Rod Machado's Private Pilot Ground School Syllabus

The Outline for Teaching A Nine Week Ground School

Rod Machado's Private Pilot, FAA Approved, Part 141 Ground Training Syllabus or Part 61 Ground Training Syllabus

Presented by: Rod Machado/Certified Flight Instructor

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To e-mail, visit web site at: www.rodmachado.com

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Required Ground School Study Materials

Rod Machado's Private Pilot Handbook (book or ebook—or optional *Audiobook*
Rod Machado's Private Pilot eWorkbook (ebook only)
Mechanical E6-B computer, plotter,
Sectional and terminal area chart (if appropriate) for training area
AIM – Aeronautical Information Manual (get combo FAR and AIM if possible)

Rod Machado's Web Site: www.rodmachdo.com

Rod Machado's Private Pilot Ground School Images for CFIs

Images for Instructor to Teach Private Pilot Ground School

Easy to use:

Rod Machado's Private Pilot Slides as 936 JPG picture files in chapter folders and inserted in PowerPoint 2000/2007 files. The PowerPoint files represent Chapters 1 through 17 of *Rod Machado's Private Pilot Handbook*. All pictures used in these PowerPoint presentations are also provided in 17 separate folders so you can build your own slideshow.

Technical Information: Pictures are JPG files in full color format. Picture format appx. 8 X 6 inches @ 150 DPI). These images are made from the pictures, text and illustrations found in *Rod Machado's Private Pilot Handbook*and are designed to follow its curriculum.

Price: $149.94 without the purchase of 10 Private Pilot Handbooks.

How to order:

Call for special discount link when purchasing 10 books wholesale (800) 247-1215. All other products call (800) 437-7080

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Rod Machado's Private Pilot Ground Training Syllabus

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Ground School Format

The ground school presented here is a nine week class. Classes meet two times a week for three hours of instruction at each meeting (an hour consists of 50 minutes of instruction and a 10 minute break). The class provides a total of 51.5 hours of presented material including 2.5 hours for issuing two stage exams and a final exam.

Ground School Presentation Sequence

The ground school presented here consists of three stages. **Stage One** covers Chapters 1-6 of *Rod Machado's Private Pilot Handbook*. **Stage Two** covers Chapters 7-12 of *Rod Machado's Private Pilot Handbook*. **Stage Three** covers Chapters 13-17 of *Rod Machado's Private Pilot Handbook*. At the end of Stage One and Stage Two, an exam is given. A final (Stage Three) exam is scheduled at the end of the nine week class period. The Stage Three exam is a comprehensive exam given on the last official day of class.

The ground school is designed to allow a student to join the class at any time during the nine week class cycle. Each class is an individualized module of learning that is independent of the information presented in a prior ground lesson.

Joining the Class Mid-Session

A student may join the class at the beginning of any scheduled class session. The student will not be eligible to take the Stage One or Two exam or the final (Stage Three) exam until that student completes all of the lessons covered by those stages.

Example 1: A student begins class during Ground Lesson 4. The student will forgo the Stage One exam. The student is eligible for the Stage Two exam after completing Ground Lessons 7-12. When the student completes Ground Lessons 13-18, that student is still not eligible for the final (Stage Three) exam. However, once the student completes Ground Lessons 1-3, that student is now eligible for the Stage One exam and the final (Stage Three) exam. Once eligible, these exams may be given to the student by any authorized instructor.

Example 2: A student begins class during Ground Lesson 8. The student will forgo the Stage Two exam and the final (Stage Three) exam as the class progresses. The student will then be eligible for the Stage Two exam and the final (Stage Three) exam only after completing Ground Lessons 1-7 (during which time that student will have completed the Stage One exam at the end of Ground Lesson 6). Once eligible, the Stage Two exam and the final (Stage Three) exam can be given to that student by an authorized instructor.

Directed Self-Study

In the event a student misses not more than four ground lessons (i.e., four, three-hour class sessions), that student may complete the ground lessons missed by directed self-study, which will be conducted under the supervision of an authorized instructor. Once the student completes the ground lessons missed, that student is eligible for the appropriate stage or final exams.

Rod Machado's Private Pilot Ground Training Syllabus

Ground Training Objectives

This syllabus prescribes the course of training necessary for a student to obtain the required knowledge for the Private Pilot Knowledge Exam specified in CFAR Part 61/Part 141.

Ground Training Completion Standards

Students will demonstrate by written exam that the knowledge required for the Private Pilot Knowledge Exam as prescribed in CFAR Part 61/Part 141 has been met.

Stage One

Stage One Objectives

In this stage, the student is introduced to the airplane's major components and learns the basics of aerodynamics, light airplane engine operations, the airplane's electrical system, the airplane's flight instruments and the Federal Aviation Regulations, as these subjects pertain to typical light airplane operations by a private pilot.

Stage One Completion Standards

Completion of this stage will occur when the student takes the Stage One exam, completing it with a minimum passing score of 80%. The instructor will orally review each incorrect response, thus ensuring an adequate understanding of the material before proceeding to the next stage.

Stage One

Ground Lesson 1

Text Reference:
Rod Machado's Private Pilot Handbook
Rod Machado's Private Pilot Workbook

Presentation Format:
Any combination of visual or oral means may be used to present the required information.

Recommended Presentation Sequence:
Chapter One - Pages A1-8, *Airplane Components (I hour)*
Chapter Two - Pages B1-25, *Aerodynamics (2 hours)*

Lesson Objective:
During this lesson, the student will become familiar with and develop a basic understanding of an airplane's major components and the terms used in the operation of an airplane. The student will also become familiar with and develop an understanding of the basic aerodynamic principles of flight from the four forces to ground effect.

Lesson Content:
Chapter 1:
_____ Airplane Components
_____ The Wing
_____ Stall Equipment
_____ Moving Parts
_____ The Empennage
_____ Antennas
_____ The Engine

Chapter 2:
_____ The Four Forces
_____ Climbs
_____ Descents
_____ Defining the Wing
_____ How the Wing Works
_____ Relative Wind
_____ Attacking the Air
_____ How Lift Develops
_____ Impact vs. Pressure Lift
_____ Angle of Attack
_____ Stalls & Angle of Attack
_____ Stall at Any Attitude or Airspeed
_____ Five Stall Warning Signs
_____ Stalling Speed, Gee Whiz and G-Force
_____ What a Drag
_____ Horizontal and Vertical Movement of Air
_____ Total Drag and Your Go Far Speed
_____ Stretching the Glide, Saving the Hide
_____ Ground Effect
_____ Where to Use Caution in Ground Effect
_____ Pitch Changes In and Out of Ground Effect

Completion Standards:
By the following class period the student will complete the sections in *Rod Machado's Private Pilot Workbook* that pertain to the material covered in this ground lesson.

Study Assignments (Assign the homework assignment below during the first class session):
Rod Machado's Private Pilot Handbook
Read: Chapter One - Pages A1-8, *Airplane Components*
Read: Chapter Two - Pages B1-25, *Aerodynamics*
Read: Chapter Three - Pages C1-9, *Engines*

Ground Lesson 2

Text Reference
Rod Machado's Private Pilot Handbook
Rod Machado's Private Pilot Workbook

Presentation Format
Any combination of visual or oral means may be used to present the required information.

Recommended Presentation Sequence
Chapter Two - Pages B26-52, *Aerodynamics (2 hours)*
Chapter Three - Pages C1-9, *Engines (1 hour)*

Lesson Objective
During this lesson, the student will become familiar with and develop a basic understanding of advanced aerodynamic concepts from flap operations to maneuvering speed. Additionally, the student will become familiar with and develop a basic understanding of general aviation engine operations from engine design to carburetor operation.

Lesson Content
Chapter 2:
_____ Flap Over Flaps
_____ Flap Varieties
_____ Why Use Flaps?
_____ How Airplanes Turn
_____ Flight Controls
_____ Ailerons
_____ Adverse Yaw
_____ Rudders
_____ Elevator
_____ Trim Tabs
_____ Left Turning Tendencies
_____ How a Spin Occurs
_____ Parasite Drag
_____ Induced Drag
_____ Maximum Range
_____ Maximum Endurance
_____ The Best Glide Speed and Weight Changes
_____ A Different Look at Maneuvering Speed
_____ Weight Change and V_a
_____ Vg Diagram

Chapter 3:
_____ The Airplane Engine
_____ Four Cycle Engine
_____ The Ignition System
_____ Dual Ignition Systems
_____ Meet Mister Magneto
_____ Impulse Coupling
_____ Selecting Magnetos
_____ The P-Lead
_____ The Exhaust System
_____ The Induction System
_____ The Carburetor

Completion Standards:
By the following class period the student will complete the sections in *Rod Machado's Private Pilot Workbook* that pertain to the material covered in this ground lesson.

Study Assignments:
Rod Machado's Private Pilot Handbook:
Read: Chapter Three - Pages C9-38, *Engines*

Ground Lesson 3

Text Reference:
Rod Machado's Private Pilot Handbook
Rod Machado's Private Pilot Workbook

Presentation Format:
Any combination of visual or oral means may be used to present the required information.

Recommended Presentation Sequence:
Chapter Three - Pages C9-38, *Engines (3 hours)*

Lesson Objective:
During this lesson, the student will become familiar with and develop a basic understanding of the advanced operations of the modern general aviation airplane engine from the carburetor's idling system to fuel injection operations.

Lesson Content:
Chapter 3:
_____ The Idling System
_____ The Accelerator Pump
_____ Atomization of Fuel
_____ Your Carburetor, the Ice Maker
_____ Ice: Just Your Type
_____ The Carburetor Heater
_____ Carb Ice Symptoms
_____ Apply Carb Heat as a Precautionary Measure
_____ Carburetor Icing Potential in Different Engines
_____ The Mixture Control
_____ The Fuel/Air Mixture
_____ When to Lean
_____ How to Lean
_____ Too Rich and Too Lean
_____ Leaning & High Alt Takeoffs for Nonturbocharged Airplanes
_____ EGT Gauge Setting for Best Power or Best Economy
_____ The Fuel System
_____ Components
_____ Fuel Colors
_____ Fuel Vents
_____ Auxiliary Fuel Pumps
_____ Prime Time
_____ Fuel Gauges
_____ How Much Is Enough?
_____ The Oil System
_____ Change of Life
_____ Malfunctions in the Oil System
_____ The Engine Cooling System
_____ The Propeller
_____ Why Constant Speed Propellers?
_____ How to Make Power Changes
_____ Propeller Tips and Ideas
_____ Detonation and Preignition
_____ Fuel Injection Systems
_____ Turbocharging (optional)
_____ Pressurization (optional)

Completion Standards:
By the following class period the student will complete the sections in *Rod Machado's Private Pilot Workbook* that pertain to the material covered in this ground lesson.

Study Assignments:
Rod Machado's Private Pilot Handbook:
Read: Chapter Four - Pages D1-16, *Electrical System*
Read: Chapter Five - Pages E1-18, *Flight Instruments*

Ground Lesson 4

Text Reference:
Rod Machado's Private Pilot Handbook
Rod Machado's Private Pilot Workbook

Presentation Format:
Any combination of visual or oral means may be used to present the required information.

Recommended Presentation Sequence:
Chapter Four - Pages D1-16, *Electrical Systems (1 hour)*
Chapter Five - Pages E1-18, *Flight Instruments (2 hours)*

Lesson Objective:
During this lesson, the student will become familiar with and develop a basic understanding of the typical general aviation airplane's electrical system. Additionally, the student will become familiar with and develop a basic understanding of the workings of the non-gyro instruments from the airspeed indicator to the altimeter.

Lesson Content:
Chapter 4:
_____ Electricity and Water
_____ The Water Pump
_____ The Electrical Ground
_____ Load Meter
_____ The Battery
_____ Battery Potential
_____ The Charge-Discharge Ammeter
_____ Load Meters
_____ Electrical Drain
_____ The Voltage Regulator
_____ Problems With Brains
_____ Making Connections
_____ Drawing It All Together
_____ How the Battery Contactor Works

Chapter 5:
_____ Non-Gyro Instruments
_____ Airspeed Indicator
_____ Static Pressure
_____ Pitot Tubes
_____ The Airspeed Indicator's Face
_____ Indicated Airspeeds
_____ Calibrated Airspeed
_____ True Airspeed
_____ Dense Doings
_____ The Altimeter
_____ Pressure Variations and the Altimeter
_____ Temperature Variations and the Altimeter
_____ Sensitive Altimeters
_____ Pressure Altitude

Completion Standards:
By the following class period the student will complete the sections in *Rod Machado's Private Pilot Workbook* that pertain to the material covered in this ground lesson.

Study Assignments:
Rod Machado's Private Pilot Handbook:
Read: Chapter Five - Pages E18-42, *Flight Instruments*
Read: Chapter Six - Pages F1-F19, FARs

Ground Lesson 5:

Text Reference:
Rod Machado's Private Pilot Handbook
Rod Machado's Private Pilot Workbook

Presentation Format:
Any combination of visual or oral means may be used to present the required information.

Recommended Presentation Sequence:
Chapter Five - Pages E18-42, *Flight Instruments (2 hours)*
Chapter Six - Pages F1-19, *FARs (1 hour)*

Lesson Objective:
During this lesson, the student will become familiar with and develop a basic understanding of the airplane's gyroscopic instruments and how they work. Additionally, the student will become familiar with and develop a basic understanding of the following sections of the Code of Federal Aviation Regulations: *Definitions* and *Part 61.*

Lesson Content:
Chapter 5:
_____ Reading the Altimeter
_____ The Vertical Speed Indicator (VSI)
_____ Alternate Static Source
_____ The Gyroscopic Instruments
_____ The Attitude Indicator
_____ The Heading Indicator
_____ The Turn Coordinator
_____ The Magnetic Compass Acceleration and Deceleration Error
_____ Northerly Turning Errors
_____ Gyroscopic Precession (optional)

Chapter 6:
_____ Definitions
_____ Aircraft
_____ Category
_____ Class
_____ Type Ratings
_____ Visual Flight Rules (VFR)
_____ Instrument Flight Rules (IFR)
_____ Night
_____ Pilot In Command (PIC)
_____ FAR 61.3 Requirements for Certificates,Ratings & Authorizations
_____ FAR 61.15 Offenses Involving Alcohol or Drugs
_____ FAR 61.23 Duration of Medical Certificates
_____ FAR 61.31 General Limitations: High performance/complex AC
_____ FAR 61.31 High Altitude Airplanes
_____ FAR 61.31 Tailwheel Airplanes
_____ FAR 61.56 Flight Reviews
_____ FAR 61.57 Recent Flight Experience - Pilot In Command
_____ FAR 61.57 Recent Experience at Night
_____ FAR 61.60 Change of Address
_____ FAR 61.81 Student and Recreational Pilots (optional)
_____ FAR 61.89 General Limitations
_____ FAR 61.93 Cross Country Flight Requirements (optional)
_____ FAR 61.103 Private Pilot Requirements (optional)
_____ FAR 61.107 Flight Experience (optional)
_____ FAR 61.118 Private Pilot Privileges and Limitations: as PIC

Completion Standards:
By the following class period the student will complete the sections in *Rod Machado's Private Pilot Workbook* that pertain to the material covered in this ground lesson.

Study Assignments:
Rod Machado's Private Pilot Handbook:
Read: Chapter Six - Pages F20-60, *FARs*

Ground Lesson 6:

Text Reference:
Rod Machado's Private Pilot Handbook
Rod Machado's Private Pilot Workbook

Presentation Format:
Any combination of visual or oral means may be used to present the required information.

Lesson Objective:
During this lesson, the student will become familiar with and develop a basic understanding of the relevant sections of Part 91 of the Code of Federal Aviation Regulations and the relevant sections of NTSB 830 rules and regulations. The Stage One written exam will be administered during class.

Recommended Presentation Sequence:
Chapter Six - Pages F20-60, *FARs (2:45 hours)*
Issue Stage One Exam (:15)

Lesson Content:
Chapter 6:

_____ FAR 91.3 Responsibility and Authority of the Pilot In Command
_____ FAR 91.7 Civil Aircraft Airworthiness
_____ FAR 91.9 Civil Aircraft Flight Manual
_____ FAR 91.15 Dropping Objects
_____ FAR 91.17 Alcohol or Drugs
_____ FAR 91.103 Preflight Action
_____ FAR 91.105 Flight Crewmembers at Stations
_____ FAR 91.107 Use of Safety Belts
_____ FAR 91.111 Operating Near Other Aircraft
_____ FAR 91.113 Right of Way Rules: Except Water
_____ FAR 91.113 Right of Way Rules: Water Operations
_____ FAR 91.117 Aircraft Speed
_____ FAR 91.119 Minimum Safe Altitudes
_____ FAR 91.121 Altimeter Settings
_____ FAR 91.123 Compliance with ATC Clearances and Instructions
_____ FAR 91.125 ATC Light Signals
_____ FAR 91.126 Operating on or in the Vicinity of an Airport in Class G Airspace (familiarize only)*
_____ FAR 91.127 Operations on or in the Vicinity of an Airport in Class E Airspace (familiarize only)*
_____ FAR 91.129 Operations in Class D Airspace (familiarize only)*
_____ FAR 91.130 Operations in Class C Airspace (familiarize only)*
_____ FAR 91.131 Operations in Class B Airspace (familiarize only)*
_____ FAR 91.133 Restricted and Prohibited Areas
_____ FAR 91.135 Operations in Class A Airspace
_____ FAR 91.151 Fuel Requirements for Flight in VFR Conditions
_____ FAR 91.155 Basic VFR Weather Minimums
_____ FAR 91.157 Special VFR Weather Minimums
_____ FAR 91.159 VFR Cruising Altitude or Flight Level
_____ FAR 91.203 Civil Aircraft: Certifications Required
_____ FAR 91.207 Emergency Locator Transmitters
_____ FAR 91.209 Aircraft Lights
_____ FAR 91.211 Use of Supplemental Oxygen
_____ FAR 91.215 ATC Transponder and Altitude Reporting Equipment and Use
_____ FAR 91.303 Aerobatic Flight
_____ FAR 91.307 Parachutes and Parachuting
_____ FAR 91.313 Restricted Cat. Civil Aircraft:Operating Limitations
_____ FAR 91.319 Aircraft Having Experimental Certificates:
_____ FAR 91.403 Aircraft Maintenance: General
_____ FAR 91.407 Operations After Maintenance, Preventive Maintenance, Rebuilding or Alteration
_____ FAR 91.409 Inspections
_____ FAR 91.413 ATC Transponder Tests and Inspections
_____ FAR 91. 417 Maintenance Records
_____ National Transportation Safety Board 830
_____ NTSB 830.2 Definitions
_____ NTSB 830.5 Immediate Notification
_____ NTSB 830.10 Preservation of Aircraft Wreckage, Mail, Cargo and Records
_____ NTSB 830.15 Reports and Statements to Be Filed

Completion Standards:
By the following class period the student will complete the sections in *Rod Machado's Private Pilot Workbook* that pertain to the material covered in this ground lesson.

Study Assignments:
Rod Machado's Private Pilot Handbook:
Read: Chapter Seven - Pages G1-32, *Airport Operations*
Read: Chapter Eight - Pages H1-11, *Radio Operations*

***Note**: The instructor should familiarize the student with the parts of these regulations that don't pertain to the construction of the associated airspace. Airspace construction will be thoroughly covered in Ground Lessons 8 & 9.

Ground Training Objectives

This syllabus prescribes the course of training necessary for a student to obtain the required knowledge for the Private Pilot Knowledge Exam specified in CFAR Part 61/Part 141.

Ground Training Completion Standards

Students will demonstrate by written exam that the knowledge required for the Private Pilot Knowledge Exam as prescribed in CFAR Part 61/Part 141 has been met.

Stage Two

Stage Two Objectives

In this stage, the student will be introduced to the basic fundamentals of airport operations at controlled and uncontrolled airports, airspace, chart symbology, radio navigation and meteorology, as these subjects pertain to typical light airplane operations by a private pilot.

Stage Two Completion Standards

Completion of this stage occurs when the student takes the Stage Two exam, completing it with a minimum passing score of 80%. The instructor will orally review each incorrect response, thus ensuring an adequate understanding of the material before proceeding to the next stage.

Ground Lesson 7:

Text Reference:
Rod Machado's Private Pilot Handbook
Rod Machado's Private Pilot Workbook

Presentation Format:
Any combination of visual or oral means may be used to present the required information.

Recommended Presentation Sequence:
Chapter Seven - Pages G1-32, *Airport Operations (2 hours)*
Chapter Eight - Pages H1-11, *Radio Operations (1 hour)*

Lesson Objective:
During this lesson, the student will become familiar with and develop a basic understanding of airport operations including signage, traffic patterns, wind designators and operations at towered and nontowered airports as well as radio telephony, HIWAS and TWEB.

Lesson Content:
Chapter 7:

_____ Runway Lighting
_____ Taxiway Markings
_____ Additional Runway Markings
_____ Airport Beacons
_____ The Traffic Pattern
_____ Traffic Pattern Components
_____ Crabbing in the Pattern
_____ Entering the Traffic Pattern
_____ The Segmented Circle
_____ Wind and Landing-Direction Indicators
_____ The 45 Degree Entry Point
_____ CTAF (Common Traffic Advisory Frequency)
_____ Using Unicom and Multicom for Information
_____ Finding Out What's Common
_____ Automatic Terminal Information Service (ATIS)
_____ Pilot Control of Airport Lighting
_____ Visual Approach Slope Indicator (VASI)
_____ Precision Approach Path Indicator (PAPI)
_____ Tricolor VASI
_____ Pulsating VASI Systems
_____ Wake Turbulence
_____ ATC Wake Turbulence Separation Requirements
_____ Taxiing in Crosswind Conditions
_____ LAHSO (Land and Hold Short Operations)

Chapter 8:

_____ Radio Technique
_____ Radio Equipment
_____ Talking the Talk
_____ Controlled Airports
_____ Control Tower Communications
_____ HIWAS and TWEB

Completion Standards:
By the following class period the student will complete the sections in *Rod Machado's Private Pilot Workbook* that pertain to the material covered in this ground lesson.

Study Assignments:
Rod Machado's Private Pilot Handbook:
Read: Chapter Eight - Pages H11-22, *Radio Operations*
Read: Chapter Nine - Pages I1-13, *Airspace*

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Ground Lesson 8:

Text Reference:
Rod Machado's Private Pilot Handbook
Rod Machado's Private Pilot Workbook

Presentation Format:
Any combination of visual or oral means may be used to present the required information.

Recommended Presentation Sequence:
Chapter Eight - Pages H11-22, *Radio Operations (1 hour)*
Chapter Nine - Pages I1-13, *Airspace (2 hours)*

Lesson Objective:
During this lesson, the student will become familiar with and develop a basic understanding of radio operations, frequencies and radar services. Additionally, the student will become familiar with and develop a basic understanding of Class A and E airspace, controlled and uncontrolled airspace, surface-based controlled airspace and special VFR operations.

Lesson Content:
Chapter 8:
_____ The Emergency Frequency
_____ The *Chart Supplement* (CS)
_____ Radar and the ATC System
_____ Transponders
_____ Airborne Cowboy: Riding a DF Steer
_____ Radar Services for Pilots
_____ Radar Assistance to VFR Aircraft
_____ Basic Radar Service
_____ Terminal Radar Service Area (TRSA) Service
_____ Class C Service
_____ Class B Service
_____ Clearance Delivery
_____ How ATC Keeps an Eye on You

Chapter 9:
_____ Controlled and Uncontrolled Airspace
_____ The Big Picture
_____ Class A Airspace Class E Airspace
_____ Class E at and Above 10,000 Feet MSL
_____ Class E Below 10,000 Feet MSL
_____ Class E Airspace Starting at 700 Feet AGL
_____ Additional Requirements in Surface-Based Controlled Airspace
_____ Special VFR Clearance
_____ Obtaining a SVFR Clearance
_____ Satellite Airports Lying Within the Primary Airport's Surface-Based Controlled Airspace

Completion Standards:
By the following class period the student will complete the sections in *Rod Machado's Private Pilot Workbook* that pertain to the material covered in this ground lesson.

Study Assignments:
Rod Machado's Private Pilot Handbook:
Read: Chapter Nine - Pages I14-36, *Airspace*

Ground Lesson 9:

Text Reference:
Rod Machado's Private Pilot Handbook
Rod Machado's Private Pilot Workbook

Presentation Format:
Any combination of visual or oral means may be used to present the required information.

Recommended Presentation Sequence:
Chapter Nine - Pages I14-36, *Airspace (3 hours)*

Lesson Objective:
During this lesson, the student will become familiar with and develop a basic understanding of Class G, D, B, and C airspace and the equipment and requirements to operate within this airspace. The student will also become familiar with and develop a basic understanding of special use airspace.

Lesson Content:
Chapter 9
_____ Class G Airspace
_____ Night Operations in Class G Airspace at 1,200 Feet AGL and Below
_____ Basic VFR Minimums in Class G Airspace
_____ Operations in Class G Airspace Above 1,200 Feet AGL
_____ Basic VFR Minimums in Class G Airspace
_____ General Conclusions About Class A, E and G Airspace
_____ Class B, C and D Airspace
_____ Class D Airspace
_____ Weather Minimums for Class D Airspace
_____ Satellite Airports Within Class D Airspace
_____ Class C Airspace
_____ Equipment Requirements to Operate Within Class C Airspace
_____ Class C Service
_____ Satellite Airports Within Class C Airspace
_____ Variations in Class C Airspace
_____ Weather Minimums for Class C Airspace
_____ Class B Airspace
_____ Requirements to Enter Class B Airspace
_____ Special VFR Within Class B Airspace
_____ Corridors and Circumnavigating Class B Airspace
_____ Transponder and Mode C Within 30 NM of Certain Airports
_____ Transponders and Mode C Above 10,000 Feet MSL
_____ Transponders in Controlled Airspace
_____ Transponder and Mode C Deviations
_____ Speed Restriction in Class C and D Airspace
_____ Terminal Radar Service Area
_____ Special Use Airspace
_____ Warning Areas
_____ Military Operations Areas
_____ Military Training Routes
_____ Variable Floors of Class E Airspace

Completion Standards:
By the following class period the student will complete the sections in *Rod Machado's Private Pilot Workbook* that pertain to the material covered in this ground lesson.

Study Assignments:
Rod Machado's Private Pilot Handbook:
Read: Chapter Ten - Pages J1-16, *Aviation Maps*
Read: Chapter Eleven - Pages K1-9, *Radio Navigation*

Ground Lesson 10:

Text Reference:
Rod Machado's Private Pilot Handbook
Rod Machado's Private Pilot Workbook

Presentation Format:
Any combination of visual or oral means can be used to present the required information.

Recommended Presentation Sequence:
Chapter Ten - Pages J1-16, *Aviation Maps (2 hours)*
Chapter Eleven - Pages K1-9, *Radio Navigation (1 hour)*

Lesson Objective:
During this lesson, the student will become familiar with and develop a basic understanding of aviation chart symbology, pilotage and VOR navigation.

Lesson Content:
Chapter 10:
_____ The Aeronautical Sectional Chart
_____ World Aeronautical Charts (WAC)
_____ VFR Terminal Area Charts
_____ Topographical Information on a Sectional Chart
_____ Relief (the sloping of terrain)
_____ Color
_____ Spot Elevation Symbols
_____ Critical Elevations
_____ Maximum Elevation Figures (MEF)
_____ Obstacles
_____ Roads
_____ Railroad Tracks
_____ Wires
_____ Shorelines, Rivers & Streams
_____ Populated Areas
_____ Airport
_____ Airways
_____ VFR Reporting Points
_____ Airborne Vehicle Symbols
_____ Park, Wildlife, Forest, Wilderness and Primitive Areas
_____ Miscellaneous

Chapter 11:
_____ Pilotage
_____ Electronic Elucidation
_____ The Big Picture
_____ VOR Stations Shown on a Sectional Chart
_____ Your VOR Equipment
_____ VORs and Airborne Freeways
_____ How to Navigate with VOR

Completion Standards:
By the following class period the student will complete the sections in *Rod Machado's Private Pilot Workbook* that pertain to the material covered in this ground lesson.

Study Assignments:
Rod Machado's Private Pilot Handbook:
Read: Chapter Eleven - Pages K10-44, *Radio Navigation*

Ground Lesson 11:

Text Reference:
Rod Machado's Private Pilot Handbook
Rod Machado's Private Pilot Workbook

Presentation Format:
Any combination of visual or oral means can be used to present the required information.

Recommended Presentation Sequence:
Chapter Eleven - Pages K10-44, *Radio Navigation (3 hours)*

Lesson Objective:
During this lesson, the student will become familiar with and develop a basic understanding of VOR course intercept, VOR tracking, DME, GPS theory, ADF operation, ADF tracking, bearing location and identification.

Lesson Content:
Chapter 11:
_____ Intercepting a VOR Course
_____ Flying from the VOR on a Selected Course
_____ Dual VORs for Position Fixing
_____ Reverse Sensing
_____ Tracking a Selected VOR Course
_____ Chasing the Needle
_____ A Nifty Technique
_____ Proper Names
_____ Distance Measuring Equipment (DME)
_____ What DME Really Tells You
_____ Position Fixing With DME
_____ Area Navigation – RNAV
_____ RNAV Based on VOR/DME
_____ Loran
_____ The Global Positioning System – GPS
_____ Automatic Direction Finding (ADF) Navigation
_____ The Radio Magnetic Indicator (RMI)
_____ ADF: Bearing Down on Homing In
_____ Tracking a Magnetic Bearing (optional)
_____ The ADF's Moveable Compass Card
_____ The ADF Fixed Compass Card
_____ Advanced ADF Navigation (optional)
_____ Another Way of Determining Your Magnetic Bearing to or from an NDB
_____ Correcting for Wind (optional)
_____ VOR Test Signal

Completion Standards:
By the following class period the student will complete the sections in *Rod Machado's Private Pilot Workbook* that pertain to the material covered in this ground lesson.

Study Assignments:
Rod Machado's Private Pilot Handbook:
Read: Chapter Twelve - Pages L1-24, *Weather Theory*

Ground Lesson 12:

Text Reference:
Rod Machado's Private Pilot Handbook
Rod Machado's Private Pilot Workbook

Presentation Format:
Any combination of visual or oral means may be used to present the required information.

Recommended Presentation Sequence:
Chapter Twelve - Pages L1-24, *Weather Theory (2:45 hours)*
Issue Stage Two Exam (:15)

Lesson Objective:
During this lesson, the student will become familiar with and develop a basic understanding of weather theory from atmospheric circulation to atmospheric stability. The Stage Two written exam will be administered during class.

Lesson Content:
Chapter 12:
_____ Introduction
_____ Atmospheric Circulation
_____ The Coriolis Force
_____ Air Pressure and Vertical Air Movement
_____ Getting Water in the Air
_____ The Water Content of Warm and Cold Air
_____ Two Ways to Cool Air
_____ Relative Humidity
_____ The Dew Point
_____ Condensation and Cloud Formation
_____ Lapse Rates and Temperature Inversions
_____ Temperature Inversions
_____ Effects of Temperature Inversions
_____ What to Expect in an Inversion
_____ Atmospheric Stability: Warm Over Cold, and Cold Over Warm
_____ The Environmental Lapse Rate
_____ Rising Parcels of Air
_____ Saturated Parcels of Rising Air, Clouds & Atmospheric Stability

Completion Standards:
By the following class period the student will complete the sections in *Rod Machado's Private Pilot Workbook* that pertain to the material covered in this ground lesson.

Study Assignments:
Rod Machado's Private Pilot Handbook:
Read: Chapter Twelve - Pages L25-58, *Weather Theory*

Ground Training Objectives

This syllabus prescribes the course of training necessary for a student to obtain the required knowledge for the Private Pilot Knowledge Exam specified in CFAR Part 61/Part 141.

Ground Training Completion Standards

Students will demonstrate by written exam that the knowledge required for the Private Pilot Knowledge Exam as prescribed in CFAR Part 61/Part 141 has been met.

Stage Three

Stage Three Objectives

In this stage, the student is introduced to the weather reporting and briefing system, weather reports, weather charts and their interpretation and flight planning, including time, distance and fuel computation, as these subjects pertain to typical light airplane operations by a private pilot. Additionally, the student learns how to determine airplane performance, compute a weight and balance, learns the physiological and psychological hazards associated with flight and acquires an understanding of flight plans and the NOTAM system. The final exam is issued at the end of Stage Three.

Stage Three Completion Standards

Completion of this stage will occur when the student takes the Stage Three final exam, completing it with a minimum passing score of 80%. The instructor will orally review each incorrect response thus ensuring an adequate understanding of the material before proceeding to the next stage.

Ground Lesson 13:

Text Reference:
Rod Machado's Private Pilot Handbook
Rod Machado's Private Pilot Workbook

Presentation Format:
Any combination of visual or oral means may be used to present the required information.

Recommended Presentation Sequence:
Chapter 12 - Pages L25-58, *Weather Theory (3 hours)*

Lesson Objective:
During this lesson, the student will become familiar with and develop a basic understanding of weather theory including pressure patterns, frontal formation and movement, fog, thunderstorms, mountains waves and wave cyclones.

Lesson Content:
Chapter 12:
_____ High and Low Pressure Areas
_____ Sea and Land Breeze Circulation
_____ Highs and Lows on Weather Maps
_____ Circulation in Highs and Lows: Going With the Flow
_____ The Answer is Flowin' in the Wind
_____ Weather Associated With Highs and Lows
_____ Ridges and Troughs
_____ Frontal Systems
_____ The Polar Front
_____ Different Types of Fronts
_____ Discontinuities Across a Front
_____ Cold Front Characteristics
_____ Two Types of Cold Fronts
_____ Warm Fronts
_____ Stationary Fronts
_____ The Jet Stream
_____ Thunderstorms
_____ The (Not So Secret) Life of a Thunderstorm
_____ Thunderstorm Types
_____ Squall Lines
_____ Thunderstorm Turbulence
_____ Virga
_____ Thunderstorm Avoidance
_____ Lightning
_____ Turbulence and Wind Shear
_____ Mountain Waves
_____ Temperature Inversions and Wind Shear
_____ Fog
_____ Radiation Fog
_____ Advection Fog
_____ Upslope Fog
_____ Precipitation-Induced Fog
_____ Ice Fog
_____ Steam Fog
_____ Weathering the Weather
_____ Advanced Weather Concepts
_____ Wave Cyclones (Frontal Waves)
_____ Wave Cyclone Weather Patterns
_____ Cold Occlusion
_____ Warm Occlusions
_____ How the Jet Stream Forms (optional)

Completion Standards:
By the following class period the student will complete the sections in *Rod Machado's Private Pilot Workbook* that pertain to the material covered in this ground lesson.

Study Assignments:
Rod Machado's Private Pilot Handbook:
Read: Chapter Thirteen - Pages M1-46, *Wx Charts/Briefings*

Ground Lesson 14:

Text Reference:
Rod Machado's Private Pilot Handbook
Rod Machado's Private Pilot Workbook

Presentation Format:
Any combination of visual or oral means may be used to present the required information.

Recommended Presentation Sequence:
Chapter Thirteen - Pages M1-46, *Wx Charts/Briefings (3 hours)*

Lesson Objective:
During this lesson, the student will become familiar with and develop a basic understanding of weather reporting services including telephone weather briefings as well as textual and graphic weather reports.

Lesson Content:
Chapter 13:
_____ Aviation Weather Services
_____ The Telephone Briefing
_____ Other Sources of Weather Information
_____ Newspapers
_____ Hazardous In-flight Weather Advisory Service (HIWAS)
_____ Enroute Weather Information
_____ Pilot Reports [An Introduction]
_____ METAR Weather Reports
_____ Automatic Weather Observing Programs
_____ ASOS
_____ AWOS
_____ Whither the Weather?
_____ Terminal Aerodrome Weather Forecasts (TAF)
_____ Graphical Forecasts for Aviation (GFA)
_____ Winds Aloft Forecasts (FD)
_____ Weather Charts: Getting the Big Picture
_____ Graphical Forecasts for Aviation (GFA)
_____ Radar Summary Chart
_____ Low Level Significant Weather
_____ Prognostic Chart
_____ Surface Analysis
_____ In-flight Aviation Weather Advisories
_____ SIGMET (WS)
_____ AIRMET (WA)
_____ Convective SIGMETs (WST)
_____ Graphical AIRMETS
_____ Pilot Reports (PIREPS)
_____ Putting It All Together
_____ Surface Analysis and Ceiling/Visibility Chart
_____ Ceiling/Visibility Chart and Radar Summary Chart
_____ Surface Analysis and Prog Charts
_____ METARs/Surface Analysis
_____ Postflight Briefings #13-1, #13-2, #13-3, #13-4

Completion Standards:
By the following class period the student will complete the sections in *Rod Machado's Private Pilot Workbook* that pertain to the material covered in this ground lesson.

Study Assignments:
Rod Machado's Private Pilot Handbook:
Read: Chapter Fourteen - Pages N1-48 , *Flight Planning*

Ground Lesson 15:

Text Reference:
Rod Machado's Private Pilot Handbook
Rod Machado's Private Pilot Workbook

Presentation Format:
Any combination of visual or oral means may be used to present the required information.

Recommended Presentation Sequence:
Chapter Fourteen - Pages N1-48 , *Flight Planning (3 hours)*

Lesson Objective:
During this lesson, the student will become familiar with and develop a basic understanding of dead reckoning navigation, wind effects on a course, flight planning, time, speed, distance and fuel usage computation as well as density altitude, true altitude and true airspeed computation.

Lesson Content:
Chapter 14:
_____ What is Flight Planning?
_____ Measuring Direction
_____ Time Measurement
_____ A Matter of Degree: Longitude & Latitude on Sectional Charts
_____ Cross Country Navigation
_____ Flight Planning Step 1: Draw a line between airports
_____ Flight Planning Step 2: Determine the true course
_____ Flight Planning Step 3: Determine the wind correction angle
_____ The Effect of Water on a Swimmer
_____ The Effect of Wind on an Airplane
_____ Using the Wind Side of the Slide Computer (six steps)
_____ Flight Planning Step 4: Determine the true heading
_____ Flight Planning Step 5: Determining the magnetic heading
_____ Flight Planning Step 6: Determine your compass heading
_____ Return Trip From AVA/Memorial to Table Rock
_____ Planning an Actual Flight
_____ A More Accurate Flight Plan
_____ Final Words on Electronic Flight Computers
_____ The Mechanical Flight Computer
_____ Dance of the Decimals: The Number Scale
_____ Miles on the Menu: Converting Nautical and Statute Miles
_____ Time, Distance and Speed Computations
_____ Fuel Consumption Problems
_____ Finding Density Altitude
_____ Finding True Airspeed
_____ Finding Your True Altitude

Completion Standards:
By the following class period the student will complete the sections in *Rod Machado's Private Pilot Workbook* that pertain to the material covered in this ground lesson.

Study Assignments:
Rod Machado's Private Pilot Handbook:
Read: Chapter Fifteen - Pages O1-26, *Performance Charts*
Read: Chapter Sixteen - Pages P1-9, *Weight and Balance*

Ground Lesson 16:

Text Reference:
Rod Machado's Private Pilot Handbook
Rod Machado's Private Pilot Workbook

Presentation Format:
Any combination of visual or oral means may be used to present the required information.

Recommended Presentation Sequence:
Chapter Fifteen - Pages O1-26, *Performance Charts (2 hours)*
Chapter Sixteen - Pages P1-9, *Weight and Balance (1 hour)*

Lesson Objective:
During this lesson, the student will become familiar with and develop a basic understanding of airplane performance computation. Additionally, the student will become familiar with and develop an understanding of the basic terms needed to compute an airplane's weight and balance.

Lesson Content:
Chapter 15:
_____ Air Density
_____ Height
_____ Heat
_____ Humidity
_____ Density Altitude
_____ Service Ceiling
_____ Performance Charts
_____ Takeoff Concepts
_____ Best Rate and Best Angle of Climb Speeds
_____ Vx and Vy Change With Altitude
_____ Cruise Climb Speed
_____ Takeoff Distance Chart
_____ Landing Distance Performance Charts
_____ A Different Landing Distance Chart
_____ Time, Fuel and Distance to Climb Chart
_____ Cruise Performance Chart
_____ Another Variety of Cruise Performance Charts
_____ Endurance and Range Profile Charts
_____ Crosswind Component Chart

Chapter 16:
_____ Definitions
_____ Excessive Weight and Structural Damage
_____ Center of Gravity
_____ Other CG Considerations
_____ Just a Moment

Completion Standards:
By the following class period the student will complete the sections in *Rod Machado's Private Pilot Workbook* that pertain to the material covered in this ground lesson.

Study Assignments:
Rod Machado's Private Pilot Handbook:
Read: Chapter Sixteen - Pages P9-22, *Weight and Balance*
Read: Chapter Seventeen - Pages Q1-21, *Pilot Potpourri*

Ground Lesson 17:

Text Reference:
Rod Machado's Private Pilot Handbook & Workbook

Presentation Format:
Any combination of visual or oral means may be used to present the required information.

Recommended Presentation Sequence:
Chapter Sixteen - Pages P9-22, *Weight and Balance (1 hour)*
Chapter Seventeen - Pages Q1-43, *Pilot Potpourri (2 hours)*

Lesson Objective:
During this lesson, the student will become familiar with and develop a basic understanding of the knowledge necessary to compute an airplane's weight and balance. Additionally, the student will become familiar with and develop a basic understanding of the physiological and mental hazards associated with flight. The student will become familiar with and develop a basic understanding of flight plans, aeronautical publications and the NOTAM system,

Lesson Content:
Chapter 16:
_____ Don't Wait to Balance
_____ Weight Change
_____ Fuel Burn Weight and Balance
_____ Weight Shift
_____ A Different Type of Weight and Balance Chart

Chapter 17:
_____ Taking AIM: The Aeronautical Information Manual
_____ Fitness for Flight
_____ Illness
_____ Medication
_____ Alcohol-Don't Fly High
_____ Hypoxia: Low O, Two
_____ Hyperventilation
_____ CO Oh Oh
_____ Spatial Disorientation
_____ Visual Illusions
_____ Night Vision
_____ Haze and Collision Avoidance
_____ Scanning for Traffic During the Day
_____ Night Scanning For Traffic
_____ Airplane Blind Spots
_____ Filing a VFR Flight Plan
_____ FAA and Industry Publications
_____ The *Chart Supplement* (CS)
_____ Notices To Airmen (NOTAMS)
_____ NOTAM D & FDC NOTAMS
_____ Advisory Circulars
_____ Aviation Judgment and Decision Making
_____ Postflight Briefings #17-1, #17-2

Completion Standards:
By the following class period the student will complete the sections in *Rod Machado's Private Pilot Workbook* that pertain to the material covered in this ground lesson.

Study Assignments:
Review: *Rod Machado's Private Pilot Handbook* as directed by instructor
Review: *Rod Machado's Private Pilot Workbook* as directed by instructor

Ground Lesson 18:

Text Reference:
Rod Machado's Private Pilot Handbook
Rod Machado's Private Pilot Workbook

Presentation Format:
Any combination of visual or oral means may be used to present the required information.

Recommended Presentation Sequence:
Review class material, discuss exam taking strategies *(:30)*
Present final (Stage Three) exam *(2:00 hours)*
Review final exam *(:30)*

Lesson Objective:
During this lesson, the instructor will review the material presented in class and the student will have the opportunity to ask questions on any topic. A final exam will be presented after the review.

Lesson Content:
Class review and exam.

Completion Standards:
The student will complete the written exam with a minimum score of 80% and the instructor will review each incorrect answer to ensure that the student understands the item missed.

Study Assignments:
The instructor will assign a specific area of review for each student based on that student's exam performance.

Stage One Exam

Rod Machado's Private Pilot Syllabus Part 61/141

Exam Covers Chapters 1-6

1. [A6/1/2]
What do we call the part of the airplane that houses the cockpit and has the wings and engine attached to it?
A. Empennage.
B. Fuselage.
C. Undercarriage.

2. [B1/3/2]
The four forces acting on an airplane in flight are
A. lift, weight, thrust, and drag.
B. lift, weight, gravity, and thrust.
C. lift, gravity, power, and friction.

3. [B14/1/3]
When the critical angle of attack is exceeded the airplane will
A. stall.
B. ascend.
C. descend.

4. [B20/3/4]
The two basic forms of drag are:
A. parasite and induced drag.
B. planform and interference.
C. good and bad drag.

5. [B23/1/4]
Ground effect allows an airplane flying close to the runway to become or remain airborne at a slightly _____ speed.
A. lower-than-normal
B. higher-than-normal
C. higher and lower

6. [B27/1/2 & 3]
What is one purpose of wing flaps?
A. To enable the pilot to make steeper approaches to a landing without increasing the airspeed.
B. To relieve the pilot of maintaining continuous pressure on the controls.
C. To decrease wing area to vary the lift.

7. [B35/1/3]
P-factor is more likely to cause the airplane to yaw to the left
A. at low angles of attack.
B. at high angles of attack.
C. at high airspeeds.

8. [C11/1/4]
Temperature drops of as much as _____ within the carburetor's throat are not uncommon.
A. 10°F
B. 550°F
C. 70°F

9. [C13/1/2]
If an aircraft is equipped with a fixed-pitch propeller and a float-type carburetor, the first indication of carburetor ice would most likely be
A. a drop in oil temperature and cylinder head temperature.
B. engine roughness.
C. loss of RPM.

10. [C15/3/2]
With an increase in altitude the air becomes thinner and doesn't _____ as much for a given volume.
A. weigh
B. count
C. vary

11. [C18/3/3]
High cylinder temperatures also lead to something known as _____.
A. pre-ignition
B. detonation
C. combustion

12. [C21/1/1]
If present, water rests on the _____ of fuel tanks, where it is the first thing to go to the engine.
A. top
B. bottom
C. outside

13. [C25/1/2]
For internal cooling, reciprocating aircraft engines are especially dependent on
A. a properly functioning thermostat.
B. air flowing over the exhaust manifold.
C. the circulation of lubricating oil.

14. [C34/1/3]
Detonation occurs in a reciprocating aircraft engine when
A. the spark plugs are fouled or shorted out or the wiring is defective.
B. hot spots in the combustion chamber ignite the fuel/air mixture in advance of normal ignition.
C. the unburned charge in the cylinders explodes instead of burning normally.

15. [D4/3/1]
Amps are a measure of _____ flow.
A. voltage
B. current
C. water pressure

16. [D6/1/1]
Between the positive terminal of the battery and the primary bus is an ammeter, called a _____ ammeter.
A. charge-discharge
B. battery
C. load

17. [D8/1/1]
A full left deflection of a load meter needle is similar to a charge-discharge ammeter reading pointing to the _____ of its scale.
A. negative side (-)
B. neutral point
C. positive side (+)

18. [D9/3/1]
Voltage regulators help alternators maintain a _____ voltage output under varying RPM conditions.
A. constant
B. low
C. high

19. [D12/1/3]
If the battery is dead, the _____ isn't going to work.
A. magneto
B. engine
C. alternator

20. [E2/3/2 & E3/3/3]
If the pitot tube and outside static vents become clogged, which instruments would be affected?
A. The altimeter, airspeed indicator, and turn-and-slip indicator.
B. The altimeter, airspeed indicator, and vertical speed indicator.
C. The altimeter, attitude indicator, and turn-and-slip indicator.

21. [E4/3/1&2]
V_{so} is defined as the
A. stalling speed or minimum steady flight speed in the landing configuration.
B. stalling speed or minimum steady flight speed in a specified configuration.
C. stalling speed or minimum takeoff safety speed.

22. [E5/3/3]
Which V-speed represents the maneuvering speed?
A. V_a
B. V_{lo}
C. V_{ne}

23. [E9/See TAS & IAS High Altitude Airports]
When making an approach at a high altitude airport, you should:
A. approach at a lower than normal indicated airspeed.
B. approach at a higher than normal indicated speed.
C. approach at a normal indicated speed.

24. [E10/1/4]
What is true altitude?
A. The vertical distance of the aircraft above sea level.
B. The vertical distance of the aircraft above the surface.
C. The height above the standard datum plane.

25. [E15/2/1 & Figure 25]
If a flight is made from an area of high pressure into an area of lower pressure without the altimeter setting being adjusted, the altimeter will indicate
A. lower than the actual altitude above sea level.
B. higher than the actual altitude above sea level.
C. the actual altitude above sea level.

26. [E34/1/2]
In the northern hemisphere, if an aircraft is accelerated or decelerated, the magnetic compass will normally indicate
A. a momentary turn.
B. correctly when on a north or south heading.
C. a turn toward the south.

27. [F2/2/2]
With respect to the certification of aircraft, a class is a subdivision of _____.
A. a category
B. the number of engines
C. the category of airplane only

28. [F4/2/2]
The definition of nighttime is
A. sunset to sunrise.
B. 1 hour after sunset to 1 hour before sunrise.
C. the time between the end of evening civil twilight and the beginning of morning civil twilight.

29. [F7/1/3]
A third class medical certificate is issued to a 19 year-old pilot on August 10. To exercise the privileges of a recreational or private pilot certificate, the medical certificate expires at midnight on
A. August 10, 2 years later.
B. August 31, 2 years later.
C. August 31, 5 years later.

30. [F11/2/3]
The three takeoffs and landings that are required to act as pilot in command at night must be done during the time period from
A. sunset to sunrise.
B. 1 hour after sunset to 1 hour before sunrise.
C. the end of evening civil twilight to the beginning of morning civil twilight.

31. [F18/2/4]
According to regulations pertaining to general privileges and limitations, a private pilot may
A. be paid for the operating expenses of a flight if at least three takeoffs and three landings were made by the pilot within the preceding 90 days.
B. share the operating expenses of a flight with the passengers.
C. not be paid in any manner for the operating expenses of a flight.

32. [F23/2/3]
With respect to passengers, what obligation, if any, does a pilot in command have concerning the use of safety belts?
A. The pilot in command must instruct the passengers to keep their safety belts fastened for the entire flight.
B. The pilot in command must brief the passengers on the use of safety belts and notify them to fasten their safety belts during taxi, takeoff, and landing.
C. The pilot in command has no obligation in regard to passengers' use of safety belts.

33. [F25/1/1]
What action should the pilots of a glider and an airplane take if on a head-on collision course?
A. The airplane pilot should give way to the left.
B. The glider pilot should give way to the right.
C. Both pilots should give way to the right.

34. [F26/2/3]
Unless otherwise authorized, the maximum indicated airspeed at which aircraft may be flown when at or below 2,500 feet AGL and within 4 nautical miles of the primary airport of Class C airspace is
A. 200 knots.
B. 230 knots.
C. 250 knots.

35. [F39/1/2]
Which VFR cruising altitude is acceptable for a flight on a Victor Airway with a magnetic course of 175 degrees?
A. 4,500 feet.
B. 5,000 feet.
C. 5,500 feet.

36. [F40/2/4]
When are non-rechargeable batteries of an emergency locator transmitter (ELT) required to be replaced?
A. Every 24 months.
B. When 50 percent of their useful life expires.
C. At the time of each 100-hour or annual inspection.

37. [F41/2/3]
Except in Alaska, during what time period should lighted position lights be displayed on an aircraft?
A. End of evening civil twilight to the beginning of morning civil twilight.
B. 1 hour after sunset to 1 hour before sunrise.
C. Sunset to sunrise.

38. [F46/2/2]
Preventive maintenance has been performed on an aircraft. What paperwork is required?
A. A full, detailed description of the work done must be entered in the airframe logbook.
B. The date the work was completed, and the name of the person who did the work must be entered in the airframe and engine logbook.
C. The signature, certificate number, and kind of certificate held by the person approving the work and a description of the work must be entered in the aircraft maintenance records.

39. [F48/2/3]
If an aircraft is involved in an accident that results in substantial damage to the aircraft, the nearest NTSB field office should be notified
A. immediately.
B. within 48 hours.
C. within 7 days.

40. [F48/2/4]
Which incident requires an immediate notification to the nearest NTSB field office?
A. A forced landing due to engine failure.
B. Landing gear damage due to a hard landing.
C. Flight control system malfunction or failure.

41. [F58/59, Postflight Briefing #6-7]
To qualify for BasicMed you must hold a:
A. a valid driver's license and comply with its restrictions.
B. current third class medical certificate.
C. valid driver's license and a current flight review.

42. [F58/59, Postflight Briefing #6-7]
To qualify for BasicMed you must have held a valid FAA medical certificate, either a regular or special issuance certificate
A. on or after July 31, 2018
B. on or after July 15, 2006
C. on or after July 1, 2016

43. [F58/59, Postflight Briefing #6-7]
If you were issued a special issuance medical certificate on January 10, 2011 and you let it expire, are you still eligible for BasicMed?
A. No. All special issuance medical certificates prevent BasicMed eligibility.
B. Yes. This is true even if you have developed a bipolar disorder during the interim.
C. Yes, as long as you haven't developed any of the FAA's designated mental health, neurologic or cardiac conditions.

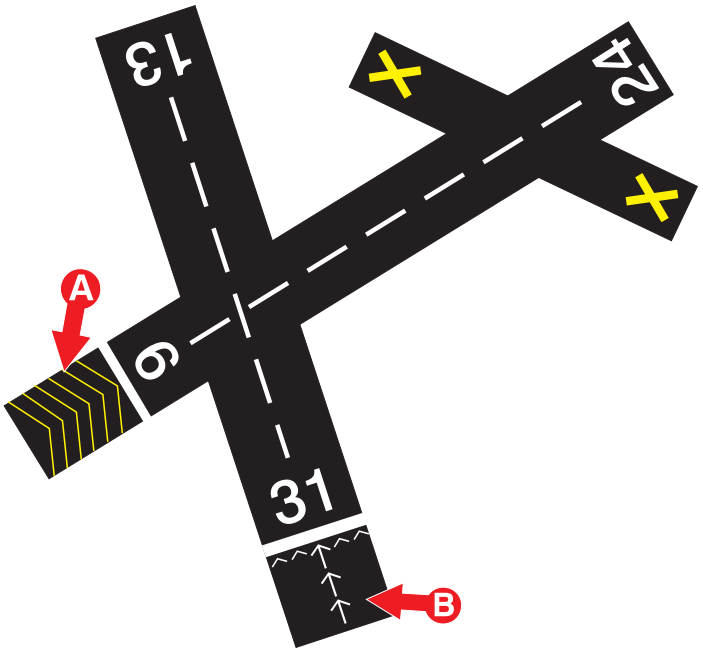
44. [F58/59, Postflight Briefing #6-7]
Can you fly outside the United States under BasicMed?
A. Yes
B. No
C. Only in aircraft weighing less than 4,000 pounds maximum certified takeoff weight.

Stage Two Exam

Rod Machado's Private Pilot Syllabus Part 61/141

Exam Covers Chapters 7-12

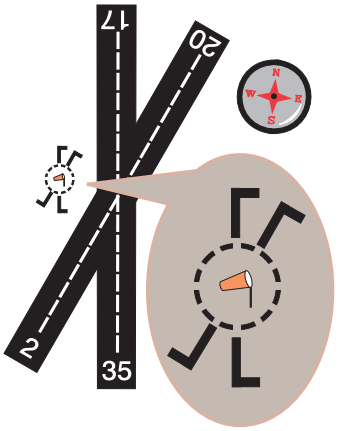
RUNWAY SURFACE MARKINGS



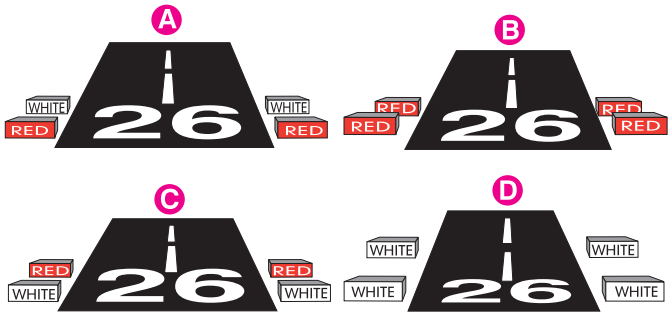
1. [G6/1/1&2] (Refer to the figure above)
According to the airport diagram, which statement is true?
A. Runway 24 is equipped at position A with emergency arresting gear to provide a means of stopping military aircraft.
B. Takeoffs may be started at position B on Runway 31, and the landing portion of this runway begins at the displaced threshold.
C. The takeoff and landing portion of Runway 6 begins at position A.

2. [G13/Figure 22] (Referring to the figure below)
The segmented circle indicates that a landing on Runway 20 will be with a
A. right-quartering headwind.
B. left-quartering headwind.
C. left-quartering tailwind.

TRAFFIC PATTERN INDICATOR



3. [G18/3/2]
Automatic Terminal Information Service (ATIS) is the continuous broadcast of recorded information concerning
A. pilots of radar-identified aircraft whose aircraft is in dangerous proximity to terrain or to an obstruction.
B. non-essential information to reduce frequency congestion.
C. non-control information in selected high-activity terminal areas.



4. [G22/1/2]
VASI lights as shown by illustration D (above) indicate that the airplane is
A. off course to the left.
B. above the glideslope.
C. below the glideslope.

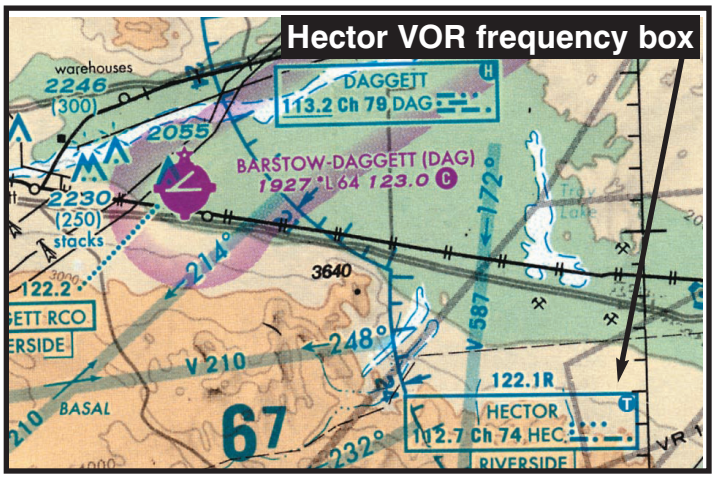
5. [G24/2/4 & G25/1/2]
Wingtip vortices are created only when an aircraft is
A. operating at high airspeeds.
B. heavily loaded.
C. developing lift.

6. [G28/1/2]
How should the flight controls be held while taxiing a tricycle-gear equipped airplane with a left quartering tailwind?
A. Left aileron up, elevator neutral.
B. Left aileron down, elevator down.
C. Left aileron up, elevator down.

7. [G28/See Land and Hold Short Operations]
Where is the "Available Landing Distance" (ALD) data published for an airport that utilizes Land and Hold Short Operations (LAHSO) published?
A. Aeronautical Information Manual (AIM).
B. 14 CFR Part 91, General Operating and Flight Rules.
C. Chart Supplement (CS).

8. [H3/2/1]
The Federal Communications Commission (FCC) assigns frequencies ranging from _____ megahertz (MHz) to _____ MHz for aviation use.
A. 200, 850
B. 118.0, 135.975
C. 119.7, 149.325

9. [H9/1/1]
Referring to the figure below, on what frequency could you contact Riverside FSS if you're in the vicinity of Hector VOR?
A. Transmit on 122.1 MHz, listen on 112.7 MHz.
B. Transmit on 110.2 MHz, listen on 122.1 MHz.
C. Transmit on Channel 39 MHz, listen on 110.2 MHz.



10. [H16/3/3]
An ATC radar facility issues the following advisory to a pilot flying on a heading of 090 degrees:

"TRAFFIC 3 O'CLOCK, 2 MILES, WESTBOUND..."

Where should the pilot look for this traffic?
A. East.
B. South.
C. West.

11. [H18/3/2]
TRSA Service provides
A. IFR separation (1,000 feet vertical and 3 miles lateral) between all aircraft.
B. a warning to pilots when their aircraft is in unsafe proximity to terrain, obstructions, or other aircraft.
C. sequencing and separation for participating VFR aircraft and all IFR aircraft.

12. [H20/1/1]
What publication could you use to determine the stage of radar service available at an airport?
A. The *Chart Supplement*.
B. *Aeronautical Information Manual*.
C. Tony's Handbook of Radar Range Cooking.

13. [I7/2/1]
What minimum flight visibility is required for VFR flight operations on an airway below 10,000 feet MSL?
A. 1 mile.
B. 3 miles.
C. 4 miles.

14. [I9/1/5]
When operating at an airport having any type of surface-based controlled airspace established for it the reported ground visibility at the airport must be at least _____ statute mile(s).
A. five
B. one
C. three

15. [I11/1/2]
A SVFR clearance allows you to operate below _____ feet MSL down to the surface, within the _____ boundaries of surface-based controlled airspace
A. 10,000, lateral
B. 1,200, lateral
C. 14,500, 10 mile

16. [I20/3/1]
Normal VFR operations in Class D airspace with an operating control tower require the ceiling and visibility to be at least
A. 1,000 feet and 1 mile.
B. 1,000 feet and 3 miles.
C. 2,500 feet and 3 miles.

17. [I22/1/2]
Class C airspace is geometrically shaped like two cylinders. The surface-based inner cylinder extends upward to approximately _____ AGL and has a five nautical mile radius from the center of the _____ airport.
A. 4,000 feet, primary
B. 1,200 feet, primary
C. 1,200 feet, satellite

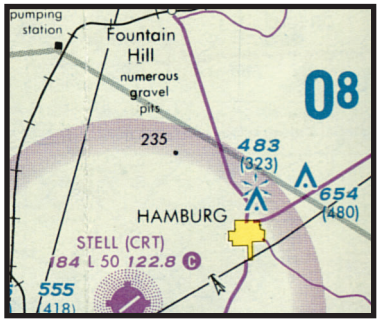
18. [I26/1/3]
What minimum pilot certification is required for operation within Class B airspace?
A. Private pilot certificate or student pilot certificate with appropriate logbook endorsements.
B. Commercial pilot certificate.
C. Private pilot certificate with an instrument rating.

19. [I30/2/3]
Prohibited areas are defined by _____ lines.
A. red dashed
B. red hatched
C. blue hatched

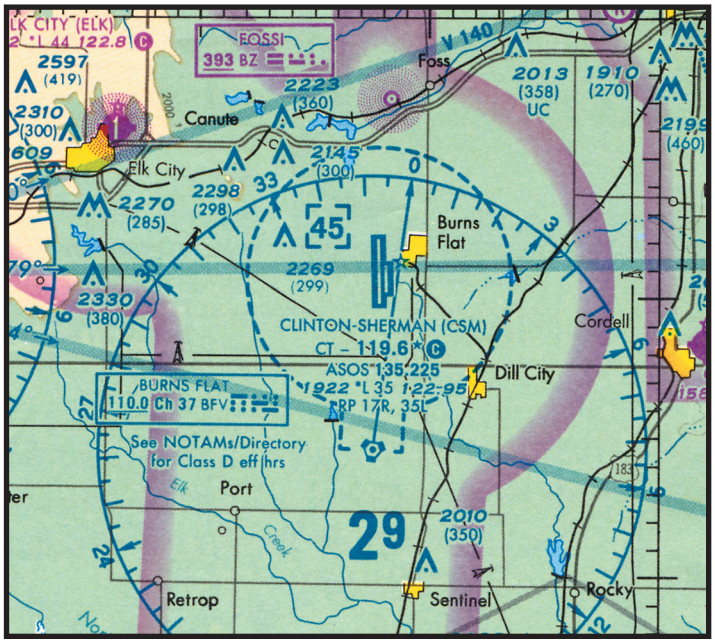
20. [J2/1/1]
Sectional charts are valid for
A. 12 months.
B. 6 months.
C. a lot of things.

21. [J7/1/2]
Maximum elevation figures (MEFs) represent the highest elevation of terrain and other obstacles (towers, trees, etc.) within _____.
A. any area on the chart
B. a quadrangle
C. a magenta bordered area

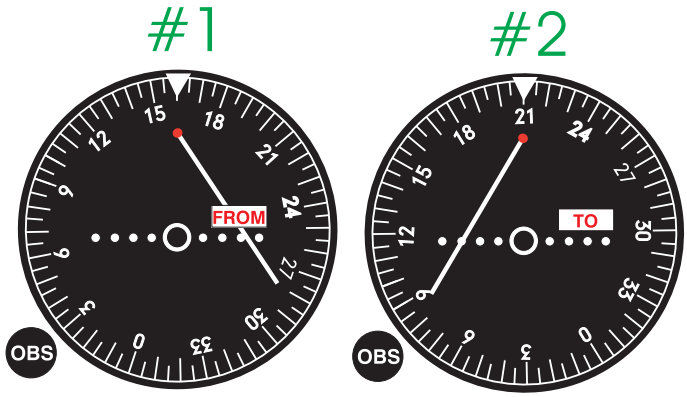
22. [J8/1/1 & J8/2/1&2]
Referring to the figure on the right, the top of the lighted obstacle approximately 2 miles north of the city of Hamburg is
A. 323 feet MSL.
B. 483 feet MSL.
C. 483 feet AGL.



23. [J11/1/1]
Airports are coded by colors on the map. Those airports colored in _____ don't have an air traffic control tower. Those shown in _____ have a tower (although it may not be in operation 24 hours a day—most aren't).
A. magenta, black
B. magenta, blue
C. blue, magenta



24. [J13/1/1]
Referring to the figure above and the airport data listed under Clinton-Sherman airport, what is the airport elevation?
A. 35 feet.
B. 1,922 feet.
C. 119.6 feet.



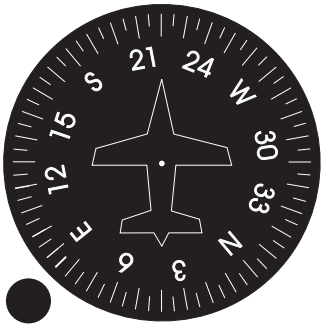
25. [K10/All & Figure 15]
Referring to VOR #1 shown above, what heading should you fly to intercept and track outbound on the 160 degree radial at a 30 degree angle?
A. 160 degrees.
B. 130 degrees.
C. 190 degrees.

26. [K16/All, K16/Figure 22 & K9/Figure 13]
Referring to VOR #2 above, what is the aircraft's position relative to the station?
A. North.
B. West.
C. South.

27. [K24/Figure 34]
How many satellites are in the GPS constellation?
A. 25
B. 24
C. 22

THE RADIO MAGNETIC INDICATOR

28. [K28/2/1]
Based on the RMI above, what radial is the airplane on from the VOR station?
A. 270 degree radial.
B. 090 degree radial.
C. 030 degree radial.



29. [K34/2/5 & Formula on K34]
Referring to the ADF and DG above, determine the magnetic bearing TO the station.
A. 330 degrees MBTS.
B. 220 degrees MBTS.
C. 190 degrees MBTS.

30. [L2/1/2]
Every physical process of weather is accompanied by, or is the result of, a
A. movement of air.
B. pressure differential.
C. heat exchange.

31. [L8/1/4]
Relative humidity is a number that tells you how much _____ the air is holding in relationship to how much it could theoretically hold at its current _____.
A. water vapor, temperature
B. water vapor, humidity
C. pressure, volume

32. [L9/3/2]
The dewpoint is a great indicator of the atmosphere's _____ content. _____ dewpoint temperatures indicate that there's a lot of water in the air. _____ dewpoint temperatures indicate that there's little water in the air.
A. pressure, Low, Low
B. water, Low, High
C. water, High, Low

33. [L10/1/1]
If the temperature/dewpoint spread is small and decreasing, and the temperature is 62 degrees F, what type weather is most likely to develop?
A. Freezing precipitation.
B. Thunderstorms.
C. Fog or low clouds.

34. [L17/3/1]
Warm air resting on top of a cold layer of air would be considered
A. a stable condition.
B. an unstable condition.
C. a neutrally stable condition.

35. [L23/Figure 38]
What is a characteristic of stable air?
A. Stratiform clouds.
B. Unlimited visibility.
C. Cumulus clouds.

36. [L32/2/1]
The boundary between two different air masses is referred to as a
A. frontolysis.
B. frontogenesis.
C. front.

37. [L40/2/4]
What conditions are necessary for the formation of thunderstorms?
A. High humidity, lifting force, and unstable conditions.
B. High humidity, high temperature, and cumulus clouds.
C. Lifting force, moist air, and extensive cloud cover.

38. [L48/Figure 82]
Possible mountain wave turbulence could be anticipated when winds of 40 knots or greater blow
A. across a mountain ridge, and the air is stable.
B. down a mountain valley, and the air is unstable.
C. parallel to a mountain peak, and the air is stable.

39. [L50/1/2&3]
A pilot can expect a wind shear zone in a temperature inversion whenever the wind speed at 2,000 to 4,000 feet above the surface is at least
A. 10 knots.
B. 15 knots.
C. 25 knots.

40. [L51/2/2]
What situation is most conducive to the formation of radiation fog?
A. Warm, moist air over low, flatland areas on clear, calm nights.
B. Moist, tropical air moving over cold, offshore water.
C. The movement of cold air over much warmer water.

Stage Three Exam

Rod Machado's Private Pilot Syllabus Part 61/141

Exam Covers Chapters 1-17

1. [B4/3/3]
The minimum forward speed of the airplane is called the _____ speed.
A. certified
B. stall
C. best rate of climb

2. [B28/1/6]
What force makes an airplane turn?
A. The horizontal component of lift.
B. The vertical component of lift.
C. Centrifugal force.

3. [C15/3/2]
With an increase in altitude the air becomes thinner and doesn't _____ as much for a given volume.
A. weigh
B. count
C. vary

4. [C34/3/4]
If the grade of fuel used in an aircraft engine is lower than specified for the engine, it will most likely cause
A. a mixture of fuel and air that is not uniform in all cylinders.
B. lower cylinder head temperatures.
C. detonation.

5. [D5/3/4]
While airplane batteries are rated at 12 or 24 volts, airplane electrical systems (their alternators) are rated for ____ or ____ volts.
A. 12, 24
B. 14, 28
C. 7, 14

6. [E16/2/4 & Figure 28]
Under what condition will true altitude be lower than indicated altitude?
A. In colder than standard air temperature.
B. In warmer than standard air temperature.
C. When density altitude is higher than indicated altitude.

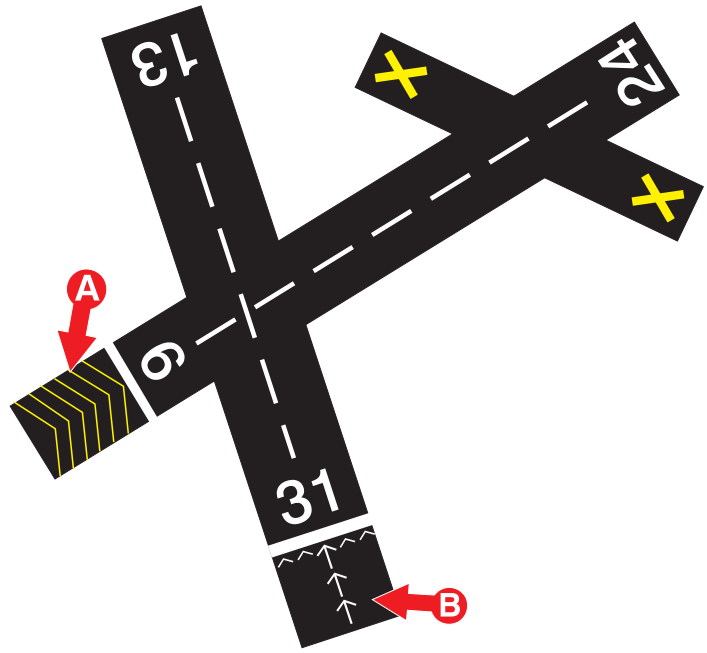
7. [E34/3/2]
In the northern hemisphere, a magnetic compass will normally indicate initially a turn toward the east if
A. an aircraft is decelerated while on a south heading.
B. an aircraft is accelerated while on a north heading.
C. a left turn is entered from a north heading.

8. [F5/3/2]
Regulations require that you report all drug and alcohol motor vehicle actions to the FAA within _____ days.
A. 60
B. 30
C. 120

9. [F46/2/4]
An aircraft had a 100 hour inspection when the tachometer read 1259.6. When is the next 100 hour inspection due?
A. 1349.6 hours.
B. 1359.6 hours.
C. 1369.6 hours.

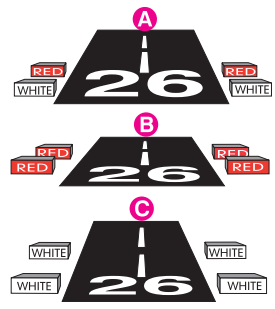
10. [F48/2/3]
The operator of an aircraft that has been involved in an incident is required to submit a report to the nearest field office of the NTSB
A. within 7 days.
B. within 10 days.
C. when requested.

RUNWAY SURFACE MARKINGS



11. [G6/1/1] (Refer to the figure above)
What is the difference between area A and area B on the airport depicted?
A. "A" may be used for taxi and takeoff; "B" may be used only as an overrun.
B. "A" may be used for all operations except heavy aircraft landings; "B" may be used only as an overrun.
C. "A" may not be used at all; "B" may be used for all operations except landings.

12. [G22/1/2]
VASI lights as shown by illustration B (to the right) indicate that the airplane is
A. below the glideslope.
B. on the glideslope.
C. above the glideslope.



13. [G28/See Land and Hold Short Operations]
What is the minimum visibility for a pilot to receive a land and hold short (LAHSO) clearance?
A. 3 nautical miles.
B. 1 statute mile.
C. 3 statute miles.

14. [H16/3/3]
An ATC radar facility issues the following advisory to a pilot flying on a heading of 360 degrees:

"TRAFFIC 10 O'CLOCK, 2 MILES, SOUTHBOUND..."

Where should the pilot look for this traffic?
A. Northwest.
B. Northeast.
C. Southwest.

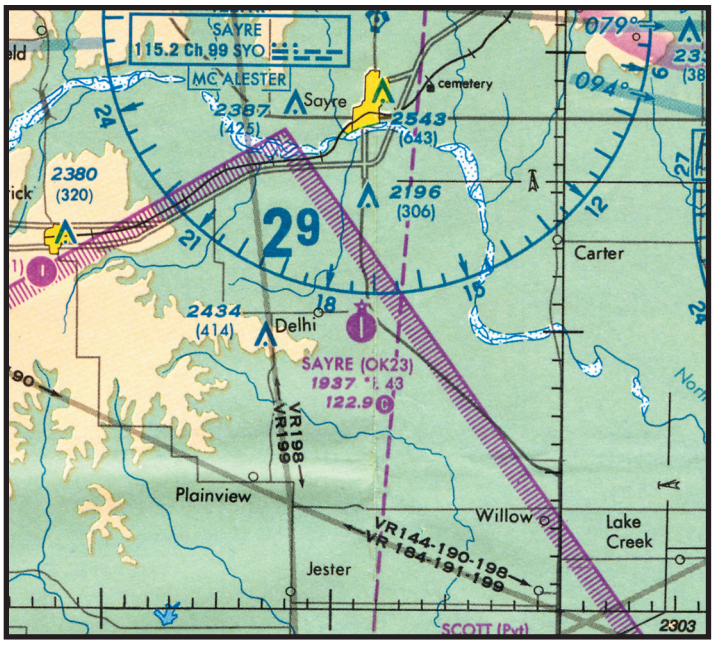
15. [H19/3/1]
If Air Traffic Control advises that radar service is terminated when the pilot is departing Class C airspace, the transponder should be set to code
A. 0000
B. 1200
C. 4096

16. [I7/2/1]
During operations within controlled airspace at altitudes of less than 1,200 feet AGL, the minimum horizontal distance from clouds requirement for VFR flight is
A. 1,000 feet.
B. 1,500 feet.
C. 2,000 feet.

17. [I9/1/5]
If the ground visibility isn't reported in surface-based controlled airspace, then the flight visibility during takeoff, landing or when operating in the traffic pattern must be at least _____ statute miles.
A. three
B. five
C. one

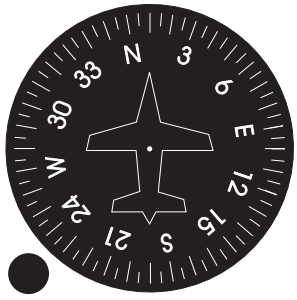
18. [I30/3/2]
Restricted areas restrict flights due to the unusual activities conducted within them. These areas often contain invisible hazards to aircraft such as the firing of _____, _____, _____.
A. artillery, aerial gunnery, guided missiles
B. artillery, lasers, rocks
C. bullets, rockets, gum wads

19. [J2/3/2]
Changes on the sectional chart occurring prior to the next publication cycle can be found in the
A. FARs.
B. POH (Pilots Operating Handbook).
C. The *Chart Supplement.*



20. [J8/1/1 & J8/2/1&2]
Referring to the figure above, what minimum altitude is required to fly over the obstacle located approximately three miles west of Sayre airport? (Assume that the entire area is a congested area.)
A. 3,434 feet AGL.
B. 1,414 feet MSL.
C. 3,434 feet MSL.

21. [K10/All & Figure 15]
Referring to VOR receiver #1, shown to the right, what heading should you fly to intercept and track inbound on the 060 degree course at a 40 degree intercept angle?
A. 020
B. 100
C. 060



22. [K34/2/5 & Formula on K34]
Referring to the ADF and DG above, determine the magnetic bearing FROM the station (MBFS).
A. 030 degrees MBFS.
B. 010 degrees MBFS.
C. 040 degrees MBFS.

23. [L8/Figure 15]
Cooling the air _____ its relative humidity.
A. increases
B. decreases
C. doesn't affect

24. [L10/1/1]
If the temperature/dewpoint spread is small and decreasing, and the temperature is 62 degrees F, what type of weather is most likely to develop?
A. Freezing precipitation.
B. Thunderstorms.
C. Fog or low clouds.

25. [M5/1/3]
Which type weather briefing should a pilot request when departing within the hour, if no preliminary weather information has been received?
A. Outlook briefing.
B. Abbreviated briefing.
C. Standard briefing.

26. [M11/2/2]
Referring to Figure 1 below, the letters RAB34 found in the METAR for KINK indicate
A. that light rain blew at 1834 Zulu.
B. that rain began at 1934 Zulu.
C. that rain began at 1834 Zulu.

27. [M17/1/3]
Referring to the KLAX TAF below in Figure 2 below, the "FM (FROM) Group"
A. forecasts for the hours from 2200Z to 0200Z, winds of 330 degrees at 15 knots with gusts to 20 knots and a probability of a 600 foot ceiling, a 1,500 foot broken ceiling and and overcast ceiling at 2,500 feet.
B. forecasts for the hours from 0200Z to 0600Z, a ceiling of 800 feet and a 40-49% probability of 2 miles visibility between the hours of 0200Z and 0500Z.
C. forecasts for the hours from 1600Z to 1800Z, variable winds at 40 knots and visibilities less than 6 miles.

28. [M46/1/3]
Using the GFA (Graphical Forecast for Aviation) excerpt shown below in Figure 1, where can you find infrared satellite images for up to 14 hours in the past?
A. In the forecast section of the GFA.
B. In the TAF
C. In the Observations/Warning section of the GFA.

29. [M21/3/1]
When the term "light and variable" is used in reference to a winds aloft forecast, the coded group and wind speed are
A. 0000 and less than 7 knots.
B. 9900 and less than 5 knots.
C. 9999 and less than 10 knots.

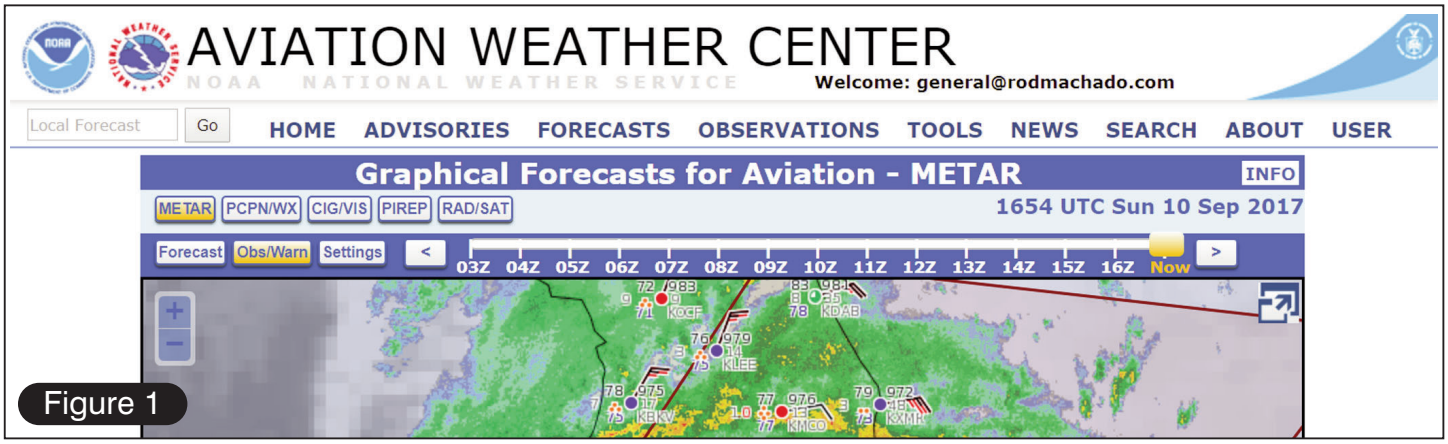


Figure 1

Figure 2

TERMINAL AERODROME WEATHER FORECAST (TAF)

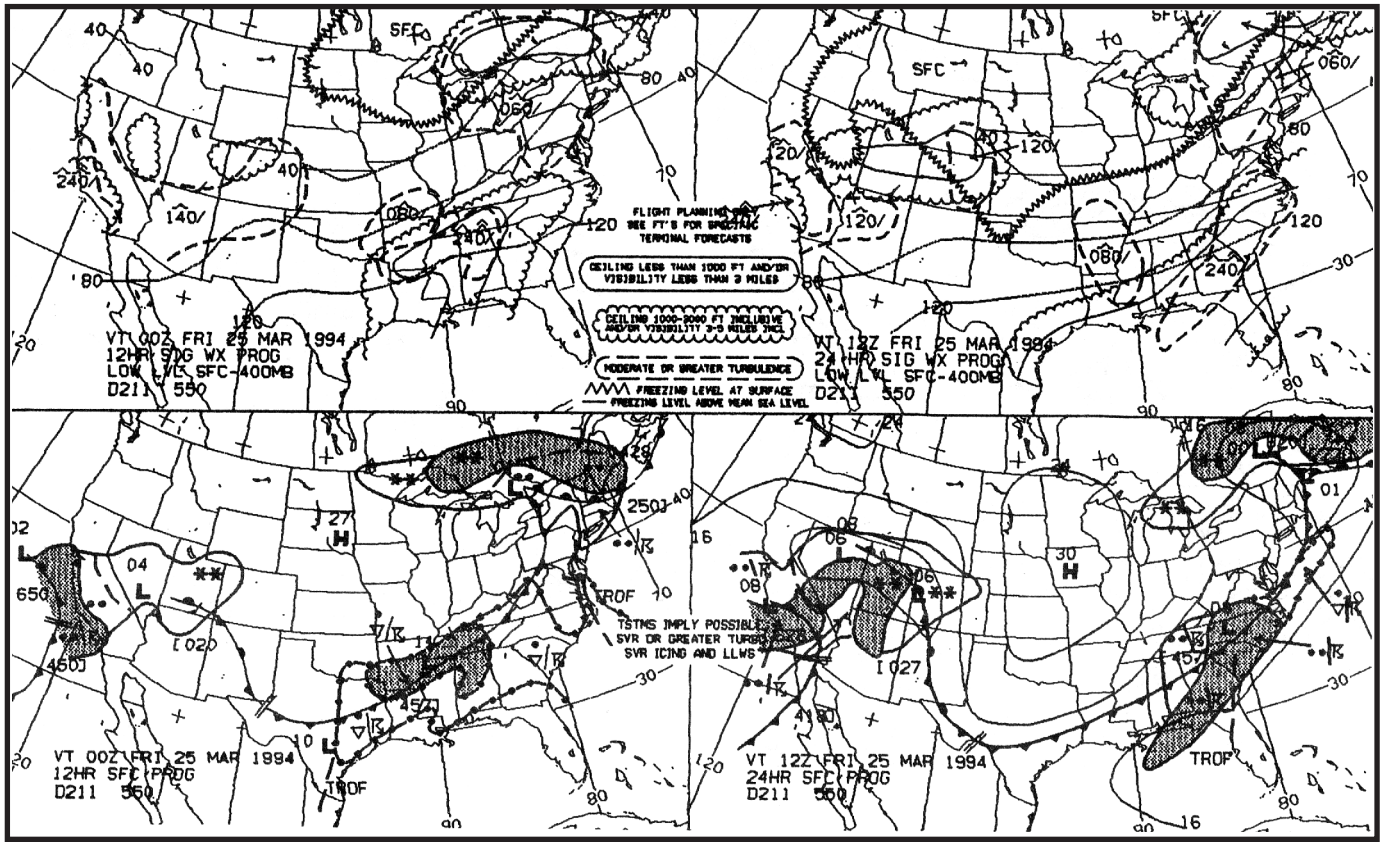
TAF
KLAX 121720Z 121818 20012KT 5SM HZ BKN030 PROB40 2022 1SM TRSA OVC008CB
FM2200 33015G20KT P6SM BKN015 OVC025 PROB40 2202 3SM SHRA
FM0200 35012KT OVC008 PROB40 0205 2SM -RASN BECMG 0608 02008KT NSW BKN012
BECMG 1012 00000KT 3SM BR SKC TEMPO 1214 1/2SM FG
FM1600 VRB04KT P6SM NSW SKC

Figure 1

METAR WEATHER REPORTING FORMAT

METAR KINK 081955Z 34016G22KT 1/2SM R30R/2400FT +SHRA OVC012 13/12 A2990 RAB34
SPECI KMKC 081936Z 20014G24KT 1/2SM R34/2600FT -SHRA OVC008 04/03 A2898 THN FG SE

THE LOW LEVEL SIGNIFICANT WEATHER PROGNOSTIC CHART

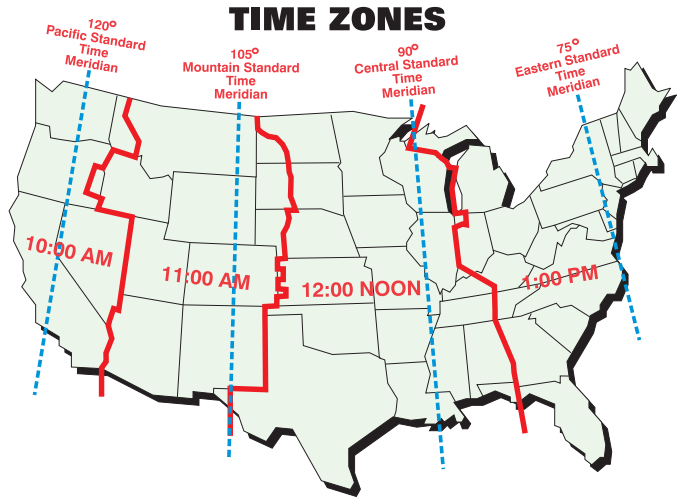


30. [M27/1/1]
Referring to the figure above, what weather is forecast for the state of Nevada during the first 12 hours?
A. Ceiling 1,000 to 3,000 feet and/or visibility 3 to 5 miles.
B. IFR conditions with ceiling less than 1,000 feet and/or visibilities less than 3 miles.
C. Moderate or greater turbulence at the surface.

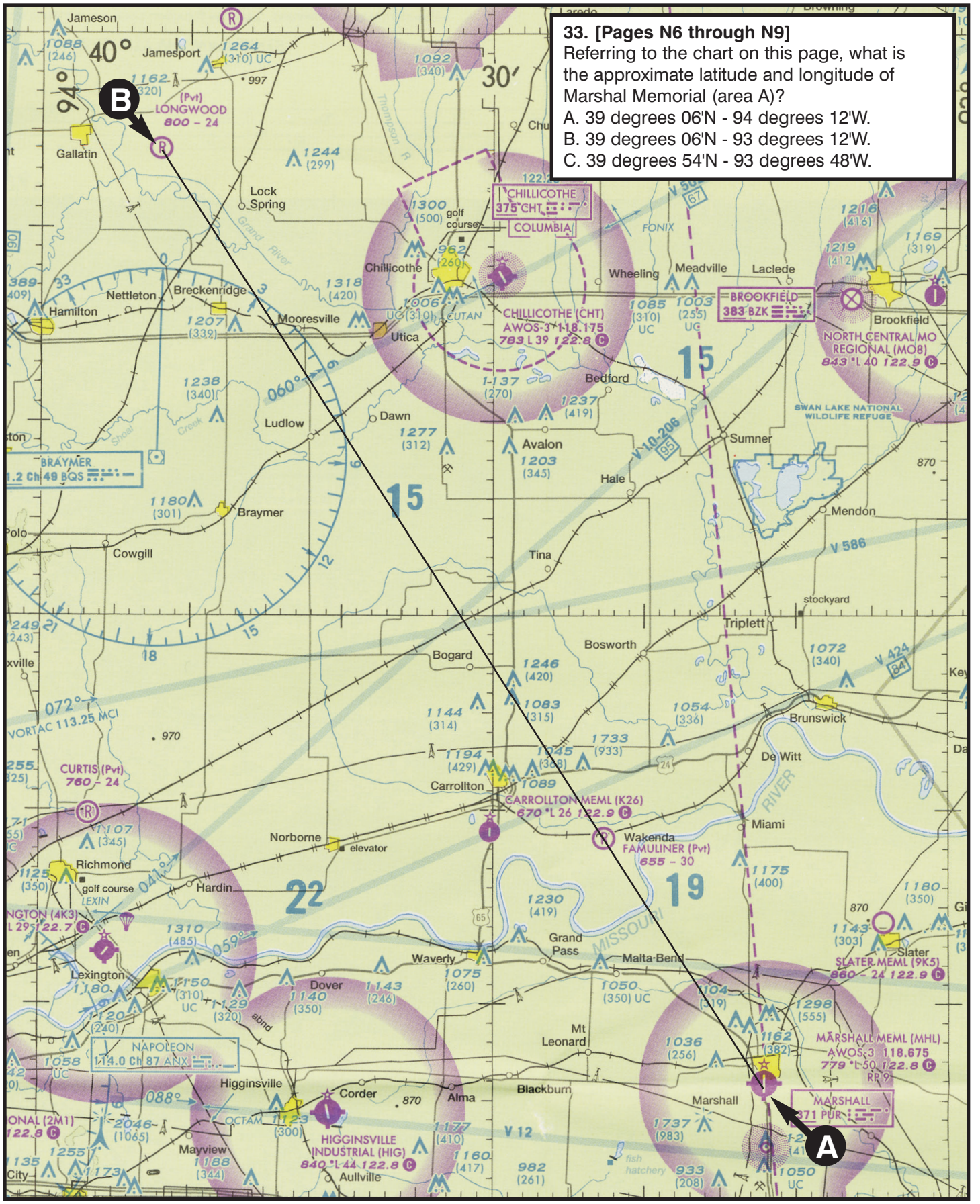
31. [M29/2/5]
AIRMETs are advisories of significant weather phenomena but of lower intensities than SIGMETs and are intended for dissemination to
A. only IFR pilots.
B. only VFR pilots.
C. all pilots.

32. [N4 & N5 /All]
(Refer to the figure to the right) An aircraft departs an airport in the Mountain Standard Time zone at 1415 MST for a 2 hour 30 minute flight to an airport located in the Pacific Standard Time zone. What is the estimated time of arrival at the destination airport?
A. 1545 PST.
B. 1645 PST.
C. 1745 PST.

TO CONVERT FROM:	TO COORDINATED UNIVERSAL TIME
Eastern Standard Time	Add 5 hours
Eastern Daylight Time	Add 4 hours
Central Standard Time	Add 6 hours
Central Daylight Time	Add 5 hours
Mountain Standard Time	Add 7 hours
Mountain Daylight Time	Add 6 hours
Pacific Standard Time	Add 8 hours
Pacific Daylight Time	Add 7 hours
Yukon Standard Time	Add 9 hours
Alaska, Hawaii Standard Time	Add 10 hours
Bering Standard Time	Add 11 hours



33. [Pages N6 through N9]
Referring to the chart on this page, what is the approximate latitude and longitude of Marshal Memorial (area A)?
A. 39 degrees 06'N - 94 degrees 12'W.
B. 39 degrees 06'N - 93 degrees 12'W.
C. 39 degrees 54'N - 93 degrees 48'W.



34. [N19-N22]
Referring to the chart to the left, determine the compass heading for a flight from Marshall Memorial airport (area A) to Longwood airport (area B). The wind at 4,500 feet is from 260 degrees at 17 knots, the true airspeed is 110 knots and the magnetic variation is 3 degrees east. Use the compass deviation card shown below.
A. 321 degrees.
B. 318 degrees.
C. 151 degrees.

TYPICAL COMPASS DEVIATION CARD

FOR (MAGNETIC)	N	30	60	E	120	150
STEER (COMPASS)	O	28	57	86	117	148
FOR (MAGNETIC)	S	210	240	W	300	330
STEER (COMPASS)	180	212	243	274	303	332

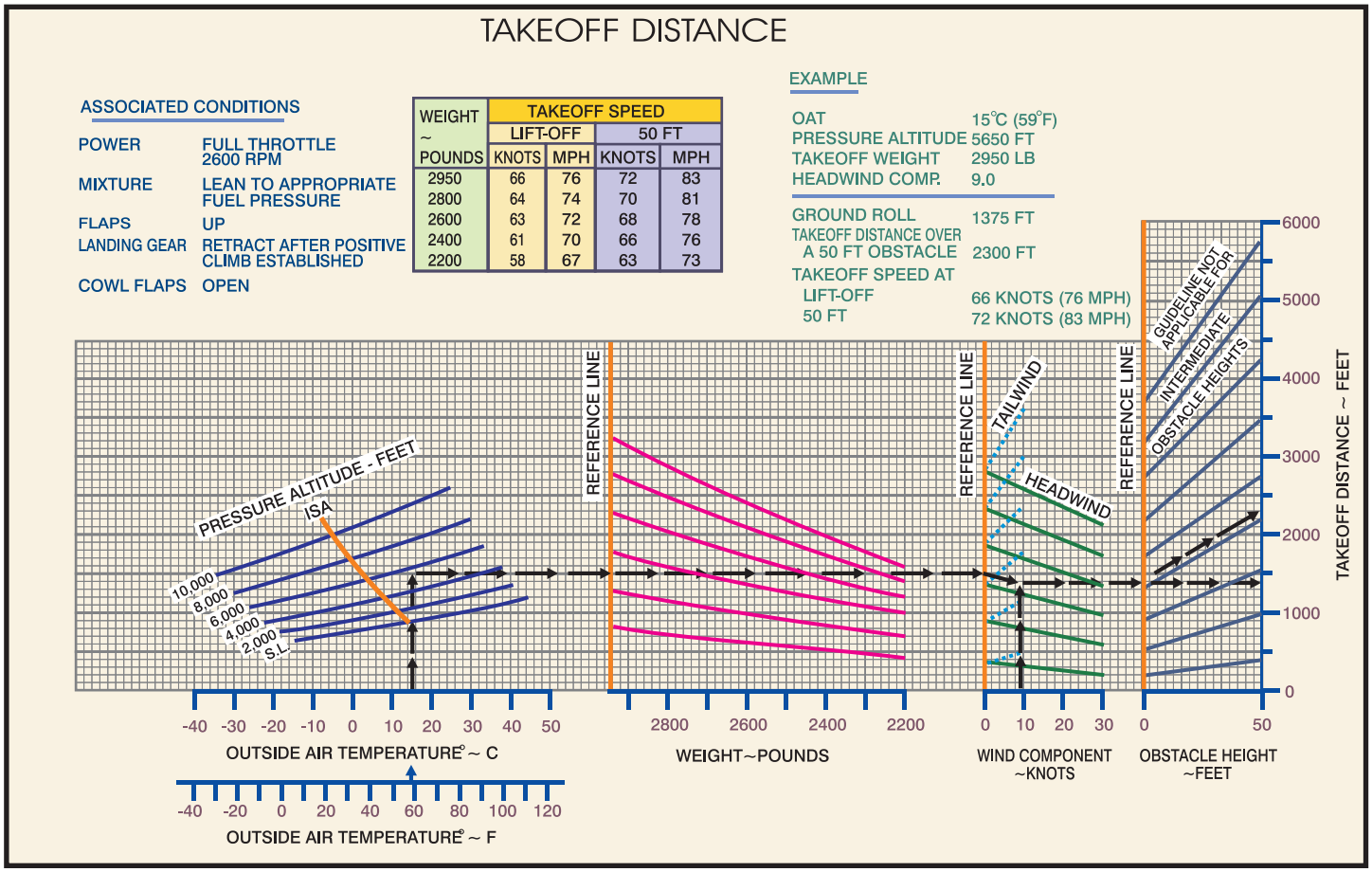
35. [N19-N22]
Determine the fuel used on the flight described above, if the fuel consumption is 7.8 gallons per hour (add .5 gallons for taxi, takeoff and climb).
A. 4.0 gallons.
B. 4.4 gallons.
C. 4.9 gallons.

36. [N42/2/1]
What is your true airspeed if the pressure altitude is 9,000 feet, the temperature is -8 degrees Celsius and the indicated airspeed is 125 knots?
A. 124 knots.
B. 142 knots.
C. 112 knots.

37. [N42/3/2]
What is your true altitude if the pressure altitude is 7,000 feet, the indicated altitude is 8,500 feet and the outside air temperature is -10 degrees Celsius?
A. 8,155 feet.
B. 8,775 feet.
C. 7,800 feet.

38. [O10/1/1/Entire section]
Referring to the performance chart below, determine the approximate distance required to clear a 50 foot obstacle.

OAT: 80 degrees F
Pressure altitude: 2,500 ft
Takeoff weight: 2,250 lb
Headwind component: 20 kts
A. 900 feet.
B. 500 feet.
C. 700 feet.



TAKEOFF DISTANCE
SHORT FIELD

CONDITIONS
Flaps 10 degrees
Full Throttle Prior to Brake Release
Paved, Level Dry Runway
Zero Wind

NOTES:
1. **Short field technique as specified in Section 4.**
2. **Prior to takeoff from fields above 3000 feet elevation, the mixture should be leaned to give maximum RPM in a full throttle, static runup.**
3. **Decrease distances 10% for each 9 knots of headwind. For operations with tailwinds up to 10 knots, increase distances by 10% for each 2 knots.**
4. **For operations on a dry, grass runway, increase distances by 15% of the "ground roll" figure.**

WEIGHT LBS	TAKEOFF SPEED KIAS		PRESS ALT FT	0°C		10°C		20°C		30°C		40°C	
	LIFT OFF	AT 50 FT		GRND ROLL	TOTAL TO CLEAR 50 FT OBS	GRND ROLL	TOTAL TO CLEAR 50 FT OBS	GRND ROLL	TOTAL TO CLEAR 50 FT OBS	GRND ROLL	TOTAL TO CLEAR 50 FT OBS	GRND ROLL	TOTAL TO CLEAR 50 FT OBS
1,670	50	54	S.L.	640	1190	695	1290	755	1390	810	1495	875	1605
			1000	705	1310	765	1420	825	1530	890	1645	960	1770
			2000	775	1445	840	1565	910	1690	980	1820	1055	1960
			3000	855	1600	925	1730	1000	1870	1080	2020	1165	2185
			4000	940	1775	1020	1920	1100	2080	1190	2250	1285	2440
			5000	1040	1970	1125	2140	1215	2320	1315	2525	1420	2750
			6000	1145	2200	1245	2395	1345	2610	1455	2855	1570	3125
			7000	1270	2470	1375	2705	1490	2960	1615	3255	1745	3590
			8000	1405	2800	1525	3080	1655	3395	1795	3765	1940	4195

39. [O12/2/2/Entire section]
Referring to the takeoff performance chart above, determine the total distance required for takeoff to clear a 50 foot obstacle.
OAT: 10 degrees C
Pressure altitude: 4,000 ft
Takeoff weight: 1,670 lb
Headwind component: 0 kts
Runway: dry, grass

A. 1,020 feet.
B. 1,920 feet.
C. 2,073 feet.

40. [O18/1/1/Entire section]
Referring to the cruise performance chart below, what is the expected fuel consumption for a 500 nautical mile flight under the following conditions?

Pressure altitude: 6,000 ft
Temperature: -15 degrees C
Manifold pressure: 19.8" Hg
Wind: calm

A. 31.4 gallons.
B. 37.5 gallons.
C. 44.1 gallons.

CRUISE POWER SETTINGS

For Training Purposes Only!

65% MAXIMUM CONTINUOUS POWER (OR FULL THROTTLE)
2800 POUNDS

Section 1 | Section 2 | Section 3

PRESS ALT.	ISA - 20 °C (-36 °F)								STANDARD DAY (ISA)								ISA + 20 °C (+36 °F)							
	IOAT		ENGINE SPEED	MAN. PRESS	FUEL FLOW		TAS		IOAT		ENGINE SPEED	MAN. PRESS	FUEL FLOW		TAS		IOAT		ENGINE SPEED	MAN. PRESS	FUEL FLOW		TAS	
FEET	°F	°C	RPM	IN HG	PSI	GPH	KTS	MPH	°F	°C	RPM	IN HG	PSI	GPH	KTS	MPH	°F	°C	RPM	IN HG	PSI	GPH	KTS	MPH
S.L.	27	-3	2450	20.9	6.6	11.5	147	169	63	17	2450	21.2	6.6	11.5	150	173	99	37	2450	21.8	6.6	11.5	153	176
2000	19	-7	2450	20.4	6.6	11.5	149	171	55	13	2450	21.0	6.6	11.5	153	176	91	33	2450	21.5	6.6	11.5	156	180
4000	12	-11	2450	20.1	6.6	11.5	152	175	48	9	2450	20.7	6.6	11.5	156	180	84	29	2450	21.3	6.6	11.5	159	183
6000	5	-15	2450	19.8	6.6	11.5	155	178	41	5	2450	20.4	6.6	11.5	158	182	79	26	2450	21.0	6.6	11.5	161	185
8000	-2	-19	2450	19.5	6.6	11.5	157	181	36	2	2450	20.2	6.6	11.5	161	185	72	22	2450	20.8	6.6	11.5	164	189
10,000	-8	-22	2450	19.2	6.6	11.5	160	184	28	-2	2450	19.9	6.6	11.5	163	188	64	18	2450	20.3	6.5	11.4	166	191
12,000	-15	-26	2450	18.8	6.4	11.3	162	186	21	-6	2450	18.8	6.1	10.9	163	188	57	14	2450	18.8	5.9	10.6	163	188
14,000	-22	-30	2450	17.4	5.8	10.5	159	183	14	-10	2450	17.4	5.6	10.1	160	184	50	10	2450	17.4	5.4	9.8	160	184
16,000	-29	-34	2450	16.1	5.3	9.7	156	180	7	-14	2450	16.1	5.1	9.4	156	180	43	6	2450	16.1	4.9	9.1	155	178

NOTES: 1. Full throttle manifold pressure settings are approximate.
2. Shaded area represents operation with full throttle.

Figure 1

CRUISE POWER SETTINGS

65% MAXIMUM CONTINUOUS POWER (OR FULL THROTTLE)
2800 POUNDS

SECTION 5 PERFORMANCE — CESSNA MODEL 152

CRUISE PERFORMANCE

CONDITIONS:
1,670 Pounds
Recommended Lean Mixture (See Section 4, Cruise)

NOTES:
Cruise speeds are shown for an airplane equipped with speed fairings which increase the speeds by approximately two knots

PRESSUE ALTITUDE FT	RPM	20 °C BELOW STANDARD TEMP			STANDARD TEMPERATURE			20 °C ABOVE STANDARD TEMP		
		% BHP	KTAS	GPH	% BHP	KTAS	GPH	% BHP	KTAS	GPH
2000	2400				75	101	6.1	70	101	5.7
	2300	71	97	5.7	66	96	5.4	63	95	5.1
	2200	62	92	5.1	59	91	4.8	56	90	4.6
	2100	55	87	4.5	53	86	4.3	51	85	4.2
	2000	49	81	4.1	47	80	3.9	46	79	3.8
4000	2450				75	103	6.1	70	102	5.7
	2400	76	102	6.1	71	101	5.7	67	100	5.4
	2300	67	96	5.4	63	96	5.1	60	95	4.9
	2200	60	91	4.8	56	90	4.6	54	89	4.4
	2100	53	86	4.4	51	85	4.2	49	84	4.0
	2000	48	81	3.9	46	80	3.8	45	79	3.7
6000	2500				75	105	6.1	71	104	5.7
	2400	72	101	5.8	67	100	5.4	64	99	5.2
	2300	64	96	5.1	60	95	4.9	57	94	4.7
	2200	57	90	4.6	45	89	4.4	52	88	4.3
	2100	51	85	4.2	49	84	4.0	48	83	3.9
	2000	46	80	3.8	45	79	3.7	44	77	3.6
8000	2550				75	107	6.1	71	106	5.7
	2500	76	105	6.2	71	104	5.8	67	013	5.4
	2400	68	100	5.5	64	99	5.2	61	98	4.9
	2300	61	95	5.0	58	94	4.7	55	93	4.5
	2200	55	90	4.5	52	89	4.3	51	87	4.2
	2100	49	84	4.1	48	83	3.9	46	82	3.8
10,000	2500	72	105	5.8	68	103	5.5	64	103	5.2
	2400	65	99	5.3	61	98	5.0	58	97	4.8
	2300	58	94	4.7	65	93	4.5	53	92	4.4
	2200	53	89	4.3	51	88	4.2	49	86	4.0
	2100	48	83	4.0	46	82	3.9	45	81	3.8
12,000	2450	65	101	5.3	62	100	5.0	59	99	4.8
	2400	62	99	5.0	59	97	4.8	56	96	4.6
	2300	56	93	4.6	54	92	4.4	52	91	4.3
	2200	51	88	4.2	49	87	4.1	48	85	4.0
	2100	47	82	3.9	45	81	3.8	44	79	3.7

41. [O19/1/4]
Referring to Figure 1, determine the expected fuel consumption and true airspeed for a flight at a pressure altitude of 7,000 feet at 2,400 RPM under standard conditions.
A. 5.4 GPH, 101 knots.
B. 5.3 GPH, 99 knots.
C. 5.2 GPH, 105 knots.

42. [O21/Entire section]
Referring to the crosswind component chart (Figure 2), determine the maximum wind velocity for a 45 degree crosswind if the maximum crosswind component for the airplane is 20 knots.
A. 25 knots.
B. 28 knots.
C. 35 knots.

43. [O24/Postflight Briefing #15-1]
Referring to the density altitude chart (Figure 3), determine the density altitude at an airport that is 1,795 feet MSL with an altimeter setting of 29.70 and a temperature of 80 degrees F.
A. 3,800 feet MSL.
B. 2,000 feet MSL.
C. 3,500 feet MSL.

Figure 2

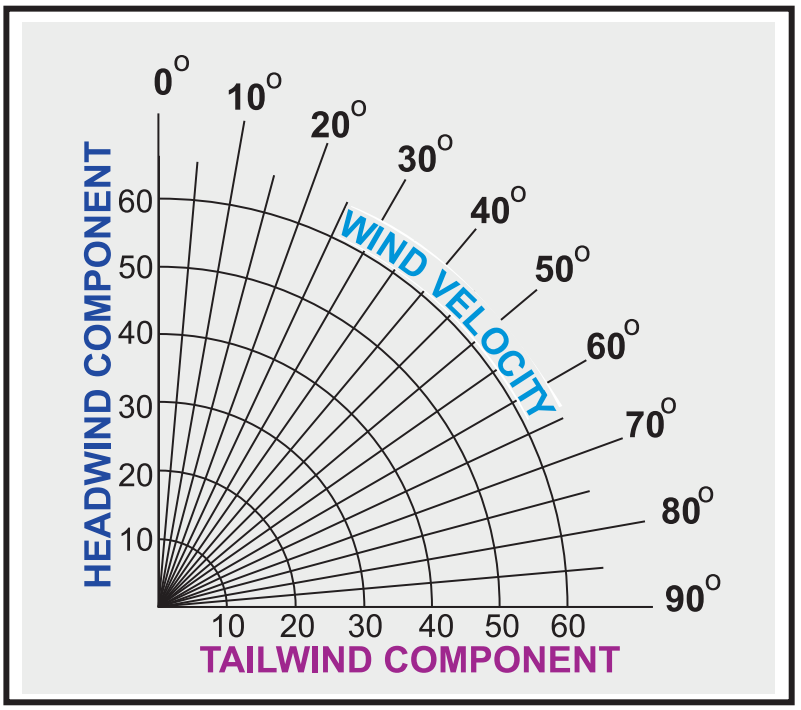
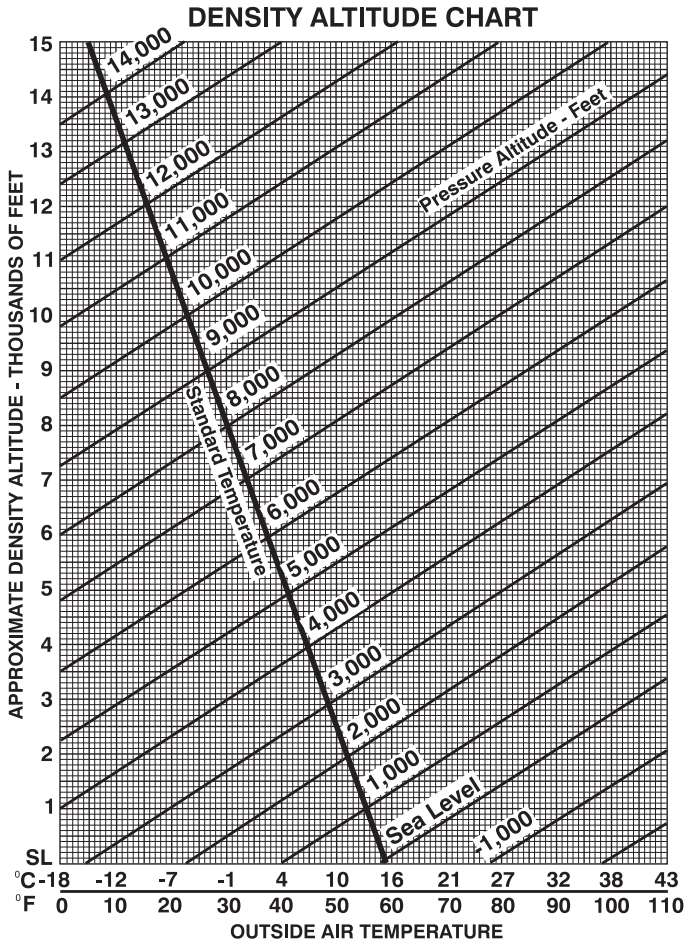


Figure 3



Altimeter Setting (" Hg)	Pressure Altitude Conversion Factor
28.0	1,824
28.1	1,727
28.2	1,630
28.3	1,533
28.4	1,436
28.5	1,340
28.6	1,244
28.7	1,148
28.8	1,053
28.9	957
29.0	863
29.1	768
29.2	673
29.3	579
29.4	485
29.5	392
29.6	298
29.7	205
29.8	112
29.9	20
29.92	0
30.0	-73
30.1	-165
30.2	-257
30.3	-348
30.4	-440
30.5	-531
30.6	-622
30.7	-712
30.8	-803
30.9	-893
31.0	-983

USEFUL LOAD WEIGHTS AND MOMENTS

OCCUPANTS

FRONT SEATS ARM 85		REAR SEATS ARM 121	
Weight	Moment 100	Weight	Moment 100
120	102	120	145
130	110	130	157
140	119	140	169
150	128	150	182
160	136	160	194
170	144	170	206
180	153	180	218
190	162	190	230
200	170	200	242

USABLE FUEL

MAIN WING TANKS ARM 75		
Gallons	Weight	Moment 100
5	30	22
10	60	45
15	90	68
20	120	90
25	150	112
30	180	135
35	210	158
40	240	180
44	264	198

BAGGAGE OR 5TH SEAT OCCUPANT ARM 140

Weight	Moment 100
10	14
20	28
30	42
40	56
50	70
60	84
70	98
80	112
90	126
100	140
110	154
120	168
130	182
140	196
150	210
160	224
170	238
180	252
190	266
200	280
210	294
220	308
230	322
240	336
250	350
260	364
270	378

AUXILIARY WING TANKS ARM 94

Gallons	Weight	Moment 100
5	30	28
10	60	56
15	90	85
19	114	107

***OIL**

Quarts	Weight	Moment 100
10	19	5

*Included in basic Empty Weight

Basic Empty Weight ~ 2015

MOM / 100 ~ 1554

MOMENT LIMITS vs WEIGHT

Moment limits are based on the following weight and center of gravity limit data (landing gear down).

WEIGHT CONDITION	FORWARD CG LIMIT	AFT CG LIMIT
2950 lb (takeoff or landing)	82.1	84.7
2525 lb	77.5	85.7
2475 lb or less	77.0	85.7

MOMENT LIMITS vs WEIGHT (Continued)

Weight	Minimum Moment 100	Maximum Moment 100
2100	1617	1800
2110	1625	1808
2120	1632	1817
2130	1640	1825
2140	1648	1834
2150	1656	1843
2160	1663	1851
2170	1671	1860
2180	1679	1868
2190	1686	1877
2200	1694	1885
2210	1702	1894
2220	1709	1903
2230	1717	1911
2240	1725	1920
2250	1733	1928
2260	1740	1937
2270	1748	1945
2280	1756	1954
2290	1763	1963
2300	1771	1971
2310	1779	1980
2320	1786	1988
2330	1794	1997
2340	1802	2005
2350	1810	2014
2360	1817	2023
2370	1825	2031
2380	1833	2040
2390	1840	2048
2400	1848	2057
2410	1856	2065
2420	1863	2074
2430	1871	2083
2440	1879	2091
2450	1887	2100
2460	1894	2108
2470	1902	2117
2480	1911	2125
2490	1921	2134
2500	1932	2143
2510	1942	2151
2520	1953	2160
2530	1963	2168
2540	1974	2176
2550	1984	2184
2560	1995	2192
2570	2005	2200
2580	2016	2208
2590	2026	2216

Weight	Minimum Moment 100	Maximum Moment 100
2600	2037	2224
2610	2048	2232
2620	2058	2239
2630	2069	2247
2640	2080	2255
2650	2090	2263
2660	2101	2271
2670	2112	2279
2680	2123	2287
2690	2133	2295
2700	2144	2303
2710	2155	2311
2720	2166	2319
2730	2177	2326
2740	2188	2334
2750	2199	2342
2760	2210	2350
2770	2221	2358
2780	2232	2366
2790	2243	2374
2800	2254	2381
2810	2265	2389
2820	2276	2397
2830	2287	2405
2840	2298	2413
2850	2309	2421
2860	2320	2428
2870	2332	2436
2880	2343	2444
2890	2354	2452
2900	2365	2460
2910	2377	2468
2920	2388	2475
2930	2399	2483
2940	2411	2491
2950	2422	2499

44. [P3/1/1]
If an airplane will return, unassisted, to level flight after its controls are disturbed, it is said to have _____ dynamic stability.
A. negative
B. positive
C. neutral

45. [P3/Figure 3]
The term used to describe the airplane's pitching motion is known as _____ stability.
A. vertical
B. longitudinal
C. lateral

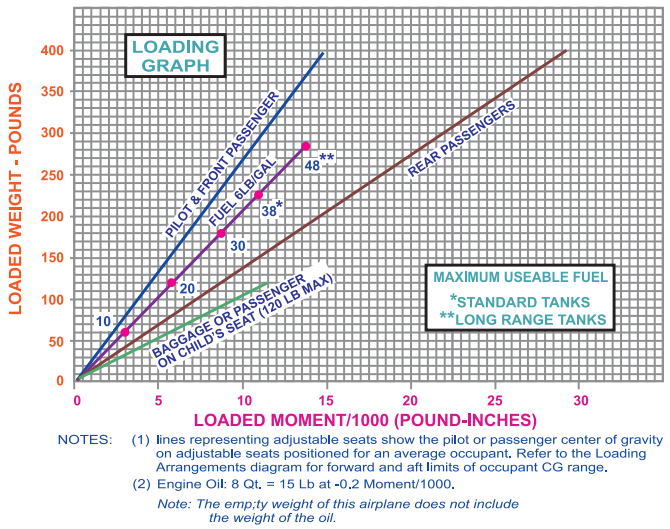
46. [P8/2/6]
An aircraft is loaded 110 pounds over maximum certificated gross weight. If fuel (gasoline) is drained to bring the aircraft weight within limits, how much fuel should be drained?
A. 15.7 gallons.
B. 16.2 gallons.
C. 18.4 gallons.

Weight & Balance Problem

Determine if the airplane's weight and balance are within safe limits.

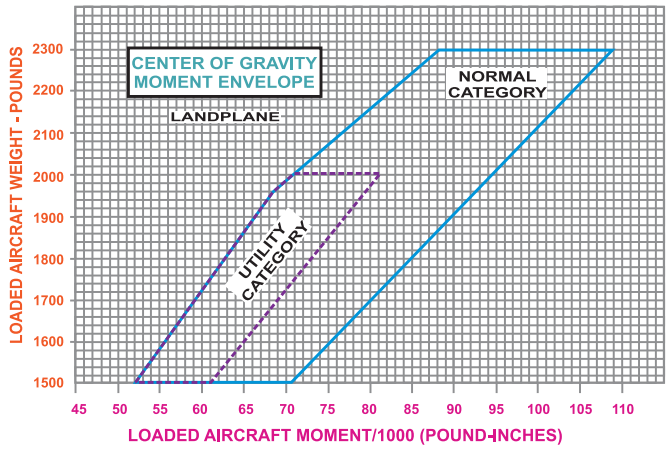
Pilot & front seat occupants.....	340 lb
Rear seat occupants.....	295 lb
Fuel (main & aux tanks both full)	44 gal
Baggage.....	36 lb

47. [P14/1/2]
Based on the conditions listed above and the weight and balance charts shown above, what is the airplane's center of gravity location and is the airplane within proper CG limits?
A. The airplane is over gross weight, within the CG aft of aft limits.
B. The airplane is at gross weight and the CG is within the limits.
C. The airplane is under gross weight with the CG forward of the forward limit.



NOTES: (1) lines representing adjustable seats show the pilot or passenger center of gravity on adjustable seats positioned for an average occupant. Refer to the Loading Arrangements diagram for forward and aft limits of occupant CG range.
(2) Engine Oil: 8 Qt. = 15 Lb at -0.2 Moment/1000.

Note: The emp;ty weight of this airplane does not include the weight of the oil.



	Weight (lb)	Moment (lb-in)
Empty weight	1,350.0	51.5
Pilot & front passenger	400.0	?
Rear passengers	400.0	?
Fuel (std tanks)	?	?
Oil (8 qts.)	15.0	-.2
Baggage	17.0	1.7
Total	?	?

48. [P20/1/1]
Using the airplane loading information and the weight and balance charts shown above, determine the maximum amount of fuel that can be carried aboard the aircraft.
A. 13.3 gallons.
B. 19.6 gallons.
C. 15.5 gallons.

49. [Q3/2/2]
What happens to the percentage of oxygen available in the atmosphere as altitude increases?
A. It decreases dramatically.
B. It actually increases slightly.
C. It remains the same.

50. [Q4/1/3]
Which would most likely result in hyperventilation?
A. Emotional tension, anxiety, or fear.
B. The excessive consumption of alcohol.
C. An extremely slow rate of breathing and insufficient oxygen.

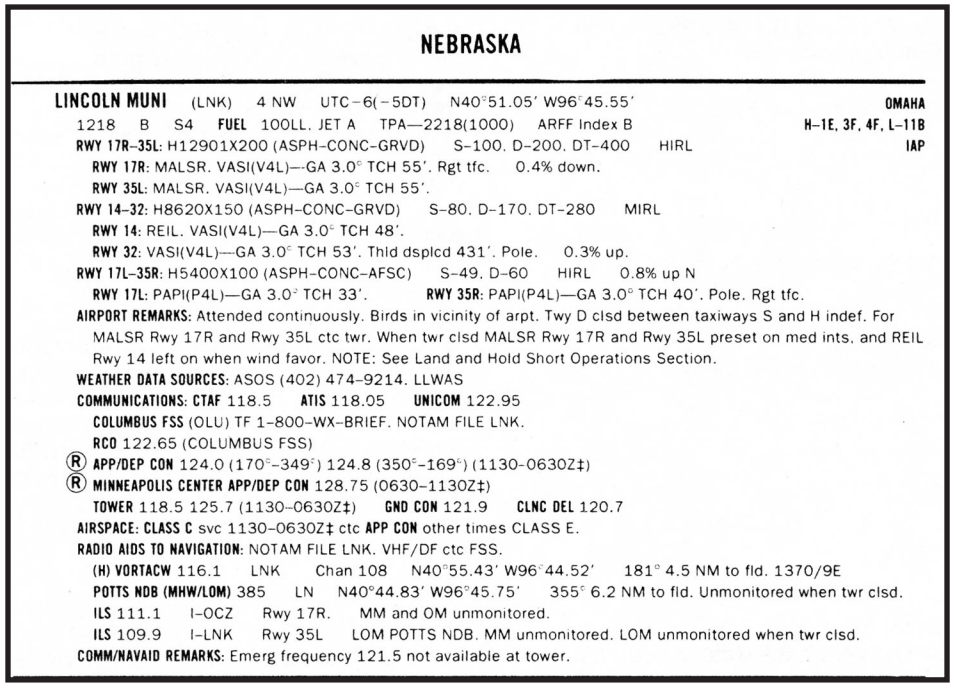
51. [Q5/1/4]
Ear problems common to pilots usually involve a little flaccid tube that connects the middle ear to the back of the throat. This tube is known as the _____ tube.
A. throat
B. eustachian
C. middle ear tube

52. [Q8/1/2]
At night, a blending of the earth and sky is often responsible for creating an indiscernible _____, resulting in near-instrument flight conditions. This is most prevalent on moonless nights when stars take on the appearance of _____ and city lights appear to be stars.
A. star map, planets
B. horizon, city lights
C. horizon, the sky

53. [Q10/1/6]
What effect does haze have on the ability to see traffic or terrain features during flight?
A. Haze causes the eyes to focus at infinity.
B. The eyes tend to overwork in haze and do not detect relative movement easily.
C. All traffic or terrain features appear to be farther away than their actual distance.

54. [Q13/Figure 15]
During a night flight, you observe steady red and green lights ahead and at the same altitude. What is the general direction of movement of the other aircraft?
A. The other aircraft is crossing to the left.
B. The other aircraft is flying away from you.
C. The other aircraft is approaching head-on.

55. [Q17/3/2] (Refer to the *Chart Supplement* excerpt at the top of page R34) Which type of radar service is provided to VFR aircraft at Lincoln Municipal?
A. Sequencing to the primary Class C airport and standard separation.
B. Sequencing to the primary Class C airport and conflict resolution so that radar targets do not touch, or 1,000 feet vertical separation.
C. Sequencing to the primary Class C airport, traffic advisories, conflict resolution, and safety alerts.



NEBRASKA

LINCOLN MUNI (LNK) 4 NW UTC−6(−5DT) N40°51.05′ W96°45.55′ **OMAHA**
1218 B S4 **FUEL** 100LL, JET A TPA—2218(1000) ARFF Index B **H-1E, 3F, 4F, L-11B**
RWY 17R-35L: H12901X200 (ASPH-CONC-GRVD) S-100, D-200, DT-400 HIRL **IAP**
RWY 17R: MALSR. VASI(V4L)—GA 3.0° TCH 55′. Rgt tfc. 0.4% down.
RWY 35L: MALSR. VASI(V4L)—GA 3.0° TCH 55′.
RWY 14-32: H8620X150 (ASPH-CONC-GRVD) S-80, D-170, DT-280 MIRL
RWY 14: REIL. VASI(V4L)—GA 3.0° TCH 48′.
RWY 32: VASI(V4L)—GA 3.0° TCH 53′. Thld dsplcd 431′. Pole. 0.3% up.
RWY 17L-35R: H5400X100 (ASPH-CONC-AFSC) S-49, D-60 HIRL 0.8% up N
RWY 17L: PAPI(P4L)—GA 3.0° TCH 33′. **RWY 35R:** PAPI(P4L)—GA 3.0° TCH 40′. Pole. Rgt tfc.
AIRPORT REMARKS: Attended continuously. Birds in vicinity of arpt. Twy D clsd between taxiways S and H indef. For MALSR Rwy 17R and Rwy 35L ctc twr. When twr clsd MALSR Rwy 17R and Rwy 35L preset on med ints, and REIL Rwy 14 left on when wind favor. NOTE: See Land and Hold Short Operations Section.
WEATHER DATA SOURCES: ASOS (402) 474-9214. LLWAS
COMMUNICATIONS: CTAF 118.5 **ATIS** 118.05 **UNICOM** 122.95
COLUMBUS FSS (OLU) TF 1-800-WX-BRIEF. NOTAM FILE LNK.
RCO 122.65 (COLUMBUS FSS)
Ⓡ **APP/DEP CON** 124.0 (170°-349°) 124.8 (350°-169°) (1130-0630Z‡)
Ⓡ **MINNEAPOLIS CENTER APP/DEP CON** 128.75 (0630-1130Z‡)
TOWER 118.5 125.7 (1130-0630Z‡) **GND CON** 121.9 **CLNC DEL** 120.7
AIRSPACE: CLASS C svc 1130-0630Z‡ ctc **APP CON** other times CLASS E.
RADIO AIDS TO NAVIGATION: NOTAM FILE LNK. VHF/DF ctc FSS.
(H) VORTACW 116.1 LNK Chan 108 N40°55.43′ W96°44.52′ 181° 4.5 NM to fld. 1370/9E
POTTS NDB (MHW/LOM) 385 LN N40°44.83′ W96°45.75′ 355° 6.2 NM to fld. Unmonitored when twr clsd.
ILS 111.1 I-OCZ Rwy 17R. MM and OM unmonitored.
ILS 109.9 I-LNK Rwy 35L LOM POTTS NDB. MM unmonitored. LOM unmonitored when twr clsd.
COMM/NAVAID REMARKS: Emerg frequency 121.5 not available at tower.

56. [Q20/3/2]
How might you identify the FSS having jurisdiction over your destination airport?
A. Look in the FDC NOTAMS.
B. Look in the Chart Supplement.
C. Look in the Advisory Circulars.

57. [Q23/2/5]
What often leads to spatial disorientation or collision with ground/obstacles when flying under Visual Flight Rules (VFR)?
A. Getting behind the aircraft.
B. Duck-under syndrome.
C. Continued flight into instrument conditions.

58. [Q25/Figure 28]
What is the antidote when a pilot has a hazardous attitude, such as "anti-authority"?
A. Follow the rules.
B. Rules do not apply in this situation.
C. I know what I am doing.

59. [Q25/Figure 28]
What is the antidote when a pilot has a hazardous attitude, such as "invulnerability"?
A. It could happen to me.
B. It cannot be that bad.
C. It will not happen to me.

60. [Q23/1/3]
What is the one factor common to most preventable accidents?
A. Human error.
B. Mechanical difficulties.
C. Luck.

Stage Exam Answers

Stage One Exam Answers

1. B
2. A
3. A
4. A
5. A
6. A
7. B
8. C
9. C
10. A
11. B
12. B
13. C
14. C
15. B
16. A
17. A
18. A
19. C
20. B
21. A
22. A
23. C
24. A
25. B
26. B
27. A
28. C
29. C
30. B
31. B
32. B
33. C
34. A
35. C
36. B
37. C
38. C
39. A
40. C
41. A
42. B
43. C
44. B

Stage Two Exam Answers

1. B
2. C
3. C
4. B
5. C
6. B
7. C
8. B
9. A
10. B
11. C
12. A
13. B
14. C
15. A
16. B
17. A
18. A
19. C
20. B
21. B
22. B
23. B
24. B
25. C
26. A
27. B
28. B
29. C
30. C
31. A
32. C
33. C
34. A
35. A
36. C
37. A
38. A
39. C
40. A

Note: To ensure that you have the most current answers to these questions, please check the *Book & Slide Updates* section at Rod Machado's web site: www.rodmachado.com

Stage Three Exam Answers

1. B
2. A
3. A
4. C
5. B
6. A
7. C
8. A
9. B
10. C
11. C
12. A
13. C
14. A
15. B
16. C
17. A
18. A
19. C
20. C
21. B
22. C
23. A
24. C
25. C
26. B
27. B
28. C
29. B
30. A
31. C
32. A
33. B
34. B
35. C
36. B
37. A
38. A
39. C
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55. C
56. B
57. C
58. A
59. A
60. A

Note: To ensure that you have the most current answers to these questions, please check the *Book & Slide Updates* section at Rod Machado's web site: www.rodmachado.com

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T.S.

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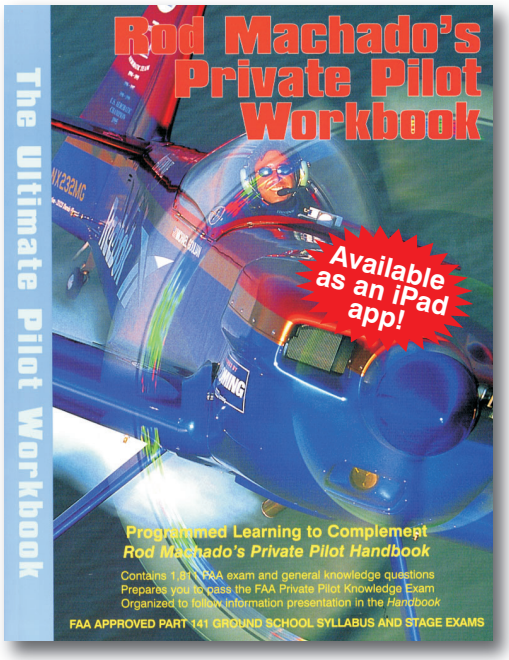

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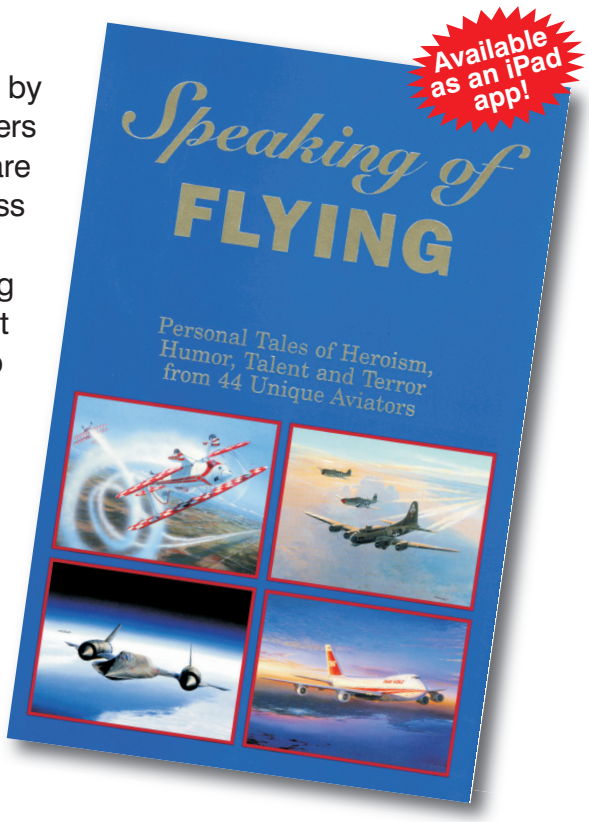

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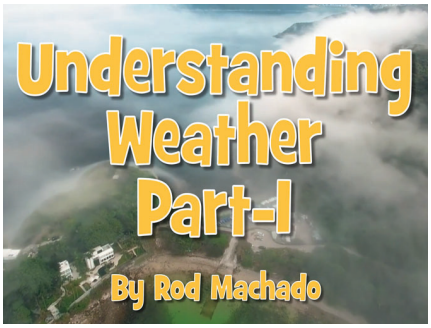

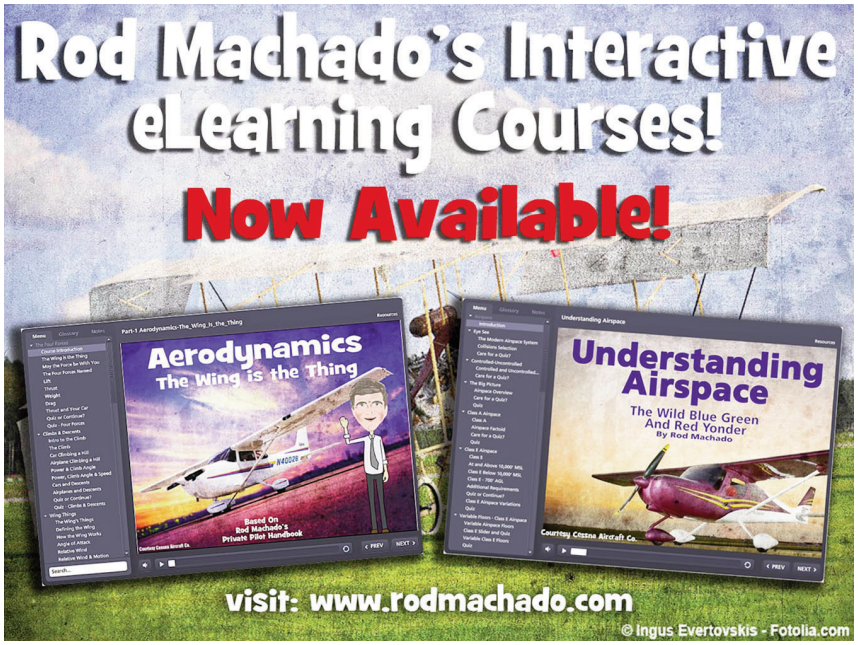

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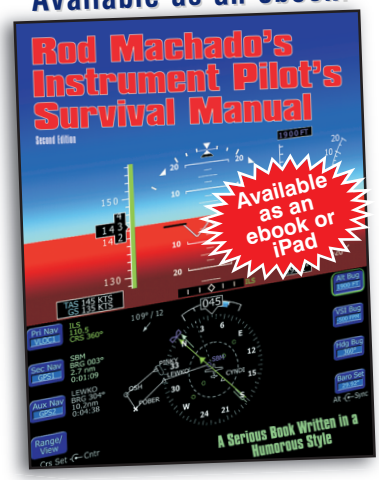

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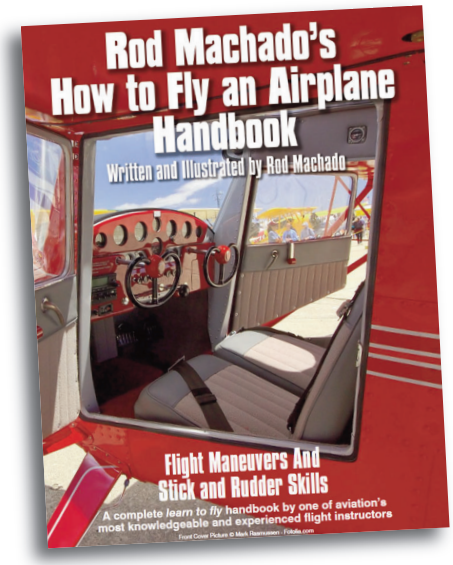

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From how the basic aircraft instruments really work through what's inside a thunderstorm and how a GPS approach works, Machado teaches IFR pilots not just the minimum needed to pass the instrument pilot written exam, but every aspect of IFR flying. This up-to-date text covers the latest information on GPS, glass cockpits, data uplinks, computer-based resources, and other new (and future) technologies and techniques. It is also a rich source of practical information about how real pilots really fly IFR. Readers learn how to gauge the thunderstorm potential of a cumulus cloud by estimating the rainfall rate, scan their instruments in a way that provides maximum performance with minimum effort, and keep the needle centered during an ILS or LPV approach by using the sky pointer on the attitude indicator.

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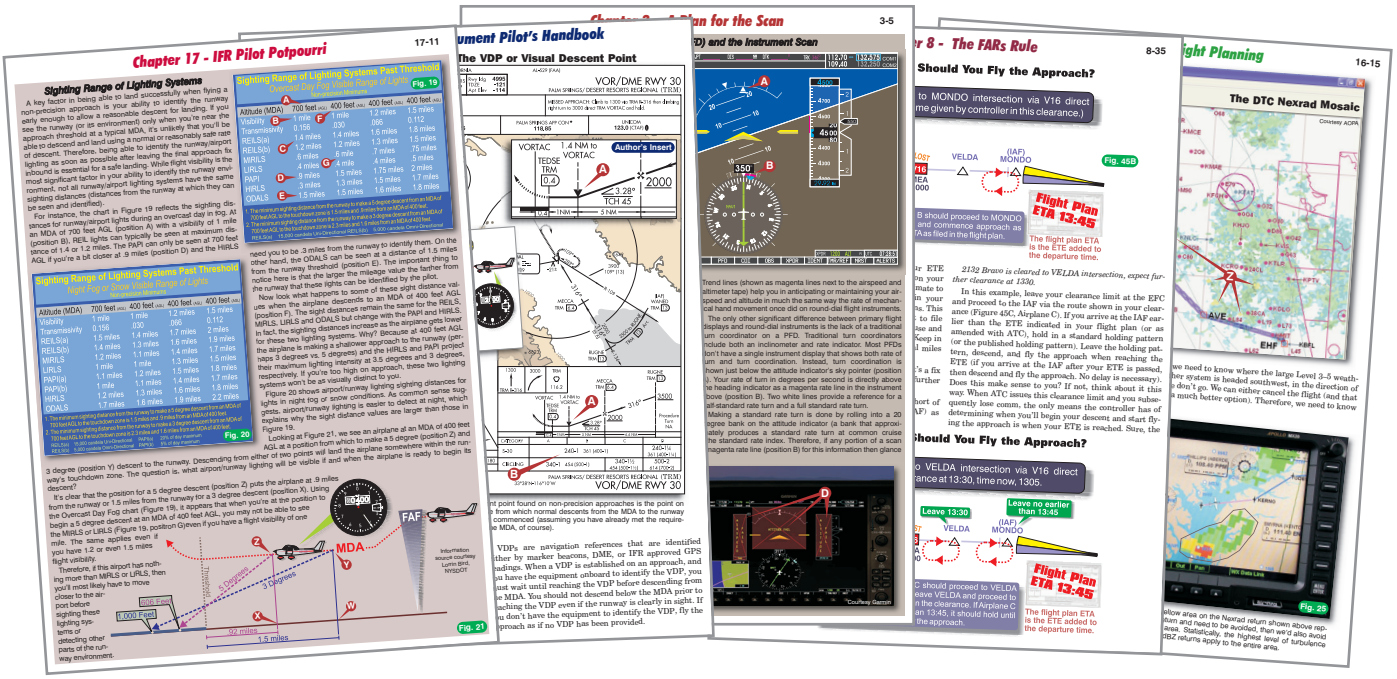

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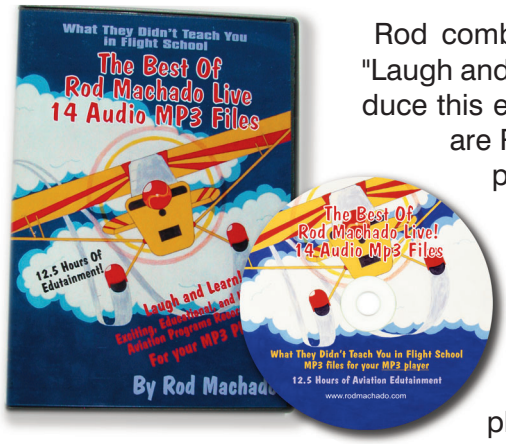

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