Aviation Maintenance Technology I

8728 36 weeks / 280 hours

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Acknowledgments

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Course Description

Suggested Grade Level: 10 or 11

Students will work with airframe and control surfaces, power plants, and basic aviation electricity, and perform ground operations and servicing procedures, as specified by Federal
Aviation Administration (FAA) requirements. Students will also practice lab and tool safety, apply science and mathematics principles to aviation maintenance tasks, and research and use maintenance publications, forms, and records.

As noted in Superintendent's Memo #058-17 (2-28-2017), this Career and Technical Education (CTE) course must maintain a maximum pupil-to-teacher ratio of 20 students to one teacher, due to safety regulations. The 2016-2018 biennial budget waiver of the teacher-to-pupil ratio staffing requirement does not apply.

**Task Essentials List**

- Tasks/competencies designated by plus icons (⊕) in the left-hand column(s) are essential
- Tasks/competencies designated by empty-circle icons (○) are optional
- Tasks/competencies designated by minus icons (⊖) are omitted
- Tasks marked with an asterisk (*) are sensitive.

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<td>⊕</td>
<td>Follow general safety procedures with tools and equipment.</td>
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<td>Identify tools, their care and maintenance needs, functions, and handling.</td>
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<tr>
<td>43</td>
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<td>Apply principles of physics to aviation maintenance and flight.</td>
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<td>Applying Mathematics</td>
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<tr>
<td>46</td>
<td>⊕</td>
<td>Apply principles of mathematics to aviation maintenance, flight, and associated tasks.</td>
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<td>47</td>
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<td>Extract roots and raise numbers.</td>
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<td>Determine areas and volumes of various geometrical shapes.</td>
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<td>Apply measurement skills.</td>
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<tr>
<td>50</td>
<td>✗</td>
<td>Solve ratio, proportion, and percentage problems.</td>
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<tr>
<td>51</td>
<td>✗</td>
<td>Perform algebraic equations.</td>
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Interpreting Maintenance Publications, Forms, and Records

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<td>Interpret airworthiness certificates.</td>
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<td>55</td>
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<td>Explain the function of supplemental type certificates (STC) and airworthiness directives (ADs).</td>
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<td>Identify various technical forms important to aviation maintenance technicians.</td>
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<td>Prepare a simple outline for a technical report.</td>
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<td>Identify the abbreviations associated with the Federal Aviation Regulations (FARs).</td>
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<td>Explain the aviation mechanic privileges and limitations addressed in the Federal Aviation Regulations (FARs), part 43.</td>
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<td>60</td>
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<td>Explain the aviation mechanic privileges and limitations addressed in the FARs, part 65.</td>
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<td>✗</td>
<td>Explain the regulations for maintaining maintenance forms and records as contained in FARs, parts 43 and 91.</td>
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<td>Describe the use of Technical Standard Orders (TSOs) to complete specific maintenance tasks.</td>
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<td>Research aircraft information to determine aircraft conformity.</td>
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**Exploring Airframe and Control Surfaces**

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<td>Explain how the movements of the rudder, ailerons, flaps, and elevator affect the flight path of an airplane.</td>
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<td>Explain how an airfoil’s lift and angle of attack are affected by relative wind and airspeed.</td>
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<td>Explain how relative wind, angle of attack, center of lift, and laminar flow affect the performance of an airfoil.</td>
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<td>74</td>
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<td>Compare rotary-winged and fixed-wing flight.</td>
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<td>77</td>
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Providing Ground Operations and Servicing

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<td>Convert civilian time to 24-hour (military) time and vice-versa.</td>
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Maintaining the Power Plant
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<td>94</td>
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<td>Explain the functions of the engine oil system and how the system is monitored in the cockpit.</td>
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<td>Explain the operation of the air cooling system and how the system is monitored in the cockpit.</td>
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<td>Explain how thrust is produced in both the fixed-pitch and constant-speed aircraft propellers and how RPM is registered on the tachometer.</td>
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Performing Basic Electricity Tasks

<p>| Task Number | | Tasks/Competencies |
|-------------|-----------------|
| 102         | + Inspect and service batteries. |
| 103         | + Calculate and measure capacitance and inductance. |
| 104         | + Calculate and measure electrical power. |
| 105         | + Measure voltage, current, resistance, and continuity. |
| 106         | + Determine the relationship between voltage, current, and resistance in electrical circuits. |
| 107         | + Interpret aircraft electrical circuit diagrams, including solid-state devices and logic functions. |</p>
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<td>Describe career patterns in the aviation maintenance technology industry.</td>
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<td>109</td>
<td>Participate in a mock interview.</td>
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Legend: 🔺Essential 🔴Non-essential 🔼Omitted

Curriculum Framework

Following Tool and Equipment Safety and Care Guidelines

Task Number 39

Follow general safety procedures with tools and equipment.

Definition

Following procedures should include:

- adhering to professional conduct in the lab, shop, and classroom (being alert, respectful, courteous, and cautious)
- wearing work attire that safeguards against injury
- wearing appropriate personal protective equipment (PPE), including eye-safety and respiratory gear, when necessary
- locating first-aid equipment
- following first-aid procedures
- identifying lab, shop, and classroom layout
- locating emergency exits, fire extinguishers, and other emergency gear and equipment.

Process/Skill Questions

- What are the consequence of not wearing PPE?
- What are types of PPE?
Task Number 40

Identify tools, their care and maintenance needs, functions, and handling.

Definition

Identification should include

- naming hand tools, power equipment, and additional shop equipment used in aviation maintenance
- selecting the appropriate tool for the job
- following manufacturer's guidelines for cleaning, maintenance, and storage
- calibrating tools.

Process/Skill Questions

- Why is tool calibration important?
- Why is it important to maintain tools?

Task Number 41

Demonstrate the use of hand tools and precision measuring devices in aircraft maintenance.

Definition

Demonstration should include

- practicing with instructor
- selecting and using tools proficiently
- wearing appropriate clothing and PPE, when necessary
- following manufacturer’s guidelines.

Process/Skill Questions

- How does one determine proper tool use?
- What are common hand tools in aviation maintenance?
Task Number 42

Demonstrate electric and materials safety.

Definition

Demonstration should include

- identifying shock hazards, including the condition and location of power cords
- identifying equipment condition
- locating and interpreting data from the Safety Data Sheet (SDS)
- adhering to Occupational Safety and Health Administration (OSHA) guidelines.

Process/Skill Questions

- Where would one locate SDS?
- What is the importance of equipment conditions?

Applying Science

Task Number 43

Apply principles of physics to aviation maintenance and flight.

Definition

Demonstration should include applying an understanding of

- Archimedes’ laws
- Newton’s laws
- Pascal’s laws
- Bernoulli’s principle.

Process/Skill Questions

- Why are Newton’s laws of physics important to aviation maintenance?
Task Number 44

Apply principles of chemistry to aviation maintenance and flight.

Definition

Demonstration should include applying an understanding of

- Mendeleev's Periodic Table of the Elements and its organization
- the symbol and chemical structure of the 25 elements commonly used in aviation mechanics
- the density in each of the 25 substances commonly used in aviation mechanics
- the composition of matter.

Process/Skill Questions

- Why are flammable chemicals stored in a fire-proof cabinet?
- What types of chemicals must not be stored together?
- Would it be advisable to mix two dissimilar metals in a storage bin? Explain.

Task Number 45

Apply principles of earth science to aviation maintenance and flight.

Definition

Demonstration should include applying an understanding of

- the composition of the earth's atmosphere
- variations of atmospheric pressure and methods for measuring it.

Process/Skill Questions

- How do the elements of the atmosphere stimulate corrosion?
- How would a technician counteract the effects of corrosion?

Applying Mathematics
Task Number 46

Apply principles of mathematics to aviation maintenance, flight, and associated tasks.

Definition

Demonstration should include applying an understanding of

- mathematical symbols used in aircraft mechanics
- mathematical terms used in aircraft mechanics
- proper method of interpolation.

Process/Skill Questions

- How is math used in aviation?
- Why does it make sense to use calculations of weight and balance?

Task Number 47

Extract roots and raise numbers.

Definition

Extracting roots and raising numbers should include

- applying operations to common fractions and decimals
- converting fractions to decimals and vice versa.

Process/Skill Questions

- How does one know which formula is appropriate to complete an aviation maintenance task?

Task Number 48

Determine areas and volumes of various geometrical shapes.
Definition

Determination should include applying the formulas for geometric figures used in computing aircraft mechanics problems.

Process/Skill Questions

- How should one measure outside diameters of various hardware?

---

**Task Number 49**

**Apply measurement skills.**

Definition

Application should include

- identifying units of measurement and their application
- converting units of measurement.

Process/Skill Questions

- What units of measurement are common in aviation maintenance?
- How does one convert units of measurement?

---

**Task Number 50**

**Solve ratio, proportion, and percentage problems.**

Definition

Solution should include defining the following terms and explaining how each is used in aviation:

- *Ratio*
- *Aspect ratio*
- *Proportion*

Process/Skill Questions
• What is ratio? How is it different than aspect ratio?
• What is proportion?

Task Number 51

Perform algebraic equations.

Definition

Performance should include equations that contain positive and negative numbers involving addition, subtraction, multiplication, and division.

Process/Skill Questions

• What is PEMDAS? (It is an acronym for the words parenthesis, exponents, multiplication, division, addition, subtraction.) How does one use it?

Interpreting Maintenance Publications, Forms, and Records

Task Number 52

Interpret aircraft information, using FAA specifications and type certificate data sheets (TCDS).

Definition

Interpretation should be made by locating aircraft information in appropriate maintenance manuals and through online sources, such as the FAA website, and include

- Air Transport Association (ATA) standards
- TCDS.

Note: Airlines for America (A4A), formerly the ATA, was the first and remains the only trade organization of the leading U.S. passenger and cargo carriers. While ATA has become A4A, many of the standards and codes have retained the ATA abbreviation.

Process/Skill Questions
Why do ATA codes exist?
What are TCDS?
How is the *Aviation Mechanic Handbook* used?

Task Number 53

Interpret technical data.

Definition

Interpretation should include

- using the ATA standards to locate procedures in maintenance manuals
- identifying the correct aviation maintenance information that provides solutions to given maintenance problems.

Process/Skill Questions

- What is considered to be technical data?
- What is the significance of an ATA code?

Task Number 54

Interpret airworthiness certificates.

Definition

Interpretation should include

- researching airworthiness certificates through the FAA website
- identifying the reason these certificates are issued
- identifying aircraft, airspace, and air safety information presented on the certificate.

Process/Skill Questions

- How many different types of airworthiness certificates exist? What are some examples?
Task Number 55

Explain the function of supplemental type certificates (STC) and airworthiness directives (ADs).

Definition

Explanation should include

- researching STC through the FAA website
- identifying the reason STC are issued
- identifying information presented on the STC
- identifying reasons for an AD being issued.

Process/Skill Questions

- What is the function of ADs?
- What is an STC?
- Why would an AD be issued?

Task Number 56

Identify various technical forms important to aviation maintenance technicians.

Definition

Identification may include the following technical forms:

- Log page
- Form 337
- 8130 series
- 8010-4
- Part request form
- Inspection report
- Maintenance tags

Process/Skill Questions

- When would one complete a log page?
- What is the significance of a maintenance tag?
Task Number 57

Prepare a simple outline for a technical report.

Definition

Preparation should include

- selecting the appropriate report format
- following formatting guidelines
- using correct terminology, symbols, grammar, and punctuation
- identifying the means for publication and dissemination.

Process/Skill Questions

- How would one know which format to use on a report?
- Where are the formatting guidelines located?

Task Number 58

Identify the abbreviations associated with the Federal Aviation Regulations (FARs).

Definition

Identification should include

- researching abbreviations/acronyms and locating their associated definitions through the FAA website
- listing all abbreviations appearing in part 1 of the FARs.

Process/Skill Questions

- Where would one find acronyms in aviation?
- Why are acronyms used in aviation?

Task Number 59
Explain the aviation mechanic privileges and limitations addressed in the Federal Aviation Regulations (FARs), part 43.

**Definition**

Explanation should include

- a definition of *mechanic privileges*—FAA rules that govern the tasks that the licensed mechanic is able to perform on airplanes
- a definition of *mechanic limitations*—FAA rules that govern areas in which the mechanic is able to operate
- the components of this information (e.g., maintenance information, preventive maintenance information, rebuilding information, alteration information).

**Process/Skill Questions**

- What privileges do mechanics with an Airframe and Powerplant (A&P) certificate enjoy?
- How does the A&P certificate differ from the Inspection Authorization (IA) certificate?

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**Task Number 60**

Explain the aviation mechanic privileges and limitations addressed in the FARs, part 65.

**Definition**

Explanation should include

- the procedure for receiving an airman’s certificate
- violations associated with the airman’s certificate.

**Process/Skill Questions**

- What is the process to obtain an airman’s certificate or a mechanic’s certificate?

---

**Task Number 61**
Explain the regulations for maintaining maintenance forms and records as contained in FARs, parts 43 and 91.

Definition

Explanation should include the procedure for aircraft maintenance records including

- maintenance information
- preventive maintenance information
- rebuilding information
- alteration information.

Process/Skill Questions

- What are required components for a proper maintenance entry?
- What is the purpose of a maintenance entry?

Task Number 62

Describe the use of Technical Standard Orders (TSOs) to complete specific maintenance tasks.

Definition

Description should include

- defining TSO—a minimum performance standard issued by the FAA for specified materials, parts, processes, and appliances used on civil aircraft
- identifying parts whose installation require a TSO
- determining the difference between a TSO and an FAA-Parts Manufacturer Approval (PMA).

Process/Skill Questions

- What is a TSO?
- Does a TSO give approval to be installed on any given aircraft? Explain.

Task Number 63
Identify manufacturer’s manuals and related publications to accomplish specific maintenance tasks.

Definition

Identification should include

- locating ATA spec 100
- describing ATA spec 100—contains format and content guidelines for technical manuals written by aviation manufacturers and suppliers used by airlines and other segments of the industry in the maintenance of their respective products
- using ATA spec 100 to find correct maintenance procedures for a given maintenance task.

Process/Skill Questions

- What is the purpose of an ATA code?
- Where are ATA codes located?

Task Number 64

Maintain record entries for a specific aviation maintenance task.

Definition

Maintenance of records should include documentation of parts and procedures used in the repair.

Process/Skill Questions

- What details are listed in a maintenance entry?
- When must a mechanic make a maintenance entry?

Task Number 65

Research aircraft information to determine aircraft conformity.
Definition

Research may include

- locating FAA specifications and TCDS through the FAA website
- interpreting FAA specifications and TCDS
- airworthiness limitation section of applicable maintenance manual
- researching STCs and service bulletins (SBs).

Process/Skill Questions

- What information does a TCDS have?
- How does the STC affect TCDS?

Exploring Airframe and Control Surfaces

Task Number 66

Explain the four forces of flight and how each affects an aircraft in straight-and-level flight.

Explanation

Explanation should include

- lift—provides elevation
- thrust—provides forward motion
- drag—impedes/slow forward motion
- weight—pulls aircraft toward Earth.

Process/Skill Questions

- How does weight affect aircraft performance?
- What are causes of drag? What effect does drag have on an aircraft?

Task Number 67

Define common terminology used in aerodynamics.

Definition
Definitions should include, but not be limited to

- theory of flight
- airfoil
- thrust and drag
- aircraft stability
- aircraft control
- transport aircraft control surface
- control system
- high-speed aerodynamics.

Process/Skill Questions

- What is an airfoil?
- What are the forces involved in flight?
- What is the relationship between thrust and drag?

Task Number 68

Identify the five major components of an airplane.

Definition

Identification should include

- fuselage
- empennage
- wings
- power plant
- landing gear.

Process/Skill Questions

- What is the fuselage?
- What are the five major components of an airplane?

Task Number 69
Explain how the movements of the rudder, ailerons, flaps, and elevator affect the flight path of an airplane.

Definition

Explanation should include

- rudder—controls the yaw
- ailerons—control the roll
- flaps—alter the wing area to control airflow and lift
- elevator—controls pitch.

Process/Skill Questions

- What is yaw?
- What components control yaw, roll, lift, and pitch?

Task Number 70

Explain how an airfoil’s lift and angle of attack are affected by relative wind and airspeed.

Definition

Explanation should include effects on airfoil regarding angle of attack at various degrees and air speeds.

Process/Skill Questions

- What is angle of attack?
- How does angle of attack affect an aircraft?

Task Number 71

Explain how relative wind, angle of attack, center of lift, and laminar flow affect the performance of an airfoil.

Definition
Explanation should include definitions of

- *relative wind*—the direction of movement of the atmosphere relative to an aircraft or an airfoil
- *angle of attack*—the angle between a reference line on a lifting body (often the chord line of an airfoil) and the vector representing the relative motion between the lifting body and the fluid (air) through which it is moving
- *center of lift*—the point at which the pitching moment coefficient for the airfoil does not vary with lift coefficient (i.e., angle of attack)
- *laminar flow*—a flow regime characterized by high momentum diffusion and low momentum convection; the opposite of turbulent flow (laminar flow is smooth, while turbulent flow is rough).

**Process/Skill Questions**

- What is relative wind?
- What is significance of laminar flow vs. turbulent flow?

---

**Task Number 72**

**Explain how rudder, aileron, and elevator deflection move an airplane around the center of gravity through each of the three axes of flight.**

**Definition**

Explanation should include

- rudder—controls yaw
- aileron—controls roll
- elevator—controls pitch
- the axes of flight—vertical, lateral, longitudinal.

**Process/Skill Questions**

- What are the axes of flight?
- Which component controls which axis?

---

**Task Number 73**
Describe the role of lift, weight, drag, and thrust on a climbing, descending, and turning airplane.

Definition

Description should include the way aerodynamic forces change as the aircraft changes direction in flight, altering the aircraft's dynamic stability and equilibrium. Examples should be provided for a number of scenarios.

Process/Skill Questions

• How does turn of an aircraft affect lift?
• How does thrust power affect pitch?

Task Number 74

Describe how centrifugal force, yaw, and skid are associated with a turning aircraft.

Definition

Description should include how forces will change as the aircraft changes direction in flight and by defining the following:

• Centrifugal force—an outward force associated with curved motion, that is, rotation about some (possibly not stationary) center
• Yaw—the force that allows the nose of the aircraft to move left to right by actuating the rudder
• Skid—the force produced when only the rudder is used to change direction, causing the aircraft to slide sideways away from the curve

Process/Skill Questions

• How does centrifugal force relate to an airplane that is changing direction?

Task Number 75

Compare rotary-winged and fixed-wing flight.
**Definition**

Comparison should include the following:

- Rotary-wing aircraft produce lift by rotating the airfoils (wings).
- Fixed-wing aircraft use forward motion (relative wind) to produce lift.

**Process/Skill Questions**

- What is a rotary wing aircraft?
- How does a rotary wing aircraft achieve lift?
- How does a fixed wing aircraft achieve lift?

---

**Task Number 76**

**Explain the functions of the control surfaces and flight controls for a rotary-winged aircraft.**

**Definition**

Explanation of the control surfaces for a rotary-winged aircraft should include the following:

- Pitch and roll—controlled by the cyclic control tilting the main rotor
- Yaw—controlled by the foot pedals of the anti-torque system that changes the blade pitch in the tail of the aircraft
- Collective—allows the rotor blades to change pitch to increase or decrease lift

**Process/Skill Questions**

- How is pitch and roll controlled on a rotary wing aircraft?
- How is yaw controlled on a rotary wing aircraft?
- What is the purpose of a collective?

---

**Task Number 77**

**Explain the factors affecting air pressure around an airfoil.**

**Definition**
Explanation should include how the following factors affect an airfoil in flight:

- Temperature affects the lift generated by the airfoil.
- Air speed increases pressure difference between upper and lower wing surface.
- Altitude decreases airfoil efficiency.
- Angle of attack affects the airflow over the wing.

**Process/Skill Questions**

- What are the effects of temperature on an airfoil?
- What are the effects of airspeed over a wing?

---

**Task Number 78**

**Explain how simple machines are used in aircraft engines, control surfaces, and cockpit controls.**

**Definition**

Explanation should include exploring first-, second-, and third-class levers and pulleys used in aircraft, including

- throttle controls
- flap controls
- speed breaks
- landing gear
- flight controls.

**Process/Skill Questions**

- How are engines manipulated from the cockpit or cabin of an aircraft?
- How does the pilot control aircraft functions?

---

**Providing Ground Operations and Servicing**

**Task Number 79**

**Identify the types and uses of ground support equipment.**

**Definition**
Identification should include

- ground power units (GPUs)—provide power to the aircraft on the ground
- huffers—provide high-power air to start turbine engines
- start carts—provide power to start aircraft engines
- air-conditioning (A/C) units—provide A/C to aircraft on the ground at the gate
- de-icing equipment—provides removal of ice from the aircraft structure on the ground
- fueling and de-fueling trucks and systems—provide fuel for the aircraft or removes fuel from the aircraft
- jet ways—provide a safe path for passengers and crew to board and exit the aircraft to and from the terminal
- oxygen service carts—provide oxygen to the aircraft oxygen system
- hydraulic power units—provide power to the hydraulic system during maintenance.

Process/Skill Questions

- What is ground support equipment?
- What is the purpose of ground support equipment?

---

**Task Number 80**

**Demonstrate the procedures for moving an aircraft on the flight line.**

**Definition**

Demonstration should include

- moving aircraft physically without tow bars
- moving aircraft physically with tow bars (Some tow bars are used with tugs, and some can be operated by hand.)
- using marshalling signals to direct movement of an aircraft.

**Process/Skill Questions**

- How would one physically move an aircraft?
- What process is used to guide a taxiing aircraft?

---

**Task Number 81**
Prepare an aircraft for outside storage.

**Definition**

Preparation should include using a routine overnight kit (RON) for storage, which includes properly applying

- engine intake covers
- engine exhaust covers
- pitot tubes and static port covers
- gust locks for flight controls
- aircraft tie-down points
- safety flags.

**Process/Skill Questions**

- How are aircraft stored outside?
- What is the reason for mooring an aircraft?

---

**Task Number 82**

**Describe the four classes of aircraft fires.**

**Definition**

Description should include the following four classes of aircraft fires:

1. Class A—fires involving ordinary combustible materials, such as wood, cloth, paper, rubber, and plastics.
2. Class B—fires involving flammable liquids, petroleum oils, greases, tars, oil-based paints, lacquers, solvents, alcohols, and flammable gases.
3. Class C—fires involving energized electrical equipment in which the use of an extinguishing media that is electrically nonconductive is important.
4. Class D—fires involving combustible metals, such as magnesium, titanium, zirconium, sodium, lithium, and potassium.

**Process/Skill Questions**

- What are four classes of aircraft fires?
- Why are there four classes of aircraft fires?
Task Number 83

Describe the physical and chemical properties of each of the four types of fire extinguishing agents.

Definition

Description should include

- water—for class-A fires
- carbon dioxide (CO2)—for class B or C fires
- halogenated hydrocarbons (Halons)—for class-A–C fires
- specialized dry powder—for class-D fires.

Process/Skill Questions

- How does one determine which extinguishing agent to use?

Task Number 84

Compare fixed and portable aircraft fire extinguishers.

Definition

Comparison should include the following:

- Fixed fire extinguishers are mounted and linked to a building and detection system, and, as such, their use is typically building-wide, for larger fires.
- Portable fire extinguishers are located on site and transported to the location of fire, and, as such, use is typically more localized, for smaller fires.

Process/Skill Questions

- Where are fixed fire extinguishers located?
- Where are portable fire extinguishers located?

Task Number 85
Compare common types of aviation fuels.

Definition

Comparison should include

- aviation gasoline (avgas)(100LL): similar to gas used in automobiles but with lead additive that keeps the aircraft cylinders cool
- jet fuel—(i.e., Jet A, Jet A1, Jet B): similar to diesel fuel and is only used in turbine engines.

Process/Skill Questions

- Where is jet fuel used?
- What type of aircraft would use 100LL?

Task Number 86

Describe the characteristics and properties of aviation fuels.

Definition

Description should include analyzing the fuel for

- detonation
- pre-ignition
- performance numbers
- color coding
- chemical composition.

Process/Skill Questions

- What color is aviation gas?
- What causes detonation?
- What causes pre-ignition in aviation fuels?

Task Number 87

Compare aviation gasolines and turbine engine fuels.
Definition

Comparison should include analyzing the fuel for

- combustibility
- flashpoint
- color coding
- performance numbers
- chemical composition.

Process/Skill Questions

- What is the difference between jet fuel and 100LL? Is that difference apparent? Explain.

Task Number 88

Demonstrate the procedures for fueling and defueling.

Definition

Demonstration should include

- safe handling of all fuel types
- PPE requirements
- fueling and defueling outside only
- fueling and defueling from a fuel truck
- fueling using secure static grounding
- following spill procedures.

Process/Skill Questions

- What is the significance of static grounding?
- Why would a mechanic defuel an aircraft?

Task Number 89

Identify aircraft fueling systems and how they are monitored in the cockpit.
**Definition**

Identification should include single-point fueling and over-the-wing fueling. Fueling systems are monitored in the cockpit by gauges.

**Process/Skill Questions**

- What is the difference between single-point and over-the-wing fueling?
- How is the fuel system monitored from the cockpit?

---

**Task Number 90**

**Identify color codes used to designate fluids in the servicing and assembly of aircraft.**

**Definition**

Identification should include

- AVGAS 82UL—purple
- AVGAS 100—green
- AVGAS 100LL—blue
- Jet A—no color
- Jet A1—no color
- Jet B—no color.

**Process/Skill Questions**

- Why is fuel color-coded?

---

**Task Number 91**

**Convert civilian time to 24-hour (military) time and vice-versa.**

**Definition**

Conversion should include
• maintaining four-number consistency
• adding consecutive hours after noon in military time (e.g., 1 p.m. becomes 13:00 in military time)
• subtracting 12 from any number of 13-hundred or higher to convert from military to regular time.

Process/Skill Questions

• What is the mathematical process to convert civilian time to military time?

Maintaining the Power Plant

Task Number 92

Demonstrate the procedures for starting a reciprocating aircraft engine.

Definition

Demonstration should include

• locating aircraft flight manual (AFM) or pilot’s operating handbook (POH)
• adhering to safety precautions and walk-around inspection of the aircraft
• following procedure for starting found in the associated checklist.

Process/Skill Questions

• Where does one find the information about starting an aircraft?
• What should be done before starting an aircraft engine?

Task Number 93

Operate the ground engine for a light aircraft.

Definition

Operation should include

• starting reciprocating engine on aircraft as outlined in the aircraft operations manual
• monitoring revolutions per minute (RPM), oil pressure, and engine temperature.
Process/Skill Questions

- What instruments are important at start up?
- What should one do if indications are not as they should be?

Task Number 94

Explain the procedures for starting a turbine engine.

Definition

Explanation should include

- reviewing general procedures for starting an aircraft turbine engine
- following the AFM.

Process/Skill Questions

- Where are the procedures for starting the turbine engine located?

Task Number 95

Explain how work, power, and air density affect engine power output.

Definition

Explanation should include

- how an increase in air density can increase the power output of an aircraft engine
- how a decrease in air density can decrease the power output of an aircraft engine.

Process/Skill Questions

- How does air density affect engine performance?

Task Number 96
Identify the cycles of a four-stroke reciprocating engine.

Definition

Identification should include

- intake—fuel and air is drawn in to the cylinders
- compression—fuel and air mixture is compressed within the cylinders
- power—fuel and air mixture is ignited, creating usable energy
- exhaust—fuel and air mixture is burned and expelled from the cylinder.

Process/Skill Questions

- What are the components of a four-stroke reciprocating engine?

Task Number 97

Identify the components in the reciprocating engine ignition system.

Definition

Explanation should include

- magnetos—produce energy for spark
- spark plugs—deliver spark to the cylinder
- interconnecting wires—deliver spark from magneto to spark plug
- ignition switch—allows magnetos to deliver spark.

Process/Skill Questions

- What components generate the energy for ignition?
- How is the ignition system redundant? Explain

Task Number 98

Explain the formation of carburetor ice.

Definition
Explanation should include the concept that Venturi processes (air flow) create carburetor ice.

**Process/Skill Questions**

- How does carburetor ice materialize?

---

**Task Number 99**

**Explain the functions of the engine oil system and how the system is monitored in the cockpit.**

**Definition**

Explanation should include the following:

- Oil is stored in a tank and delivered to engine components by way of the oil pump.
- Oil pump pressure is monitored by an oil-pressure gauge located in the cockpit.

**Process/Skill Questions**

- How is oil supplied to an engine?
- What is the purpose of oil in an engine?

---

**Task Number 100**

**Explain the operation of the air cooling system and how the system is monitored in the cockpit.**

**Definition**

Explanation should include the following:

- Ram air is forced over the cylinders and out the bottom of the aircraft.
- The cowling provides the pressurized path for cooling airflow.
- The cylinder head temperature is monitored by a gauge in the cockpit.

**Process/Skill Questions**

- How does an aircraft direct air over the engine for cooling?
Task Number 101

Explain how thrust is produced in both the fixed-pitch and constant-speed aircraft propellers and how RPM is registered on the tachometer.

Definition

Explanation should include the following:

- Thrust is produced by the propeller rotating and pulling air through it, forcing it rearward, causing the aircraft to move forward.
- Fixed-pitch propellers adjust their RPM to gain thrust.
- Constant-speed propellers change their blade pitch to increase thrust.

Process/Skill Questions

- How does a fixed pitched propeller gain thrust?
- What is thrust?

Performing Basic Electricity Tasks

Task Number 102

Inspect and service batteries.

Definition

Procedure should include

- checking condition of outer case for physical and heat damage
- checking connectors for corrosion and wear
- checking the state of charge
- checking electrolyte level and specific gravity
- cleaning the battery
- removing corrosion from terminals
- charging the battery to proper voltage as outlined in the battery service manual
- adding distilled water as required
• performing a capacity check to determine the strength of battery cells.

**Process/Skill Questions**

• What is the purpose of proper battery maintenance?
• What is specific gravity?

---

**Task Number 103**

**Calculate and measure capacitance and inductance.**

**Definition**

Procedure should include

• using various electrical equipment
• comparing and contrasting the functions of capacitance and inductance
• determining how capacitance and inductance functions in an electrical circuit.

**Process/Skill Questions**

• What is capacitance?
• What is conductance?

---

**Task Number 104**

**Calculate and measure electrical power.**

**Definition**

Procedure should include using

• Ohm's law to calculate electrical power in a circuit
• a multimeter to measure electrical power in a circuit
• bread boards to perform electrical experiments.

**Process/Skill Questions**

• What is Ohm’s law?
• What tools would be used to measure electrical power in a circuit?
Task Number 105

Measure voltage, current, resistance, and continuity.

Definition

Procedure should include

- measuring voltage, current, resistance, and continuity, using a multimeter and capacitance checker
- documenting findings
- troubleshooting problems related to the circuit.

Process/Skill Questions

- How is continuity in a circuit determined?
- How is voltage in circuit measured?

Task Number 106

Determine the relationship between voltage, current, and resistance in electrical circuits.

Definition

Determination should be based on using the power wheel to determine the relationship between voltage, current, and resistance in electrical circuits.

Process/Skill Questions

- How might one differentiate among voltage, current, and resistance in electrical circuits?

Task Number 107

Interpret aircraft electrical circuit diagrams, including solid-state devices and logic functions.
Definition

Interpretation should include

- locating and isolating electrical parts and systems
- determining the function of each of these parts and systems
- determining how these parts and systems work in conjunction with each other and other systems in the aircraft
- troubleshooting and isolating problems in an aircraft electrical system.

Process/Skill Questions

- How would the mechanic isolate an electrical part in a system for troubleshooting?
- How does one determine how the parts work together in a system?

Exploring Aviation Careers

Task Number 108

Describe career patterns in the aviation maintenance technology industry.

Definition

Description should include typical career areas within the aviation maintenance technology industry such as

- hangar line
- production
- maintenance
- maintenance management
- compliance
- engineering.

Process/Skill Questions

- What career paths are known in the industry?

Task Number 109
Participate in a mock interview.

Definition

Participation should include the opportunity to practice interviewing skills prior to an actual interview. Students should play a variety of roles to illustrate interviewee behaviors both desirable (e.g., maintaining eye contact, asking informed questions) and undesirable (e.g., speaking too softly, failing to answer questions completely).

Process/Skill Questions

- What are three things an interviewee should always do, and three things an interviewee should never do?

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**SOL Correlation by Task**

<table>
<thead>
<tr>
<th>Task</th>
<th>Description</th>
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<th>History and Social Science:</th>
<th>Science:</th>
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<td>39</td>
<td>Follow general safety procedures with tools and equipment.</td>
<td>11.5, 12.5</td>
<td>GOVT.1, GOVT.16, VUS.1</td>
<td>CH.1</td>
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<td>40</td>
<td>Identify tools, their care and maintenance needs, functions, and handling.</td>
<td>11.5, 12.5</td>
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<tr>
<td>41</td>
<td>Demonstrate the use of hand tools and precision measuring devices in aircraft maintenance.</td>
<td>11.5, 12.5</td>
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<tr>
<td>42</td>
<td>Demonstrate electric and materials safety.</td>
<td>11.5, 12.5</td>
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<td>43</td>
<td>Apply principles of physics to aviation maintenance and flight.</td>
<td>11.5, 12.5</td>
<td>PH.5</td>
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<td>44</td>
<td>Apply principles of chemistry to aviation maintenance and flight.</td>
<td>11.5, 12.5</td>
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<td>45</td>
<td>Apply principles of earth science to aviation maintenance and flight.</td>
<td>11.5, 12.5</td>
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<td>46</td>
<td>Apply principles of mathematics to aviation maintenance, flight, and associated tasks.</td>
<td>11.5, 12.5</td>
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<tr>
<td>47</td>
<td>Extract roots and raise numbers.</td>
<td></td>
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<td>A.3</td>
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</table>
| 48 | Determine areas and volumes of various geometrical shapes. | English: 11.5, 12.5  
Mathematics: A.1, A.4, G.13, G.14 |
| 49 | Apply measurement skills. | English: 11.5, 12.5 |
| 50 | Solve ratio, proportion, and percentage problems. |  |
| 51 | Perform algebraic equations. | Mathematics: A.1, A.4 |
| 52 | Interpret aircraft information, using FAA specifications and type certificate data sheets (TCDS). | English: 11.5, 11.8, 12.5, 12.8 |
| 53 | Interpret technical data. | English: 11.5, 12.5 |
| 54 | Interpret airworthiness certificates. | English: 11.5, 11.8, 12.5, 12.8 |
| 55 | Explain the function of supplemental type certificates (STC) and airworthiness directives (ADs). | English: 11.5, 11.8, 12.5, 12.8 |
| 56 | Identify various technical forms important to aviation maintenance technicians. | English: 11.5, 12.5 |
| 57 | Prepare a simple outline for a technical report. | English: 11.5, 11.7, 12.5, 12.7  
History and Social Science: GOVT.1, VUS.1 |
| 58 | Identify the abbreviations associated with the Federal Aviation Regulations (FARs). | English: 11.3, 11.5, 11.8, 12.3, 12.5, 12.8 |
| 59 | Explain the aviation mechanic privileges and limitations addressed in the Federal Aviation Regulations (FARs), part 43. | English: 11.3, 11.5, 12.3, 12.5 |
| 60 | Explain the aviation mechanic privileges and limitations addressed in the FARs, part 65. | English: 11.5, 12.5 |
| 61 | Explain the regulations for maintaining maintenance forms and records as contained in FARs, parts 43 and 91. | English: 11.5, 12.5 |
| 62 | Describe the use of Technical Standard Orders (TSOs) to complete specific maintenance tasks. | English: 11.3, 11.5, 12.3, 12.5 |
| 63 | Identify manufacturer’s manuals and related publications to accomplish specific maintenance tasks. | English: 11.5, 12.5 |
| 64 | Maintain record entries for a specific aviation maintenance task. | English: 11.5, 11.6, 11.7, 12.5, 12.6, 12.7 |
| 65 | Research aircraft information to determine aircraft conformity. | English: 11.8, 12.8 |
| 66 | Explain the four forces of flight and how each affects an aircraft in straight-and-level flight. | English: 11.5, 12.5  
Science: PH.5 |
|   | Define common terminology used in aerodynamics. | English: 11.3, 11.5, 12.3, 12.5  
Science: PH.5 |
|---|---|---|
| 68 | Identify the five major components of an airplane. | English: 11.5, 12.5  
Science: PH.5 |
| 69 | Explain how the movements of the rudder, ailerons, flaps, and elevator affect the flight path of an airplane. | English: 11.5, 12.5  
Science: PH.5 |
| 70 | Explain how an airfoil’s lift and angle of attack are affected by relative wind and airspeed. | English: 11.5, 12.5  
Science: PH.5 |
| 71 | Explain how relative wind, angle of attack, center of lift, and laminar flow affect the performance of an airfoil. | English: 11.3, 11.5, 12.3, 12.5  
Science: PH.5 |
| 72 | Explain how rudder, aileron, and elevator deflection move an airplane around the center of gravity through each of the three axes of flight. | English: 11.5, 12.5  
Science: PH.5 |
| 73 | Describe the role of lift, weight, drag, and thrust on a climbing, descending, and turning airplane. | English: 11.5, 12.5  
Science: PH.5 |
| 74 | Describe how centrifugal force, yaw, and skid are associated with a turning aircraft. | English: 11.5, 12.5 |
| 75 | Compare rotary-winged and fixed-wing flight. | English: 11.5, 12.5 |
| 76 | Explain the functions of the control surfaces and flight controls for a rotary-winged aircraft. | English: 11.5, 12.5 |
| 77 | Explain the factors affecting air pressure around an airfoil. | English: 11.5, 12.5 |
| 78 | Explain how simple machines are used in aircraft engines, control surfaces, and cockpit controls. | English: 11.5, 12.5 |
| 79 | Identify the types and uses of ground support equipment. | English: 11.5, 12.5 |
| 80 | Demonstrate the procedures for moving an aircraft on the flight line. | English: 11.5, 12.5 |
| 81 | Prepare an aircraft for outside storage. | |
| 82 | Describe the four classes of aircraft fires. | English: 11.5, 12.5 |
| 83 | Describe the physical and chemical properties of each of the four types of fire extinguishing agents. | English: 11.5, 12.5 |
| 84 | Compare fixed and portable aircraft fire extinguishers. | English: 11.5, 12.5 |
| 85 | Compare common types of aviation fuels. | English: 11.5, 12.5 |
| 86 | Describe the characteristics and properties of aviation fuels. | English: 11.5, 12.5 |
| 87 | Compare aviation gasolines and turbine engine fuels. | |
| 88 | Demonstrate the procedures for fueling and defueling. | |
| 89 | Identify aircraft fueling systems and how they are monitored in the cockpit. | English: 11.5, 12.5 |
| 90 | Identify color codes used to designate fluids in the servicing and assembly of aircraft. | English: 11.5, 12.5 |
| 91 | Convert civilian time to 24-hour (military) time and vice-versa. | |
| 92 | Demonstrate the procedures for starting a reciprocating aircraft engine. | |
| 93 | Operate the ground engine for a light aircraft. | |
| 94 | Explain the procedures for starting a turbine engine. | English: 11.5, 12.5 |
| 95 | Explain how work, power, and air density affect engine power output. | English: 11.5, 12.5 |
| 96 | Identify the cycles of a four-stroke reciprocating engine. | English: 11.5, 12.5 |
| 97 | Identify the components in the reciprocating engine ignition system. | English: 11.5, 12.5 |
| 98 | Explain the formation of carburetor ice. | English: 11.5, 12.5 |
| 99 | Explain the functions of the engine oil system and how the system is monitored in the cockpit. | English: 11.5, 12.5 |
| 100 | Explain the operation of the air cooling system and how the system is monitored in the cockpit. | English: 11.5, 12.5 |
| 101 | Explain how thrust is produced in both the fixed-pitch and constant-speed aircraft propellers and how RPM is registered on the tachometer. | English: 11.5, 12.5 |
| 102 | Inspect and service batteries. | |
| 103 | Calculate and measure capacitance and inductance. | English: 11.5, 12.5 |
| 104 | Calculate and measure electrical power. | Mathematics: A.1, A.4, AII.3 |
| 105 | Science: PH.11 | |
| 106 | Measure voltage, current, resistance, and continuity. | English: 11.5, 11.6, 12.5, 12.6 |
| 107 | Science: PH.11 | |
| 108 | Determine the relationship between voltage, current, and resistance in electrical circuits. | English: 11.5, 12.5 |
| 109 | Science: PH.11 | |
| 110 | Interpret aircraft electrical circuit diagrams, including solid-state devices and logic functions. | English: 11.5, 12.5 |
Entrepreneurship Infusion Units

Entrepreneurship Infusion Units may be used to help students achieve additional, focused competencies and enhance the validated tasks/competencies related to identifying and starting a new business venture. Because the unit is a complement to certain designated courses and is not mandatory, all tasks/competencies are marked “optional.” Teachers can find the infusion/unit in the course listing.
Appendix: Credentials, Course Sequences, and Career Cluster Information

Industry Credentials: Only apply to 36-week courses

- College and Work Readiness Assessment (CWRA+)
- Customer Service Examination
- Customer Service Specialist (CSS) Examination
- National Career Readiness Certificate Assessment
- Professional Communications Certification Examination
- Small Unmanned Aircraft System (UAS) Safety Certification Examination
- Workplace Readiness Skills for the Commonwealth Examination

Concentration sequences: A combination of this course and those below, equivalent to two 36-week courses, is a concentration sequence. Students wishing to complete a specialization may take additional courses based on their career pathways. A program completer is a student who has met the requirements for a CTE concentration sequence and all other requirements for high school graduation or an approved alternative education program.

- Air Traffic Controller (8734/36 weeks, 280 hours)
- Aviation Maintenance Technology II (8729/36 weeks, 280 hours)

Career Cluster: Transportation, Distribution and Logistics

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