that Aviation Maintenance Technicians use in their daily job:

Table 3. Types of Aircraft Maintenance Tools

Tool	Purpose
Speed Handle	A speed handle is a long screwdriver with the middle of its shaft offset. This part is used as a handle that a technician can spin very quickly with one hand while using their other hand, or entire body, for leverage. Speed handles can also be equipped with sockets.
Torque Wrench	Screw-type fasteners on aircraft need to be installed to a specified torque or tightness. The only way to reliably tighten a screw, nut or bolt to the correct torque is to use a calibrated torque wrench.
Safety Wire Pliers	Safety wire pliers spin strands of aluminum wire into a strong braid that is used to "tie" nuts and bolts together in such a way that any loosening of a nut or bolt (usually through vibration) would increase the toughness of the strand of safety wire and prevent any further loosening.
Metal Working Tools	Airframe technicians repair the actual metal structures of airplanes. They use tools to cut, bend, grind and fasten metal. Drills and rivet guns are used to install rivets that hold aircraft skins and other important structural pieces. Workers also use less mobile tools such as electric band saws and sheet metal rollers.

Tool	Purpose
Magnet	Small metallic parts, fasteners, and tools can cause catastrophic failures if they make their way into moving cable assemblies or engines. Long and often extendable magnets are helpful in retrieving lost metallic items from locations that are hard to reach.
Mirror	Aviation Maintenance Technicians don't always have a direct line of sight to the parts they are working on or inspecting. Sometimes using a mirror is the only way for a technician to see what he or she is doing.
Rulers	Rulers are made of steel and are either rigid or flexible. In aircraft work, the unit of measure most commonly used is the inch. The inch may be divided into smaller parts by means of either common or decimal fraction division.
Screwdrivers	The screwdriver can be classified by its shape, type of blade, and blade length. It is made for loosening and tightening screws or screw head bolts.
Safety Glasses	Goggles, or safety glasses, are forms of protective eyewear that usually enclose or protect the area surrounding the eye in order to prevent particulates, water, or chemicals from striking the eyes.

5.3 What Are Aircraft Systems? (5 minutes)

- Technicians can work on many different types of aircraft, such as jets, propeller-driven airplanes, helicopters, and even blimps
- To keep aircraft airworthy, Aviation Maintenance Technicians perform scheduled maintenance, make repairs, and inspect many different **aircraft systems**
- They can specialize in one system, such as the **engine, landing gear, or avionics**
- Let's go over some of the systems to understand what they do: [select one to two aircraft systems from the table below to discuss with the class]

Table 4. Types of Aircraft Systems

Aircraft System	Description
Aircraft Engine	An engine that is intended to be used to propel aircraft.
Flight Control	Surfaces, pilot controls, linkages, and operating mechanisms to adjust an aircraft's track in flight and on the ground.
Hydraulics (Landing Gear)	Aircraft systems that are used to move landing gear, flaps, and brakes.
Avionics	Electronic systems used on aircraft, artificial satellites, and spacecraft.

Suggested Visual:
Show slide or video of the different aircraft systems within an aircraft (e.g., airliner responsible transports millions of people every single day). Tie in that life-saving potential to the importance of an AMT.

5.4 Avionics, Artificial Intelligence, and Aviation Safety Technologies (10 minutes)

- Aviation technicians may use laptops, iPads, or other high-tech tools as much as they use a wrench
- One field of aircraft maintenance is called avionics, which comes from aviation + electronics, and this area deals with the electronic systems of an aircraft
- Avionics are important for navigation and communications and may include radars, instruments,

computer systems, radio communications, and global positions systems (GPS)

- Every modern aircraft, spacecraft, and satellite uses electronic systems of different types to operate and perform various functions
- Technical skills and wiring knowledge are needed for working in avionics maintenance
- Advancements in technology like Artificial Intelligence (AI), Augmented Reality (AR), or machine learning can help build smart machines and systems capable of performing tasks that typically require a human
- AI-based systems can help speed up the analysis of a problem and make the decision-making process more efficient
- Augmented Reality can help train technicians how to work on planes in a safe, virtual environment
- They can also help with work planning and allocation when a plane is grounded for repair or maintenance
- Machine learning is based on the idea that systems can learn from data, identify patterns, and make decisions with minimal human input
- In this way, machine learning is like practicing a basketball shot over and over again, and adjusting your form until you can make a basket
- These technologies are helpful decision-making tools:
    - AI-powered systems can keep track of every single part in each plane to generate specific jobs and tasks for technicians
    - Using AI-powered data, airlines can detect issues in planes and create solutions before a breakdown occurs
    - AI and machine learning can predict breakdowns and implement planned fixes which can help airlines reduce costs and downtime
    - AR glasses enable technicians to see hands-free and with interactive 3D wiring diagrams, rather than viewing things on 2D, 20-ft.-long drawings
    - AR can also help users retain the information more efficiently while doing repair work
- The use of AI, AR, and machine learning is making the field of aviation maintenance even more interesting and exciting for future technicians

5.5 Activity (15 minutes)

The table below includes sample activities that can be used as part of the lesson.

Table 5. Sample Activities

Activity	Objectives	Educator Actions	Student Actions	Closing
Identifying Aircraft Systems	Using a basic picture of an airplane, students will identify different parts of the plane that technicians perform maintenance on	Call out a part of the plane and have the students write the name near the area of the airplane where that part is found	The students will use a pen/marker and a provided picture to label areas of the plane that fall under a particular part or system	The Educator will ask the students to share their drawings to see how many parts or areas of the airplane they could name

Activity	Objectives	Educator Actions	Student Actions	Closing
Maintenance Glossary Crossword	Using a simple crossword-style puzzle, identify important maintenance terms using their definitions as tools	Distribute copies of a crossword with clues and have students fill out the puzzle based on their knowledge	Use a pen/pencil and the provided crossword puzzle to solve the various clues on the page	The Educator will ask the students to share their crossword puzzles and see how many each student could figure out
Tools Match Game	Can you match the tool's picture to its description? If so, draw a line from the applicable tool to its correct description to make a match	Distribute copies of a match sheet that displays two parallel columns (one column is a picture of a tool, the other column is its description)	Use a pen/pencil to draw a line connecting the picture of a tool to its correct definition	The Educator will ask students to share their completed match sheets to see how many tools each student could correctly identify

6. What Did You Learn? (5 minutes)

For the closing and wrap-up, Educators can ask the students the following questions:

- How do Aviation Maintenance Technicians keep planes safe?
- What skills or abilities would you need to become a good Aviation Maintenance Technician?
- What are avionics [aviation electronics] and why are they important?
- How can computers and new technologies make their job easier?

Suggested Visual/Game:
10 question knowledge check game

7. Extension Activities

- Roleplay (read a conversational interaction between an Aircraft Safety Inspector, Aviation Maintenance Technician, Pilot, and Flight Attendant)
- Review Avoid the Dirty Dozen - Put Safety First and Minimize the 12 Common Causes of Mistakes in the Aviation Workplace and take a related quiz from the JanFeb2021 Safety Briefing (page 30)

8. Supplies

- Access to the Internet to view and share videos and slides on the screen
- Pencils/Pens/Markers (20 Qty)
- Link to the following will be provided:
  - A picture of an airplane that students can use to label parts/systems
  - A copy of the crossword activity

    - A copy of the match game activity
- A copy of the "Dirty Dozen" pamphlet and quiz (on page 30)
- Blank paper for creating paper airplanes (optional based on in-person activity)
- Spark sheet (PDF) for students to have as a reference