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2025–2026

Instructor Pilot/CFI

# TEST PREP



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AVIATION SUPPLIES & ACADEMICS, INC.  
NEWCASTLE, WASHINGTON

*Instructor Pilot/CFI Test Prep*  
2025–2026 Edition

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Airman Knowledge Testing Supplement for Flight Instructor, Ground Instructor, and Sport Pilot Instructor (FAA-CT-8080-5H)

# Updates and Practice Tests

## Free Test Updates for the Life Cycle of Test Prep Books

The FAA modifies tests as needed throughout the year. ASA keeps abreast of changes to the tests and posts free Test Updates on the ASA website. Before taking your test, be certain you have the most current information by visiting the ASA Test Updates webpage: [asa2fly.com/testupdate](http://asa2fly.com/testupdate). Additionally, sign up for free email notifications, which are sent when new Test Updates are available.

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# Introduction

Welcome to the Aviation Supplies & Academics, Inc., (ASA) Test Prep Series. This series has been helping pilots prepare for the FAA Knowledge Tests for more than 60 years with great success. We are confident that with proper use of this book you will score very well on your Flight Instructor certificate test.

Begin your studies with a classroom or home-study ground school course, which will involve reading a comprehensive textbook. Fundamentals of Instructing (FOI) applicants should thoroughly review the most current edition of the *Aviation Instructor's Handbook* (FAA-H-8083-9). Visit the Reader Resources for this Test Prep ([asa2fly.com/TPCFI](http://asa2fly.com/TPCFI)) and become familiar with the FAA guidance materials available for this certification exam. Then use this Test Prep to prepare for your exam: read the question, select your choice for the correct answer, and then read the explanation. Use the references that conclude each explanation to identify additional resources for further study of a subject. Upon completion of your studies, take practice tests at [prepware.com](http://prepware.com) (see inside the front cover for your activation code).

The questions in this book have been arranged into chapters based on subject matter to promote better understanding, aid recall, and provide a more efficient study guide. Place emphasis on questions most likely to be included in your test (identified by the aircraft category above each question). For example, a candidate preparing for the Flight Instructor – Airplane test would focus on the questions marked “ALL” and “AIR,” and a candidate preparing for the Flight Instructor – Rotorcraft test would focus on the questions marked “ALL” and “RTC.” Those preparing for the add-on tests (people who hold a Flight Instructor certificate in one category and are transitioning to another) would focus on the questions marked with that category (AIR, RTC, GLI, LSA, WSC, or PPC). Ground instructors are responsible for all aircraft categories, and therefore need to study all the questions in the database except for Chapter 1, Fundamentals of Instructing—this is a separate test.

Prior to taking an FAA Airman Knowledge Test, all applicants must establish an FAA Tracking Number (FTN) by creating a profile in the Integrated Airman Certification and Rating Application (IACRA) system at [iacra.faa.gov](http://iacra.faa.gov). Then visit [faa.psiexams.com](http://faa.psiexams.com) to register for your exam and take FAA-created practice tests to become familiar with the computer testing platform.

It is important to answer every question assigned on your FAA Knowledge Test. If in their ongoing review, the FAA decides a question has no correct answer, is no longer applicable, or is otherwise defective, your answer will be marked correct no matter which one you chose. However, you will not be given the automatic credit if you have not marked an answer. Unlike some other exams you may have taken, there is no penalty for guessing in this instance.

The FAA exams are “closed tests” which means the exact database of questions is not available to the public. The question and answer choices in this book are based on our extensive history and experience with the FAA testing and airman certification process. You might see similarly worded questions on your official FAA exam, or answer stems might be rearranged from the order you see in this book. Therefore, be sure to fully understand the intent of each question and corresponding answer while studying, rather than memorizing the letter associated with the correct response. You may be asked a question that has unfamiliar wording; studying and understanding the information in this book and the associated references will give you the tools to answer question variations with confidence.

If your study leads you to question an answer choice, we recommend you seek the assistance of a local instructor. We welcome your questions, recommendations, and concerns—send them to:

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Testing Standards Section  
PO Box 25082  
Oklahoma City, OK 73125  
Email: [TestingStandardsComments@faa.gov](mailto:TestingStandardsComments@faa.gov)



## Description of the Tests

The FAA Knowledge Exam is an objective, multiple choice test. Each question can be answered by one of the three choices. Each test question is independent of the others—a correct response to one question does not depend on the correct response to another. You must score at least 70 percent to pass the test.

All applicants seeking initial flight or ground instructor certification must successfully complete a Fundamentals of Instructing (FOI) Knowledge Test. However, a person holding a current teacher’s certificate at the junior or senior high school level or who is an instructor at a college or university can receive credit for this test.

Unlike Flight Instructor Certificates, Ground Instructor Certificates are not category-specific. In other words, it is not possible to get a Ground Instructor Certificate with an Airplane Rating. Although the emphasis of the tests is “Airplane,” applicants will be tested on all questions in all aircraft categories. Therefore, ground instructor applicants need to study all questions in Chapters 2 through 10.

Fundamentals of Instructing, Flight Instructor, and Ground Instructor test results expire at the end of 24 months after the month in which the test was taken.

The knowledge test questions for the Basic Ground Instructor, Advanced Ground Instructor, and the Certified Flight Instructor tests all come from the same body of questions. Therefore, we recommend that an applicant taking the Ground Instructor exam also take the Advanced Ground Instructor exam, since the material is the same for both tests. Similarly, we recommend that an applicant studying for the Certified Flight Instructor exam also take the Advanced Ground Instructor exam, since the material is the same for both tests. There is no medical or flight test required for a Basic or Advanced Ground Instructor Certificate. The FOI Knowledge Exam is required for all ground and flight instructor certificates, unless you hold a teacher’s certificate at the high school level or higher.

The table below lists the number of questions and the allotted time for each test. Each question in this book is preceded by a category. Use these categories to study the content that may appear on your test. Study all the questions first, then refer to the following table, placing emphasis on those questions most likely to be included on your test (identified by the test prep category above each question number).

Test Code	Test Name	Test Prep Study	Number of Questions	Min. Age	Allotted Time (hrs)	Passing Score
FOI	Fundamentals of Instructing	FOI	50	16	1.5	70
BGI	Ground Instructor—Basic	ALL, AIR, RTC, GLI, LTA, LSA, WSC, PPC	80	16	2.5	70
AGI	Ground Instructor—Advanced	ALL, AIR, RTC, GLI, LTA, LSA, WSC, PPC	100	16	2.5	70
FIA	Flight Instructor—Airplane	ALL, AIR	100	16	2.5	70
FRH	Flight Instructor—Helicopter	ALL, RTC	100	16	2.5	70
FRG	Flight Instructor—Gyroplane	ALL, RTC	100	16	2.5	70
FIG	Flight Instructor—Glider	ALL, GLI	100	16	2.5	70
AFA	Flight Instructor—Airplane (Added Rating)	AIR	25	16	1.0	70
HFA	Flight Instructor—Helicopter (Added Rating)	RTC	25	16	1.0	70
GFA	Flight Instructor—Gyroplane (Added Rating)	RTC	25	16	1.0	70
AFG	Flight Instructor—Glider (Added Rating)	GLI	25	16	1.0	70
MCI	Military Competency Instructor	FOI, ALL, MCI	125	16	3.0	70

## Sport Pilot Instructor

The Sport Pilot test is found in the Private Pilot Test Prep book (ASA-TP-P) and Prepware software (ASA-PW-P). Applicants seeking initial flight or ground instructor certification must successfully complete a FOI test. However, a person holding a current teacher's certificate at the junior or senior high school level, an instructor at a college or university level, or an ultralight instructor who already took this test can receive credit for it.

Test Code	Test Name	Test Prep Study	Number of Questions	Min. Age	Allotted Time (hrs)	Passing Score
FOI	Fundamentals of Instructing	FOI	50	16	1.5	70
SIA	Flight Instructor Sport Airplane	ALL, LSA	70	16	2.5	70
SIB	Flight Instructor Sport Balloon	ALL, LTA	70	16	2.5	70
SIG	Flight Instructor Sport Glider	ALL, GLI	70	16	2.5	70
SIL	Flight Instructor Sport Lighter-than-Air (Airship)	ALL, LTA	70	16	2.5	70
SIP	Flight Instructor Sport Powered Parachute	ALL, PPC	70	16	2.5	70
SIW	Flight Instructor Sport Weight-Shift Control	ALL, WSC	70	16	2.5	70
SIY	Flight Instructor Sport Gyroplane	ALL, RTC	70	16	2.5	70

## Knowledge Test Registration

The FAA testing provider authorizes hundreds of test center locations that offer a full range of airman knowledge tests. For information on authorized testing centers and to register for the knowledge test, visit [faa.psiexams.com](http://faa.psiexams.com).

When you contact a knowledge testing center, be prepared to select a test date and make payment. You may register for test(s) several weeks in advance online or by phone, and you may cancel in accordance with the testing center's cancellation policy.

Regardless of your registration method, you will need an FAA Tracking Number (FTN) prior to registering for the FAA Airman Knowledge Test. This FTN will follow you throughout your aviation career. You will obtain your FTN as part of the test registration process, by creating a profile in the Integrated Airman Certificate and Rating Application (IACRA) system at [iacra.faa.gov/IACRA](http://iacra.faa.gov/IACRA). This FTN will be printed on your Airman Knowledge Test Report (AKTR).

The test registration process includes collection of this information: name, FTN, physical address, date of birth, email address, photo identification, phone number, test authorization (credentials of the individual such as an instructor endorsement), and previous number of test attempts.

Step 1: Create a profile using the IACRA system and login to obtain your FTN.

Step 2: Register for your knowledge test with PSI by phone or online.

For more information, contact:

**PSI Services LLC**

844-704-1487 or [examschedule@psionline.com](mailto:examschedule@psionline.com)

[faa.psiexams.com](http://faa.psiexams.com)

## Knowledge Test Eligibility

When you take your FAA Knowledge Test, you will be required to show proper identification. The Flight and Ground Instructor tests **do not** require an instructor endorsement or other form of written authorization. The Fundamentals of Instructing (FOI) test requires an instructor endorsement.

If you are taking the test again, you must present the unsatisfactory AKTR (if failed) or register after 30 days (if seeking a higher passing score). See Retesting Procedures for more details.

Sport Pilot Flight Instructor applicants must present a ground school certificate or FAA Knowledge Exam endorsement from an authorized ground or flight instructor.

## Fundamentals of Instructing (FOI) Endorsement

I certify that (*First name, MI, Last name*) \_\_\_\_\_ has received the required training of 14 CFR §61.185(a)(1). I have determined (*Name*) \_\_\_\_\_ is prepared for the Fundamentals of Instructing (FOI) FAA Knowledge Exam.

Signed \_\_\_\_\_ Date \_\_\_\_\_

CFI Number \_\_\_\_\_ Expires \_\_\_\_\_

## Sport Instructor Endorsement

I certify that (*First name, MI, Last name*) \_\_\_\_\_ has received the required training of 14 CFR §61.405(a)(1). I have determined (*Name*) \_\_\_\_\_ is prepared for the Sport Instructor FAA Knowledge Exam.

Signed \_\_\_\_\_ Date \_\_\_\_\_

CFI Number \_\_\_\_\_ Expires \_\_\_\_\_

## Acceptable Materials

The applicant may use test aids and materials within the guidelines listed below during the test, if actual test questions or answers are not revealed.

Acceptable Materials	Unacceptable Materials	Notes
Supplement book provided by proctor.	Written materials that are hand-written, printed, or electronic.	Testing centers may provide calculators and/or deny the use of personal calculators.
All models of aviation-oriented calculators or small electronic calculators that perform only arithmetic functions.	Electronic calculators incorporating permanent or continuous type memory circuits without erasure capability.	Test proctor may prohibit the use of your calculator if he or she is unable to determine the calculator's erasure capability.
Calculators with simple programmable memories, which allow addition to, subtraction from, or retrieval of one number from the memory; or simple functions, such as square root and percentages.	Magnetic cards, magnetic tapes, modules, computer chips, or any other device upon which pre-written programs or information related to the test can be stored and retrieved.	Printouts of data must be surrendered at the completion of the test if the calculator incorporates this design feature.

Scales, straight-edges, protractors, plotters, navigation computers, blank log sheets, holding pattern entry aids, and electronic or mechanical calculators that are directly related to the test.	Dictionaries.	Before, and upon completion of the test, while in the presence of the test proctor, actuate the ON/OFF switch or RESET button, and perform any other function that ensures erasure of any data stored in memory circuits.
Manufacturer's permanently inscribed instructions on the front and back of such aids, such as formulas, conversions, regulations, signals, weather data, holding pattern diagrams, frequencies, weight and balance formulas, and ATC procedures.	Any booklet or manual containing instructions related to use of test aids.	Test proctor makes the final determination regarding aids, reference materials, and test materials.

## Testing Procedures for Applicants Requesting Special Accommodations

If you are an applicant with a learning or reading disability, you may request approval from the local FAA office to take an airman knowledge test, using the special accommodations procedures outlined in the most current version of FAA Order 8080.6 Conduct of Airman Knowledge Tests.

Prior to approval of any option, the FAA Aviation Safety Inspector must advise you of the regulatory certification requirement of being able to read, write, speak, and understand the English language.

## Test Reports

Your test will be graded immediately upon completion and your score will display on the computer screen. You will receive your Airman Knowledge Test Report (AKTR), which will state your score. See sample AKTR on the next page.

Visit [faa.psiexams.com](http://faa.psiexams.com) to request a duplicate or replacement AKTR due to loss or destruction.

Airman Knowledge Test Reports are valid for 24 calendar months. If the AKTR expires before completion of the practical test, you must retake the knowledge test.

The AKTR lists the Airman Certification Standard (ACS) code (if an Airman Certification Standard is available for the certificate and rating specific to the test) or Learning Statement Code (LSC) (if a Practical Test Standard is in effect for the certificate and rating specific to the test) for questions answered incorrectly. The total number of ACSs/LSCs shown on the AKTR is not necessarily an indication of the total number of questions answered incorrectly. Study these knowledge areas to improve your understanding of the subject matter. See Cross-Reference B in the back of this book for a listing of ACSs/LSCs and their associated questions.

Your instructor is required to provide instruction on each of the knowledge areas listed on your AKTR and to complete an endorsement of this instruction. You must present this to the examiner prior to taking the practical test. During the oral portion of the practical test, the examiner is required to evaluate the noted areas of deficiency.

**U.S. DEPARTMENT OF TRANSPORTATION  
Federal Aviation Administration  
Airman Knowledge Test Report**

**NAME:** TAYLOR SMITH

**FAA TRACKING NUMBER (FTN):** C1234567

**EXAM ID:** 98765432109876543

**EXAM:** Flight Instructor – Airplane (FIA)

**EXAM DATE:** 09/15/2024

**EXAM SITE:** ABC12345

**SCORE:** 88%

**GRADE:** Pass

**TAKE:** 1

The Airman Certification Standards (ACS) codes listed below represent incorrectly answered questions. These ACS codes and their associated Areas of Operation/Tasks/Elements may be found in the appropriate ACS document at [http://www.faa.gov/training\\_testing/testing/acs](http://www.faa.gov/training_testing/testing/acs).

A single code may represent more than one incorrect response.

AI.II.D.K2 AI.II.F.K1 AI.III.C.K2a AI.V.D.K4 AI.IX.A.K3d AI.IX.E.K1 AI.X.B.K4 AI.XIII.A.K2

**EXPIRATION DATE:** 09/30/2026

**DO NOT LOSE THIS REPORT**

AUTHORIZED INSTRUCTOR'S STATEMENT: (if applicable)

On \_\_\_\_\_ (date) I gave the above named applicant \_\_\_\_\_ hours of additional instruction, covering each subject area shown to be deficient, and consider the applicant competent to pass the knowledge test.

Name \_\_\_\_\_

Cert. No. \_\_\_\_\_ (print clearly)

Type of instructor certificate \_\_\_\_\_

Signature \_\_\_\_\_

**FRAUDULENT ALTERATION OF THIS FORM BY ANY PERSON IS A BASIS FOR SUSPENSION OR REVOCATION  
OF ANY CERTIFICATES OR RATINGS HELD BY THAT PERSON.**

**ISSUED BY: PSI Services LLC  
FEDERAL AVIATION ADMINISTRATION**

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Sample Airman Knowledge Test Report

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## Retesting Procedures

Applicants retesting **after failure** are required to submit the applicable AKTR indicating failure, along with an endorsement (on the test report) from an authorized instructor, who gave the applicant the additional training, certifying the applicant is competent to pass the test. The original failed AKTR and retest endorsement presented as authorization shall be retained by the proctor and attached to the applicable sign-in/out log. The latest test taken will reflect the official score.

Applicants retesting **in an attempt to achieve a higher passing score** may retake the same test for a better grade after 30 days. The latest test taken will reflect the official score. Applicants are required to submit the original applicable AKTR indicating previous passing score to the testing center prior to testing. Testing center personnel must collect and destroy this report prior to issuing the new test report.

## Cheating or Other Unauthorized Conduct

Computer testing centers must follow strict security procedures to avoid test compromise. These procedures are established by the FAA and are covered in FAA Order 8080.6 Conduct of Airman Knowledge Tests. The FAA has directed testing centers to terminate a test at any time a test proctor suspects a cheating incident has occurred. An FAA investigation will then be conducted. If the investigation determines that cheating or unauthorized conduct has occurred, then any airman certificate or rating that you hold may be revoked, and you will be prohibited for one year from applying for or taking any test for a certificate or rating under 14 CFR Part 61.

## Test-Taking Tips

Prior to launching the actual test, the test proctor's testing software will provide you with an opportunity to practice navigating through the test. This practice (or tutorial) session may include a "sample" question(s). These sample questions have no relation to the content of the test, but are meant to familiarize you with the look and feel of the system screens, including selecting an answer, marking a question for later review, time remaining for the test, and other features of the testing software.

Follow these time-proven tips, which will help you develop a skillful, smooth approach to test-taking:

- Visit **faa.psiexams.com** to take a small sample test to become familiar with the latest PSI exam interface you will see on your actual FAA knowledge test.
- Be careful to fully understand the intent of each question and corresponding answer while studying, rather than memorize the A, B, C answer choice—answer stems may appear in a different order than you studied and have some wording differences.
- Remember to bring photo I.D., the testing fee, calculator, flight computer (ASA's E6-B or CX-3 Flight Computer), plotter, magnifying glass, and a sharp pointer, such as a safety pin.
- Your first action when you sit down should be to write any formulas and information you can remember from your study on the scratch paper they will provide. Remember, some of the formulas may be on your E6-B.
- Read each question carefully before looking at the possible answers. You should clearly understand the problem before attempting to solve it.
- After formulating an answer, determine which answer choice corresponds the closest with your answer. The answer chosen should completely resolve the problem.
- From the answer choices given, it may appear that there is more than one possible answer. However, there is only one answer that is correct and complete. The other answers are either incomplete, erroneous, or represent popular misconceptions.
- Answer each question in accordance with the latest regulations and guidance publications.

- 
- If a certain question is difficult for you, tag it for REVIEW and proceed to the other questions. After you answer the less difficult questions, return to those which you tagged and answer them. Be sure to untag these questions once you have answered them. The review marking procedure will be explained to you prior to starting the test. Although the computer should alert you to unanswered questions, make sure every question has an answer recorded. This will allow you to use the available time to your maximum advantage.
  - Perform each math calculation twice to confirm your answer. If adding or subtracting a column of numbers, reverse your direction the second time to reduce the possibility of error.
  - When solving a calculation problem, select the answer nearest to your solution.
  - Remember that information is provided in the Legends and Figures contained within the Airman Knowledge Testing Supplement (FAA-CT-8080 document) you'll be using during the test.
  - Remember to answer every question, even the ones with no completely correct answer, to ensure the FAA gives you credit for a bad question.
  - Take your time and be thorough but relaxed. Take a minute off every half-hour or so to relax your brain and body. Stay hydrated.

## **Flight Instructor Certificates Eligibility Requirements**

If you are pursuing an Instructor Certificate, you should review 14 CFR §61.23 “Medical Certificates: Requirement and Duration,” §61.35 “Knowledge Test: Prerequisites and Passing Grades,” and §61.183 “Eligibility requirements.”

You must pass the FOI Knowledge Test and a Flight or Ground Instructor Knowledge Test specific to the instructor rating sought. You may take these tests on the same day, and you do not have to take them in any particular order. When applying for any additional instructor rating, you are not required to take the Fundamentals of Instructing Knowledge Test again. Once you have acquired a Flight Instructor Certificate, you are eligible to give ground instruction required for a pilot or instructor certificate or rating, based on the ratings on your flight instructor certificate. Because of this, it is not necessary to obtain a separate Ground Instructor Certificate since you would already have these privileges.

### **The Flight Instructor Certificate**

To be eligible for a Flight Instructor Certificate, an applicant must:

1. Be at least 18 years old.
2. Read, speak, write, and understand the English language.
3. Hold a current FAA Medical Certificate (unless exercising privileges of a glider or balloon rating).
4. Hold either a Commercial or Airline Transport Pilot Certificate with appropriate aircraft rating.
5. Hold an Instrument Rating if applying for either airplane or instrument instructor.
6. Pass an FOI Knowledge Exam after satisfactory completion of a ground instruction or home-study course.
7. Pass an FAA Knowledge Exam on the appropriate flight instruction subjects after satisfactory completion of a ground instruction or home study course.
8. Obtain an instructor logbook endorsement or certificate of satisfactory knowledge of subject areas where questions were missed as listed on the AKTR.

- 
9. Receive flight instruction and training and obtain an instructor logbook endorsement or certificate of competence in the appropriate flight training procedures and maneuvers.
  10. Pass an oral and flight test on the subjects and maneuvers in the appropriate flight instructor FAA Test Standards:
    - FAA-S-ACS-25 Flight Instructor for Airplane
    - FAA-S-ACS-29 Flight Instructor for Rotorcraft-Helicopter
    - FAA-S-8081-9 Flight Instructor Instrument (for CFII applicants)

## The Ground Instructor Certificate

To be eligible for a Ground Instructor Certificate, an applicant must:

1. Be at least 18 years old.
2. Read, speak, write, and understand the English language.
3. Pass an FOI Knowledge Exam.
4. Pass an FAA Knowledge Exam on the required flight instruction subjects.

There are three levels of Ground Instructor Certificate:

1. **Basic Ground Instructor.** A basic ground instructor may instruct on subjects related to the sport, private and recreational pilot certificates. The FAA Knowledge Exam questions are included in this Certified Flight Instructor test book. A basic ground instructor may endorse a logbook to authorize Sport, Private and Recreational FAA Knowledge Exams.
2. **Advanced Ground Instructor.** An advanced ground instructor may instruct on all subjects related to any certificate or rating, except for the aeronautical knowledge areas required for an instrument rating. The FAA Knowledge Exam questions are included in this Certified Flight Instructor test book. An advanced ground instructor may endorse a logbook to authorize these FAA Knowledge Exams.
3. **Instrument Ground Instructor.** An instrument ground instructor may instruct and endorse logbooks on all subjects related to instrument procedures and operations at all levels. The FAA Knowledge questions for instrument ground instructor are included in the ASA Test Prep for the Instrument Rating (not this book).

## Eligibility Requirements for Sport Pilot Instructors

To be eligible for a Flight Instructor Certificate with a Sport Pilot Rating, an applicant must:

1. Be at least 18 years old.
2. Be able to read, speak, write, and understand English or have a limitation placed on the certificate.
3. Hold at least a current and valid Sport Pilot Certificate with category and class ratings or privileges, as applicable, that are appropriate to the flight instructor privileges sought.
4. Score at least 70 percent on the required FAA Knowledge Test.
5. Pass a practical test on the subjects and maneuvers outlined in the Sport Pilot Practical Test Standards.
6. The following table explains the aeronautical experience you must have to apply for a Sport Pilot Certificate:



<b>If you are applying for a flight instructor certificate with a sport pilot rating for...</b>	<b>Then you must log at least...</b>	<b>Which must include at least...</b>
(a) Airplane category and single-engine class privileges,	(1) 150 hours of flight time as a pilot,	(i) 100 hours of flight time as pilot in command in powered aircraft, (ii) 50 hours of flight time in a single-engine airplane, (iii) 25 hours of cross-country flight time, (iv) 10 hours of cross-country flight time in a single-engine airplane, and (v) 15 hours of flight time as pilot in command in a single-engine airplane that is a light-sport aircraft.
(b) Glider category privileges,	(1) 25 hours of flight time as pilot in command in a glider, 100 flights in a glider, and 15 flights as pilot in command in a glider that is a light-sport aircraft, or (2) 100 hours in heavier-than-air aircraft, 20 flights in a glider, and 15 flights as pilot in command in a glider that is a light-sport aircraft.	
(c) Rotorcraft category and gyroplane class privileges,	(1) 125 hours of flight time as a pilot,	(i) 100 hours of flight time as pilot in command in powered aircraft, (ii) 50 hours of flight time in a gyroplane, (iii) 10 hours of cross-country flight time, (iv) 3 hours of cross-country flight time in a gyroplane, and (v) 15 hours of flight time as pilot in command in a gyroplane that is a light-sport aircraft.
(d) Lighter-than-air category and airship class privileges,	(1) 100 hours of flight time as a pilot,	(i) 40 hours of flight time in an airship, (ii) 20 hours of pilot in command time in an airship, (iii) 10 hours of cross-country flight time, (iv) 5 hours of cross-country flight time in an airship, and (v) 15 hours of flight time as pilot in command in an airship that is a light-sport aircraft.
(e) Lighter-than-air category and balloon class privileges,	(1) 35 hours of flight time as pilot-in-command,	(i) 20 hours of flight time in a balloon, (ii) 10 flights in a balloon, and (iii) 5 flights as pilot in command in a balloon that is a light-sport aircraft.
(f) Weight-shift-control aircraft category privileges,	(1) 150 hours of flight time as a pilot,	(i) 100 hours of flight time as pilot in command in powered aircraft, (ii) 50 hours of flight time in a weight-shift-control aircraft, (iii) 25 hours of cross-country flight time, (iv) 10 hours of cross-country flight time in a weight-shift-control aircraft, and (v) 15 hours of flight time as pilot in command in a weight-shift-control aircraft that is a light-sport aircraft.
(g) Powered-parachute category privileges,	(1) 100 hours of flight time as a pilot,	(i) 75 hours of flight time as pilot in command in powered aircraft, (ii) 50 hours of flight time in a powered parachute, (iii) 15 hours of cross-country flight time, (iv) 5 hours of cross-country flight time in a powered parachute, and (v) 15 hours of flight time as pilot in command in a powered parachute that is a light-sport aircraft.

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# Knowledge Exam References

The FAA references the following documents to write the FAA Knowledge Exam questions. You should be familiar with all of these as part of your ground school studies, which you should complete before starting test preparation.

FAA-H-8083-1 *Aircraft Weight and Balance Handbook*  
FAA-H-8083-2 *Risk Management Handbook*  
FAA-H-8083-3 *Airplane Flying Handbook*; FAA-H-8083-13 *Glider Flying Handbook*  
FAA-H-8083-5 *Weight-Shift Control Aircraft Flying Handbook*  
FAA-H-8083-9 *Aviation Instructor's Handbook*  
FAA-H-8083-15 *Instrument Flying Handbook*  
FAA-H-8083-21 *Helicopter Flying Handbook*; FAA-H-8083-11 *Balloon Flying Handbook*  
FAA-H-8083-25 *Pilot's Handbook of Aeronautical Knowledge*  
FAA-H-8083-28 *Aviation Weather Handbook*  
FAA-H-8083-29 *Powered Parachute Handbook*

FAA-S-8081-29 *Sport Instructor Airplane Practical Test Standards*  
FAA-S-ACS-6 *Private Pilot Airplane Airman Certification Standards*  
FAA-S-ACS-7 *Commercial Pilot Airplane Airman Certification Standards*  
FAA-S-ACS-15 *Private Pilot Helicopter Airman Certification Standards*  
FAA-S-ACS-16 *Commercial Pilot Helicopter Airman Certification Standards*  
FAA-S-ACS-25 *Flight Instructor Airplane Airman Certification Standards*  
FAA-S-ACS-29 *Flight Instructor Helicopter Airman Certification Standards*

AC 20-43 *Aircraft Fuel Control*  
AC 61-65 *Certification: Pilots, Flight and Ground Instructors*  
AC 61-67 *Stall and Spin Awareness Training*  
AC 61-107 *Operations of Aircraft at Altitudes Above 25,000 MSL*  
AC 68-1 *BasicMed*  
AC 90-48 *Pilots' Role in Collision Avoidance*  
AC 91-13 *Cold Weather Operation of Aircraft*  
AC 91-43 *Unreliable Airspeed Indications*  
AC 91-51 *Effect of Icing on Aircraft Control and Airplane Deice and Anti-Ice Systems*

*Chart Supplements U.S.*  
Sectional Aeronautical Chart (SAC)

*Aeronautical Information Manual (AIM)*  
14 CFR Parts 1, 23, 43, 61, 68, 71, 91, 121  
49 CFR Part 830

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Visit [asa2fly.com/TPCFI](http://asa2fly.com/TPCFI) for reader resources useful to ground and flight instructors.

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# Acronyms

For reference, acronyms appearing in this book are defined below.

AC	alternating current	GFA	Graphical Forecast for Aviation
ACS	Airman Certification Standards	GPS	Global Positioning System
AD	Airworthiness Directive	HIRL	high intensity runway lights
ADM	aeronautical decision making	HOTS	high-order thinking skills
AFM	aircraft flight manual	hp	horsepower
AGL	above ground level	IAS	indicated airspeed
AIRMET	airmen's meteorological information	ICAO	International Civil Aviation Organization
ASOS	Automated Surface Observing System	IFR	instrument flight rules
ATC	air traffic control	ILS	instrument landing system
ATIS	Automatic Terminal Information Service	IMC	instrument meteorological conditions
AWC	Aviation Weather Center	IR	Instrument Route (MTR)
AWOS	Automated Surface Weather Observing System	KCAS	knots calibrated airspeed
BTU	British thermal unit	KIAS	knots indicated airspeed
CAL	computer-assisted learning	LIRL	low intensity runway lights
CAT	clear air turbulence	LTM	long term memory
CBT	computer-based training	MEF	maximum elevation figure
CDI	course deviation indicator	MEL	Minimum Equipment List
CFI	certified flight instructor	METAR	aviation routine weather report
CFIT	controlled flight into terrain	MIRL	medium intensity runway lights
CG	center of gravity	MOA	Military Operations Area
CMEC	comprehensive medical examination checklist	MSL	mean sea level
CONUS	contiguous/continental United States	MTR	Military Training Route
CTAF	Common Traffic Advisory Frequency	MVFR	marginal visual flight rules
DC	direct current	NAS	National Airspace System
DME	distance measuring equipment	NM	nautical mile
DVFR	defense visual flight rules	NOTAM	Notice to Air Missions
EGT	exhaust gas temperature	NTSB	National Transportation Safety Board
ELT	emergency locator transmitter	OAT	outside air temperature
ETA	estimated time of arrival	OBS	omni bearing selector
EWCG	empty weight center of gravity	PA	pressure altitude
FA	area forecast	PAPI	precision approach path indicator
FAR	Federal Aviation Regulation	PC	personal computer
FB	winds and temperatures aloft forecast	PIC	pilot-in-command
FSS	Flight Service Station	PIREP	pilot report
GAA	glide angle in air	POH	pilot's operating handbook
GAG	glide angle over ground	PPC	powered parachute
		PTS	Practical Test Standards

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RPM	revolutions per minute
SIGMET	significant meteorological information
SM	statute mile
SRM	single pilot resource management
STM	short term memory
TACAN	tactical air navigation system
TAF	terminal aerodrome forecast
TI	thermal index
UHF	ultra high frequency
VASI	visual approach slope indicator
VFR	visual flight rules
VOR	VHF Omnidirectional Range
VORTAC	VOR-TACAN navigation system
VOT	VOR Test Facility
VR	Visual Route (MTR)
VSI	vertical speed indicator

SAMPLE

# ASA Test Prep Layout

Sample FAA questions have been sorted into chapters according to subject matter. Within each chapter, similar questions are grouped together following introductory chapter text. Figures referenced in the chapter text are numbered with the appropriate chapter number, e.g., “Figure 1-1” is Chapter 1’s first chapter text figure.

Some questions refer to Figures or Legends immediately following the question number, e.g., “6201. (Refer to Figure 14.)” These are FAA Figures and Legends from the Airman Knowledge Testing Supplement (FAA-CT-8080-5H) that can be found at the back of this book. This supplement will be provided to you as a separate booklet when you take your FAA test.

Following each sample FAA test question is ASA’s explanation in italics. The last line of the explanation contains a Learning Statement Code (LSC), for those tests referencing an FAA Practical Test Standard (PTS), or Airman Certification Standards (ACS) code, for those tests with an ACS, as well as a reference for further study. Some questions include an explanation for the incorrect answers for added clarity. When you encounter a difficult question, find the LSC or ACS code in Cross-Reference B, and then look for material relating to the subject description within the given reference(s). Refer to Cross-Reference B for more information on how to use LSCs or ACS codes for effective studying.

Answers to each question are found at the bottom of each page.

## EXAMPLE:

### Chapter text

Four aerodynamic forces are considered to be basic because they act upon an aircraft during all flight maneuvers. There is the downward-acting force called WEIGHT which must be overcome by the upward-acting force called LIFT, and there is the rearward-acting force called DRAG, which must be overcome by the forward-acting force called THRUST.

**Category rating. This question may be found on tests for these ratings.\***

ALL, AIR, RTC, GLI, LTA, FOI, PPC, WSC, LSA, MCI ←

**6201.** (Refer to Figure 14.) The four forces acting on an airplane in flight are ↑

**See the Airman Knowledge Testing Supplement at the back of the book.**

A— lift, weight, thrust, and drag.

B— lift, weight, gravity, and thrust. ←

C— lift, gravity, power, and friction.

**Question and answer choices**

*Lift, weight, thrust, and drag are the four basic aerodynamic forces acting on an aircraft in flight.* ←

**Explanation**

*(AI.II.D.K4) — FAA-H-8083-25* ←

**Code line. FAA LSC and ACS codes in parentheses, followed by references for further study.**

*Answer (B) is incorrect because the force of gravity is always the same number and reacts with the airplane’s mass to produce a different weight for almost every airplane. Answer (C) is incorrect because weight is the final product of gravity, thrust is the final product of power, and drag is the final product of friction. Power, gravity, and friction are only parts of the aerodynamic forces of flight.* ←

**Reasons why answer choices are incorrect explained here.**

\* **Note:** The FAA does *not* identify which questions are on the different ratings’ tests. Unless the wording of a question is pertinent to only one rating category, it may be found on *any* of the tests.

**ALL** = All aircraft

**AIR** = Airplane

**GLI** = Glider

**LTA** = Lighter-Than-Air

**FOI** = Fundamentals of Instructing

**RTC** = Rotorcraft (applies to both helicopter and gyroplane)

**PPC** = Powered Parachute

**WSC** = Weight-Shift Control

**LSA** = Light-Sport Aircraft Airplane

**MCI** = Military Competency Instructor

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# Chapter 5

## **Weather and Weather Services**

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## The Earth's Atmosphere

The earth's atmosphere is a mixture of gases made up primarily of nitrogen and oxygen. The atmosphere is in layers, with each layer having its own characteristics:

**Troposphere**—The layer extending from the surface up to about 7 miles. All of earth's weather occurs in the troposphere because it contains water vapor. Temperature decreases steadily with altitude in the troposphere.

**Tropopause**—The boundary between the troposphere and the stratosphere. The tropopause slopes from about 20,000 feet over the poles to about 65,000 feet over the equator, and it is higher in summer than in winter.

**Stratosphere**—The layer above the troposphere in which there is relatively little change of temperature with altitude, except for a warming trend near the top.

Energy received from the sun in the form of solar radiation is the primary driving force of the weather on the earth. The earth's surface and its atmosphere reflect about 55 percent of the radiation and absorb the remaining 45 percent, converting it to heat. The earth in turn radiates energy, and this outgoing radiation is called terrestrial radiation.

The standard temperature of the atmosphere at mean sea level is 15°C and 59°F. The standard pressure at mean sea level is 29.92 inches of mercury, 1013.2 millibars, and 14.69 pounds per square inch.

ALL

**6161.** In what part of the atmosphere does most weather occur?

- A—Tropopause.
- B—Troposphere.
- C—Stratosphere.

*Most of the weather occurs in the lower layer of our atmosphere, which is called the troposphere. (PLT203, AI.III.C.K3a, HI.III.C.K3a) — FAA-H-8083-28*

ALL

**6162.** Which is the primary driving force of weather on the Earth?

- A—The Sun.
- B—Coriolis.
- C—Rotation of the Earth.

*Energy received from the sun is the primary driving force of the weather on the earth. (PLT492, AI.III.C.K3, HI.III.C.K3) — FAA-H-8083-28*

ALL

**6173.** What are the standard temperature and pressure values for mean sea level?

- A—15°F and 29.92 "Hg.
- B—59°C and 29.92 mb.
- C—59°F and 1013.2 mb.

*The standard sea level temperature is 15°C (59°F), and the standard sea level atmospheric pressure is 29.92 inches of mercury, or 1013.2 millibars. (PLT206, AI.III.C.K3a, HI.III.C.K3a) — FAA-H-8083-28*

### Answers

6161 [B]

6162 [A]

6173 [C]

## Temperature, Pressure, and Density

Almost all weather is caused by heat transferred to the earth by the sun through solar radiation. Most of this energy is reradiated, but the rest is converted into heat.

The temperature of the air in the troposphere decreases with altitude at a rate of 2°C per 1,000 feet. This is called the **average lapse rate**. There are two other lapse rates that are of interest to pilots: dry adiabatic lapse rate and moist adiabatic lapse rate. The **dry adiabatic lapse rate** is the change in temperature with altitude for unsaturated air; it is 3°C per 1,000 feet. The moist adiabatic lapse rate is the change in temperature with altitude for saturated air. Because of the condensation of moisture from this air, the moist adiabatic lapse rate is less than the dry adiabatic lapse rate. The actual rate depends upon the dew point of the air. When we know the temperature at any given level and the lapse rate, we can find the freezing level:

1. Find the difference between the existing temperature and freezing temperature (0°C).
2. Divide this difference in temperature by 2 to find the number of thousand feet above the existing level at which the temperature will be 0°C.

A **temperature inversion** is a change in temperature in which the air gets warmer as the altitude increases. A surface inversion occurs when terrestrial radiation on a clear night cools the surface of the land and lowers the temperature of the air immediately above the surface. The air temperature increases with altitude for a few hundred feet. An inversion aloft occurs when a current of warm air aloft overruns cold air near the surface. A low-level temperature inversion with high relative humidity will trap fog, smoke, low clouds, and other restrictions to visibility. The air will normally be smooth in an inversion.

**Pressure altitude** is the altitude measured above the standard pressure level at sea level of 29.92" of mercury (Hg), or 1013.2 millibars (mb). In the lower levels of the troposphere, the atmospheric pressure decreases approximately 1 "Hg for each 1,000-foot increase in altitude. We can find the pressure altitude by setting the barometric scale of the altimeter to 29.92 "Hg, or 1013.2 mb, and reading the altimeter indication. We can also compute the approximate pressure altitude by using this standard lapse rate of 1 "Hg per 1,000 feet. If the altimeter indicates 1,850 feet when the barometric scale is set to 30.18 inches of mercury, it would indicate 260 feet lower if it were set to the standard sea level pressure of 29.92 "Hg.

The density of the air is affected by its temperature, pressure, and moisture content. It is the density of the air that determines the performance of an aircraft engine and the aerodynamic forces that are produced by an airfoil. **Density altitude** is the altitude in standard air where the density is the same as that of the existing air. It is found by correcting pressure altitude for nonstandard temperature. As the density of the air decreases because of an increase in temperature or water vapor, or a decrease in pressure, the density altitude increases. An airspeed indicator is a differential pressure indicator which measures the dynamic pressure of the air. When the density of the air decreases, the static pressure will decrease and the true airspeed will increase.

ALL

**6163.** The average lapse rate in the troposphere is

A—2.0°C per 1,000 feet.

B—3.0°C per 1,000 feet.

C—5.4°C per 1,000 feet.

*The average lapse rate (change in temperature with altitude) is 2°C per 1,000 feet. (PLT203, AI.III.C.K3c, HI.III.C.K3c) — FAA-H-8083-28*

ALL

**6166.** If the air temperature is +6°C at an elevation of 700 feet and a standard (average) temperature lapse rate exists, what will be the approximate freezing level?

A—6,700 feet MSL.

B—3,700 feet MSL.

C—2,700 feet MSL.

### Answers

6163 [A]



The air temperature is +6°C at an elevation of 700 feet, and the air cools 2°C each thousand feet. For the moisture to freeze, the air must cool to a temperature of 0°C. Its temperature must drop 6°, which will require 3,000 feet. The freezing level will be 3,000 + 700 feet, or 3,700 feet MSL. (PLT492, AI.III.C.K3c, HI.III.C.K3c) — FAA-H-8083-28

ALL

**6167.** If the air temperature is +12°C at an elevation of 1,250 feet and a standard (average) temperature lapse rate exists, what will be the approximate freezing level?

- A—7,250 feet MSL.
- B—5,250 feet MSL.
- C—4,250 feet MSL.

The air temperature is +12°C at an elevation of 1,250 feet, and the air cools 2°C each thousand feet. For the moisture to freeze, the air must cool to a temperature of 0°C. This will be  $12 \div 2 = 6,000$  feet above the surface of 1,250 feet ( $6,000 + 1,250$ ). Therefore, the freezing level is 7,250 feet MSL. (PLT492, AI.III.C.K3c, HI.III.C.K3c) — FAA-H-8083-28

ALL

**6167-1.** An increase in temperature with an increase in altitude

- A—is indication of an inversion.
- B—denotes the beginning of the stratosphere.
- C—means a cold front passage.

An increase in temperature with altitude is defined as an inversion; i.e., the lapse rate is inverted. (PLT512, AI.III.C.K3c, HI.III.C.K3c) — FAA-H-8083-28

ALL

**6167-2.** A surface inversion can

- A—indicate the chance of gusty winds.
- B—produce poor visibility.
- C—mean an unstable air mass.

A surface inversion can place a strong “lid” above smoke and haze. The result is poor visibility in the lower levels of the atmosphere, especially near industrial areas. (PLT512, AI.III.C.K3c, HI.III.C.K3c) — FAA-H-8083-28

ALL

**6164.** The most frequent type of ground- or surface-based temperature inversion is that produced by

- A—terrestrial radiation on a clear, relatively still night.
- B—warm air being lifted rapidly aloft in the vicinity of mountainous terrain.
- C—the movement of colder air under warm air or the movement of warm air over cold air.

Terrestrial radiation on a clear night cools the surface of the land and lowers the temperature of the air immediately above the surface. This causes a surface inversion in which the air temperature increases with altitude for a few hundred feet. (PLT301, AI.III.C.K3c, HI.III.C.K3c) — FAA-H-8083-28

Answer (B) is incorrect because this describes how upslope fog is produced. Answer (C) is incorrect because this describes temperature inversions aloft.

ALL

**6165.** Which weather conditions should be expected beneath a low-level temperature inversion layer when the relative humidity is high?

- A—Light wind shear and poor visibility due to light rain.
- B—Smooth air and poor visibility due to fog, haze, or low clouds.
- C—Turbulent air and poor visibility due to fog, low stratus type clouds, and showery precipitation.

A low-level temperature inversion with high relative humidity will trap fog, smoke, low clouds, and other restrictions to visibility. The air will normally be smooth in an inversion. (PLT301, AI.III.C.K3c, HI.III.C.K3c) — FAA-H-8083-28

ALL

**6168.** An altimeter indicates 1,850 feet MSL when set to 30.18. What is the approximate pressure altitude?

- A—1,590 feet.
- B—1,824 feet.
- C—2,110 feet.

In the lower levels of the troposphere, the atmospheric pressure decreases approximately 1 "Hg for each 1,000-foot increase in altitude, and pressure altitude is based on a sea level pressure of 29.92 "Hg. If the altimeter indicates 1,850 feet MSL when it is set to 30.18 "Hg, it will indicate 260 feet lower when it is set to 29.92 "Hg ( $30.18 - 29.92 = .26$ ). Therefore, the pressure altitude is 1,590 feet ( $1,850 - 260 = 1,590$ ). (PLT041, AI.III.C.K3c, HI.III.C.K3c) — FAA-H-8083-28

**Answers**

6166 [B]  
6168 [A]

6167 [A]

6167-1 [A]

6167-2 [B]

6164 [A]

6165 [B]

ALL

**6169.** An aircraft is flying at a constant power setting and constant indicated altitude. If the outside air temperature (OAT) increases, true airspeed will

- A—increase and true altitude will decrease.
- B—increase and true altitude will increase.
- C—decrease and true altitude will increase.

*True airspeed and true altitude are based on the existing OAT, which affects the density of the air. While flying at a constant power setting and a constant indicated altitude, an increase in OAT will cause the air to become less dense. Both the true airspeed and the true altitude will increase. (PLT127, Al.II.F.K2a, HI.II.G.K2av) — FAA-H-8083-28*

ALL

**6170.** An aircraft is flying at a constant power setting and constant indicated altitude. If the outside air temperature (OAT) decreases, true airspeed will

- A—decrease, and true altitude will decrease.
- B—increase, and true altitude will increase.
- C—increase, and true altitude will decrease.

*True airspeed and true altitude are based on the existing OAT, which affects the density of the air. While flying at a constant power setting and a constant indicated altitude, a decrease in OAT will cause the air to become more dense, and the true airspeed will decrease and the true altitude will be lower than indicated altitude. (PLT206, Al.II.F.K2a, HI.II.G.K2av) — FAA-H-8083-28*

ALL

**6171.** As density altitude increases, which will occur if a constant indicated airspeed is maintained in a no-wind condition?

- A—True airspeed increases; groundspeed decreases.
- B—True airspeed decreases; groundspeed decreases.
- C—True airspeed increases; groundspeed increases.

*True airspeed is based on the density of the air, which is affected by pressure, temperature, and humidity. While flying at a constant indicated airspeed, an increase in density altitude will indicate that the air has become less dense, and the true airspeed as well as ground speed will increase. (PLT127, Al.II.F.K2a, HI.II.G.K2av) — FAA-H-8083-28*

ALL

**6172.** Density altitude may be determined by correcting

- A—true altitude for nonstandard temperature.
- B—pressure altitude for nonstandard temperature.
- C—indicated altitude for temperature variations.

*Density altitude is the altitude in the standard atmosphere where the air density is the same as where you are. Density altitude is found by correcting pressure altitude for nonstandard temperature. (PLT127, Al.III.C.K3c, HI.III.C.K3c) — FAA-H-8083-28*

## Wind

Differences in temperature create differences in pressure, and these pressure differences cause winds to blow. We can tell a lot about wind by studying weather maps that show lines of equal barometric pressure, called **isobars**. When isobars are close together on a surface weather map, the pressure gradient is steep: there is a large amount of pressure change in a small distance, and the wind velocities are strong. Wind blows from an area of high pressure into an area of low pressure, but it does not cross the isobars at right angles.

The **Coriolis force**, caused by the rotation of the earth, acts at right angles to wind, and in the Northern Hemisphere it deflects wind to the right until it blows parallel to the isobars.

**Friction** between wind and the surface is a third force that acts to change wind direction. Friction slows wind. The rougher the terrain and the stronger the wind speed, the greater the effect of friction. As the friction slows windspeed, the Coriolis force decreases, but friction does not affect the pressure gradient force, which causes an imbalance in the pressure gradient and Coriolis forces. This stronger pressure gradient force turns the wind at an angle across the isobars toward the low pressure area.

### Answers

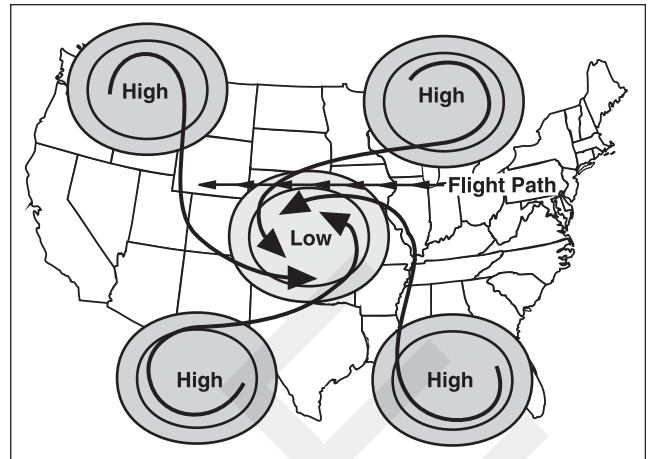
6169 [B]

6170 [A]

6171 [C]

6172 [B]

Winds at altitude follow isobars, but because of friction, surface winds flow at an angle across isobars. In the Northern Hemisphere, wind flows around low pressure areas in a counterclockwise direction. This is called **cyclonic flow**. When planning a long east to west flight, you can get an advantage from wind by flying to the north of a low pressure area and to the south of a high pressure area. See Figure 5-1. Wind circulation in the Northern Hemisphere is clockwise out of a high and counterclockwise into a low. When flying from a high-pressure area into a low-pressure area, wind will blow from the left.



**Figure 5-1.** Wind circulation in the Northern Hemisphere

Wind velocities are generally greater in a low-pressure area than in a high-pressure area, so when flying from a high pressure into a low, wind velocities will be increasing. Air flowing counterclockwise into a low-pressure area cannot flow outward against the pressure gradient, nor can it go downward into the ground; it must go upward. Therefore, a low pressure area, or **trough**, is an area of rising air. Air moving out of a high, or **ridge**, flows in a clockwise direction and depletes the quantity of air. Highs and ridges, therefore, are areas of descending air.

Convective circulation patterns associated with sea breezes occur because land surfaces warm and cool more rapidly than water surfaces. The land is warmer than the sea during the day, and wind blows from the cool water to warm land. At night the wind reverses and blows from the cool land to warmer water.

ALL

**6174.** What causes wind?

- A—Coriolis force.
- B—Pressure differences.
- C—The rotation of the Earth.

*Wind, which is the movement of air, is caused by pressure differences in the atmosphere. (PLT516, AI.III.C.K3b, HI.III.C.K3b) — FAA-H-8083-28*

ALL

**6175.** The windflow around a low pressure is

- A—cyclonic.
- B—adiabatic.
- C—anticyclonic.

*Because of the Coriolis force, the wind flow around a low-pressure area in the Northern Hemisphere is counterclockwise. This direction of flow is called cyclonic flow. (PLT516, AI.III.C.K3b, HI.III.C.K3b) — FAA-H-8083-28*

*Answer (B) is incorrect because adiabatic refers to the cooling of air as it rises. Answer (C) is incorrect because anticyclonic refers to a high-pressure system.*

ALL

**6176.** Winds at 5,000 feet AGL on a particular flight are southwesterly while most of the surface winds are southerly. This difference in direction is primarily due to

- A—local terrain effects on pressure.
- B—stronger Coriolis force at the surface.
- C—friction between the wind and the surface.

*Friction between the wind and the surface of the earth slows the wind and decreases the effect of the Coriolis force. Since friction does not decrease the pressure gradient, the Coriolis force and pressure gradient are not in balance near the surface, and the force of the pressure gradient turns the wind at an angle across the isobars toward the lower pressure. This action explains the shift of wind from southerly near the surface to southwesterly at 5,000 feet. (PLT516, AI.III.C.K3b, HI.III.C.K3b) — FAA-H-8083-28*

#### Answers

6174 [B]

6175 [A]

6176 [C]

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