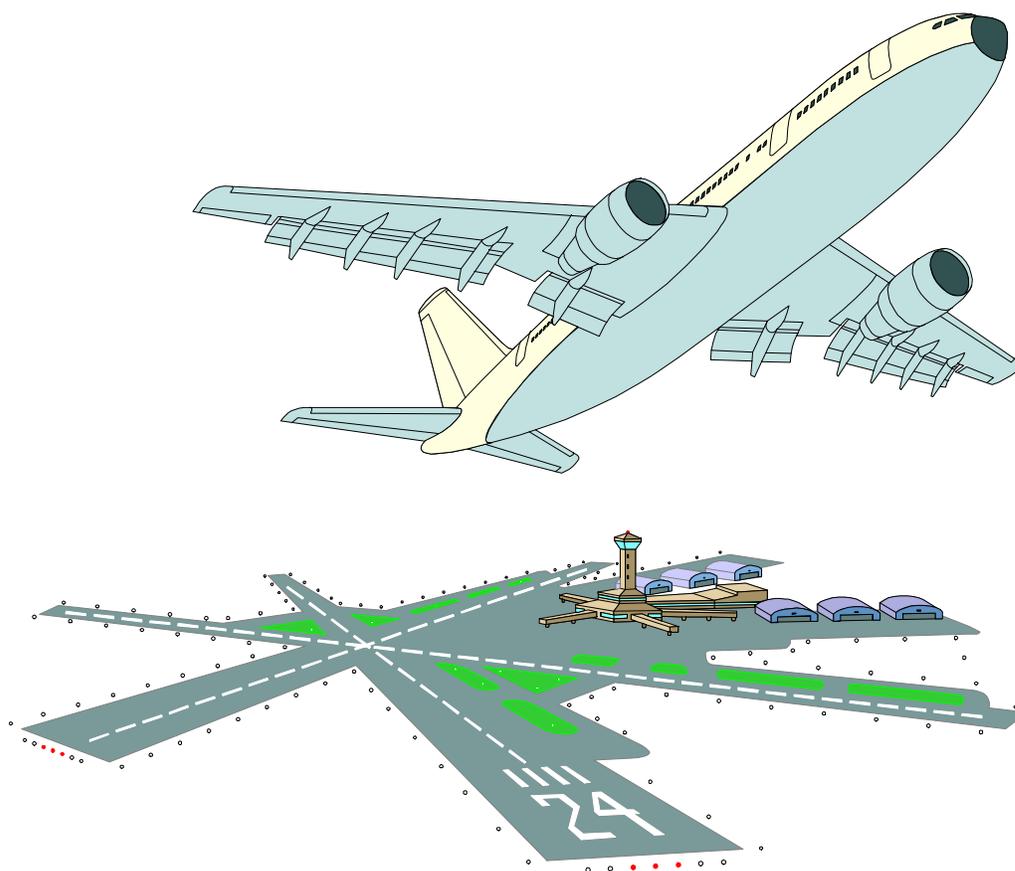


COMMERCIAL PILOT KNOWLEDGE TEST GUIDE



U.S. Department of Transportation
Federal Aviation Administration

COMMERCIAL PILOT KNOWLEDGE TEST GUIDE

1995

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

Flight Standards Service

PREFACE

The Flight Standards Service of the Federal Aviation Administration (FAA) has developed this guide to help applicants meet the knowledge requirements for commercial pilot certification.

This guide contains information about eligibility requirements, test descriptions, testing and retesting procedures, and sample test questions representative of those used in the official tests. Sample test questions and choices of answers are based on regulations, principles, and practices valid at the time this guide was printed. In addition, appendix 1 provides a list of reference materials and subject matter knowledge codes, and computer testing designees. The list of subject matter knowledge codes should be referred to when reviewing areas of deficiency on the airman test report. Changes to the subject matter knowledge code list will be published as a separate advisory circular.

The commercial pilot test question bank and subject matter knowledge code list for all airmen certificates and ratings, with changes, may be obtained by computer modem from FedWorld at (703) 321-3339. This bulletin board service is provided by the U.S. Department of Commerce, 24 hours a day, 7 days per week. For technical assistance regarding computer software and modem requirements for this service, contact the FedWorld help desk at (703) 487-4608 from 7:30 a.m. to 5:00 p.m. e.s.t., Monday through Friday.

This publication may be purchased from the Superintendent of Documents, U. S. Government Printing Office, Washington, DC 20402-9325 or from U.S. Government Printing Office bookstores located in major cities throughout the United States.

Comments regarding this guide should be sent to:

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COMMERCIAL PILOT KNOWLEDGE TEST GUIDE

INTRODUCTION

The FAA has available hundreds of computer testing centers nationwide. These testing centers offer the full range of airman knowledge tests including military competence, instrument foreign pilot, and pilot examiner predesignated tests. Refer to appendix 1 in this guide for a list of computer testing designees.

This knowledge test guide was developed to be used by applicants preparing to take a knowledge test for the following certificates and ratings:

- Commercial Pilot — Airplane
- Commercial Pilot — Rotorcraft – Helicopter
- Commercial Pilot — Rotorcraft – Gyroplane
- Commercial Pilot — Glider
- Commercial Pilot — Free Balloon – Hot Air
- Commercial Pilot — Free Balloon – Gas
- Commercial Pilot — Lighter-Than-Air Airship
- Military Competency — Airplane
- Military Competency — Helicopter

What is required to become a skilled and effective commercial pilot? Although some individuals possess more knowledge and skills than others, no one is born a natural pilot. Competent commercial pilots become so through study, hard work, and experience.

This guide is not offered as a quick and easy way to obtain the necessary information for passing the knowledge tests. There is no quick and easy way to obtain this knowledge in addition to the skills needed to transform a student into a pilot capable of operating safely in our complex national airspace system. Rather, the intent of this guide is to define and narrow the field of study, as much as possible, to the required knowledge areas for obtaining a commercial pilot certificate.

Rote memorization of test questions may render good test scores, but a correlative understanding of the subject matter may be lacking. This correlative understanding of the entire aviation schema is what produces a safe and effective pilot.

ELIGIBILITY REQUIREMENTS

The general prerequisites for a commercial pilot certificate require that the applicant have a combination of experience, knowledge, and skill. For specific information pertaining to certification, an applicant should carefully review the appropriate sections of Federal Aviation Regulations (FAR) Part 61 for commercial pilot certification.

Additionally, to be eligible for a Commercial Pilot Certificate, applicants must:

1. Be at least 18 years of age (16 to take the knowledge test).
2. Be able to read, speak, and understand the English language, or have such operating limitations placed on their pilot certificate as are necessary for safety, to be removed when they show that they can read, speak, and understand the English language.

3. Hold at least a valid second-class medical certificate issued under FAR Part 67 of this chapter, or, in the case of a glider or free balloon rating, certify that they have no known medical deficiency that makes them unable to pilot a glider or a free balloon, as appropriate.

4. Pass a knowledge test appropriate to the aircraft rating sought on the subjects in which ground instruction is required. Applicants for a knowledge test must show evidence of completing ground training or a home study course and be prepared for the knowledge test.

5. Pass an oral and flight test appropriate to the rating they seek, covering items selected by the inspector or examiner from those on which training is required.

6. Comply with the provisions of FAR Part 61 which apply to the rating they seek.

KNOWLEDGE AREAS ON THE TESTS

Commercial pilot tests are comprehensive because they must test an applicant's knowledge in many subject areas. Applicants for a commercial pilot certificate or added rating should review the appropriate information pertinent to the category sought. The information includes NTSB Part 830, FAR Parts 23, 61, 67, 71, 91, 125, 135, Principles of Flight, Weather, Navigation, Operations, and in the case of Airship applicants, Instrument Procedures. Additionally, Free Balloon, and Airship applicants must review Fundamentals of Instruction.

The applicant for a commercial pilot certificate must have received and logged (recorded) ground instruction from an authorized instructor, or must present evidence showing satisfactory completion of a course of instruction or home study course, in at least the following areas of aeronautical knowledge appropriate to the category of aircraft for which a rating is sought.

Aeronautical knowledge areas:

1. The Federal Aviation Regulations that apply to commercial pilot privileges, limitations, and flight operations.
2. Accident reporting requirements of the National Transportation Safety Board.
3. Basic aerodynamics and the principles of flight.
4. Meteorology to include recognition of critical weather situations, wind shear recognition and avoidance, and the use of aeronautical weather reports and forecasts.
5. The safe and efficient operation of aircraft.
6. Weight and balance computation.
7. Use of performance charts.
8. Significance and effects of exceeding aircraft performance limitations.
9. Use of aeronautical charts and magnetic compass for pilotage and dead reckoning.
10. Use of air navigation facilities.
11. Aeronautical decision making and judgment.

12. Principles and functions of aircraft systems.
13. Maneuvers, procedures, and emergency operations appropriate to the aircraft.
14. Night and high altitude operations.
15. Descriptions of and procedures for operating within the National Airspace System.

DESCRIPTION OF THE TESTS

All test questions are the objective, multiple-choice type, with three choices of answers. Each question can be answered by the selection of a single response. Each test question is independent of other questions, that is, a correct response to one does not depend upon, or influence the correct response to another.

The maximum time allowed for taking each test is either 2, 2.5 or 3 hours. The times vary depending on the number of questions assigned to each test, and are based on previous experience and educational statistics. This amount of time is considered more than adequate for the applicant with proper preparation and instruction. The minimum passing score is 70 percent.

The following tests each contain 100 questions and 3 hours is allowed to take each test:

- Commercial Pilot — Airplane
- Commercial Pilot — Rotorcraft – Helicopter
- Commercial Pilot — Rotorcraft – Gyroplane
- Commercial Pilot — Glider
- Commercial Pilot — Free Balloon – Hot Air
- Commercial Pilot — Lighter-Than-Air – Airship

The following test contains 60 questions and 2.5 hours is allowed to take the test:

- Commercial Pilot — Free Balloon – Gas

The following tests each contain 50 questions and 2 hours is allowed to take each test:

- Military Competency — Airplane
- Military Competency — Helicopter

Communication between individuals through the use of words is a complicated process. In addition to being an exercise in the application and use of aeronautical knowledge, a commercial pilot knowledge test is also an exercise in communication since it involves the use of written language. Since the tests involve written rather than spoken words, communication between the test writer and the person being tested may become a difficult matter if care is not exercised by both parties. Consequently, considerable effort is expended to write each question in a clear, precise manner. Make sure you carefully read the instructions given with each test, as well as the statements in each test item.

When taking a test, keep the following points in mind:

1. Answer each question in accordance with the latest regulations and procedures.

2. Read each question carefully before looking at the possible answers. You should clearly understand the problem before attempting to solve it.

3. After formulating an answer, determine which test answer most nearly corresponds with your answer. The answer chosen should completely resolve the problem.

4. From the answers 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 common misconceptions.

5. If a certain question is difficult for you, it is best to mark it for **RECALL** and proceed to the next question. After you answer the less difficult questions, return to those which you marked for recall and answer them. The recall 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 procedure will enable you to use the available time to the maximum advantage.

6. When solving a calculation problem, select the answer that is closest to your solution. The problems have been checked manually and with various types of calculators. If you have solved it correctly, your answer will be closer to the correct answer than any of the other choices.

TAKING A KNOWLEDGE TEST BY COMPUTER

You should determine what authorization requirements are necessary before going to the computer testing center. Testing center personnel cannot begin the test until you provide them with the proper authorization, if one is required. A limited number of tests require no authorization. In the case of retesting, you must present either a passed, expired passed (24 months) or failed test report for that particular test. This policy is covered in FAA Order 8080.6, Conduct of Airman Knowledge Test via the Computer Medium. However, you should always check with your instructor or your local Flight Standards District Office if you are unsure of what kind of authorization to bring to the testing facility.

The next step is the actual registration process. Most computer testing centers require that all applicants contact a central 1-800 phone number. At this time, you should select a testing center, schedule a test date, and make financial arrangements for test payment.

Applicants may register for tests several weeks in advance of the proposed testing date. You may cancel your appointment up to 2 business days before test time, without financial penalty. After that time, you may be subject to a cancellation fee as determined by the testing center.

You are now ready to take the test. Remember, you always have an opportunity to take a sample test before your actual test begins. Your actual test is under a time limit, but if you know your material, there should be sufficient time to complete and review your test. Within moments of completing the test, you will receive an airman test report, which contains your score. It also lists those subject matter knowledge areas where questions were answered incorrectly. **The total number of subject matter knowledge codes shown on the airman test report are not necessarily an indication of the total number of questions answered incorrectly.**

These codes refer to a list of knowledge areas that can be found in appendix 1 of this guide. You can study these knowledge areas to improve your understanding of the subject matter. Your instructor is required to review each of these areas listed on your airmen test report with you, and complete an endorsement that remedial instruction was conducted. Also, the pilot examiner may quiz you on the areas of deficiency during the practical test.

The airman test report, which must show the computer testing company's embossed seal, is an important document. **DO NOT LOSE THE AIRMAN TEST REPORT** as you will need to present it to the examiner before taking the practical test. Loss of this report means that you will have to request a duplicate copy from the FAA in Oklahoma City. This will be costly and time consuming.

CHEATING OR OTHER UNAUTHORIZED CONDUCT

Computer testing centers follow rigid testing procedures established by the FAA. This includes test security. When entering the test area, you are permitted to take only scratch paper furnished by the test administrator and an authorized aviation computer, plotter, etc., approved for use in accordance with FAA Order 8080.6, Conduct of Airmen Knowledge Testing via the Computer Medium, and AC 60-11, Aids Authorized for Use by Airman Written Test Applicants. The FAA has directed testing centers to stop a test any time a test administrator suspects a cheating incident has occurred. An FAA investigation will then follow. If the investigation determines that cheating or other unauthorized conduct has occurred, any airman certificate that you hold may be revoked, and you may not be allowed to take a test for 1 year.

RETESTING PROCEDURE

If the score on the airman test report is 70 or above, in most cases the report is valid for 24 calendar months. You may elect to retake the test, in anticipation of a better score, after 30 days from the date your last test was taken. Prior to retesting, you must give your current airman test report to the computer testing administrator. Remember, the score of the **latest** test you take will become your official test score. The FAA will not consider allowing anyone to retake a valid test before the 30-day remedial study period.

A person who fails a knowledge test may apply for retesting before 30 days of the last test providing that person presents the failed test report and an endorsement from an authorized instructor certifying that additional instruction has been given, and the instructor finds the person competent to pass the test. A person may retake a failed test after 30 days without an endorsement from an authorized instructor.

SAMPLE TEST QUESTIONS AND ANSWERS

AIRPLANE

1. A pilot flying a single-engine airplane observes a multiengine airplane approaching on a collision course from the left. Which pilot should give way?

A—Each pilot should alter course to the right.

B—The pilot of the single-engine airplane should give way; the other airplane is to the left.

C—The pilot of the multiengine airplane should give way; the single-engine airplane is to its right.

Answer C Subject Matter: B08. FAR Part 91.113 in part states:

“Right-of-way rules: Except water operations...

(d) Converging. When aircraft of the same category are converging at approximately the same altitude (except head-on, or nearly so), the aircraft to the other's right has the right-of-way. If the aircraft are of different categories –

(1) A balloon has the right-of-way over any other category of aircraft;

(2) A glider has the right-of-way over an airship, airplane, or rotorcraft; and

(3) An airship has the right-of-way over an airplane or rotorcraft.”

2. The ratio between the total airload imposed on the wing and the gross weight of an aircraft in flight is known as

A—load factor and directly affects stall speed.

B—aspect load and directly affects stall speed.

C—load factor and has no relation with stall speed.

Answer A Subject Matter Code: H01. AC 61-21A Flight Training Handbook ; Chapter 17: Principles of Flight and Performance Characteristics, page 294, states in part:

“Load Factors...A load factor is the ratio of the total airload acting on the airplane to the gross weight of the airplane. For example, a load factor of 3 means that the total load on an airplane's structure is three times its gross weight. Load factors are usually expressed in terms of "G"; that is, a load factor of 3 may be spoken of as 3 G's, and load factor of 4 as 4 G's, etc.

...With the structural design of airplanes planned to withstand only a certain amount of overload, a knowledge of load factors has become essential for all pilots. Load factors are important to the pilot for two distinct reasons:

1. Because of the obviously dangerous overload that is possible for a pilot to impose on the aircraft structures; and

2. Because an increased load factor increases the stalling speed and makes stalls possible at seemingly safe flight speeds.”

HELICOPTER

1. When hovering, a helicopter tends to move in the direction of tail rotor thrust. This statement is

A—true; the movement is called transverse tendency.

B—true; the movement is called translating tendency.

C—false; the movement is opposite the direction of tail rotor thrust, and is called translating tendency.

Answer B Subject Matter Code: H71. AC 61-13B Basic Helicopter Handbook; Chapter 2: Aerodynamics of Flight, page 15, states in part:

“Translating tendency or drift.—The entire helicopter has a tendency to move in the direction of tail rotor thrust (to the right) when hovering.”

2. The purpose of lead-lag (drag) hinges in a three-bladed, fully articulated helicopter rotor system is to compensate for

A—Coriolis effect.

B—dissymmetry of lift.

C—blade flapping tendency.

Answer A Subject Matter Code: H71. AC 61-13B Basic Helicopter Handbook; Chapter 5: Other Helicopter Components And Their Functions, page 32 states in part:

“The purpose of the drag hinge and dampers is to absorb the acceleration and deceleration of the rotor blades caused by Coriolis effect.”

GYROPLANE

1. To act as pilot in command of a gyroplane carrying passengers, what must the pilot do in that gyroplane to meet recent daytime flight experience requirements?

A—Make 9 takeoffs and landings within the preceding 30 days.

B—Make 3 takeoffs and landings to a full stop within the preceding 90 days.

C—Make 3 takeoffs and landings within the preceding 90 days.

Answer C—Subject Matter Code: A20. FAR Part 61.57 in part states:

“Recent flight experience: Pilot in command...

(c) General experience. No person may act as pilot in command of an aircraft carrying passengers, nor of an aircraft certificated for more than one required pilot flight crewmember, unless within the preceding 90 days, he has made three takeoffs and three landings as the sole manipulator of the flight controls in an aircraft of the same category and class and, if a type rating is required, of the same type. If the aircraft is a tailwheel airplane, the landings must have been made to a full stop in a tailwheel airplane. For the purpose of meeting the requirements of the paragraph, a person may act as pilot in command of a flight under day VFR or day IFR if no persons or property other than as necessary for his compliance thereunder, are carried....”

2. For gyroplanes with constant-speed propellers, the first indication of carburetor icing is usually

A—a decrease in engine RPM.

B—a decrease in manifold pressure.

C—engine roughness followed by a decrease in engine RPM.

Answer B Subject Matter Code H01. AC 61-23B; Pilot's Handbook of Aeronautical Knowledge; Chapter II Airplanes and Engines, page 42 in part states:

“Indications of Carburetor Icing. For airplanes with fixed-pitch propellers, the first indication of carburetor icing is loss of r.p.m. For airplanes with controllable pitch (constant-speed) propellers, the first indication is usually a drop in manifold pressure. In both cases, a roughness in engine operation may develop later. There will be no reduction in r.p.m. in airplanes with constant-speed propellers, since propeller pitch is automatically adjusted to compensate for the loss of power, thus maintaining constant r.p.m.”

GLIDER

1. What is the minimum age requirement for a person to be issued a student pilot certificate limited to gliders or free balloons?

A—14 years of age.

B—15 years of age.

C—16 years of age.

Answer A Subject Matter Code: A22. FAR Part 61.83 in part states:

“Eligibility requirements: Student pilots. To be eligible for a student pilot certificate, a person must—

(a) Be at least 16 years of age, or at least 14 years of age for a student pilot certificate limited to the operation of a glider or free balloon;

(b) Be able to read, speak, and understand the English language, or have such operating limitations placed on his pilot certificate as are necessary for the safe operation of aircraft, to be removed when he shows that he can read, speak, and understand the English language; and

(c) Hold at least a current third-class medical certificate issued under Part 67 of this chapter, or, in the case of glider or free balloon operations, certify that he has no known medical defect that makes him unable to pilot a glider or a free balloon.”

2. During aerotow of a glider that weighs 940 pounds, which towrope tensile strength would require the use of safety links at each end of the rope?

A—752 pounds.

B—1,500 pounds.

C—2,000 pounds.

Answer C Subject Matter Code: B07. FAR Part 91.309 in part states:

“Towing: Gliders....

(3) The towline used has breaking strength not less than 80 percent of the maximum certificated operating weight of the glider and not more than twice this operating weight. However, the towline used may have a breaking strength more than twice the maximum certificated operating weight of the glider if –

(i) A safety link is installed at the point of attachment of the towline to the glider with a breaking strength not less than 80 percent of the maximum certificated operating weight of the glider and not greater than twice this operating weight.

(ii) A safety link is installed at the point of attachment of the towline to the towing aircraft with a breaking strength greater, but not more than 25 percent greater, than that of the safety link at the towed glider end of the towline and not greater than twice the maximum certificated operating weight of the glider;...

Based on the last sentence in paragraph (3), twice the breaking strength of 940 pounds is 1,880 pounds. Any rope with a tensile strength of more than 1,880 pounds requires safety links as stated in (i) and (ii) of this section.”

FREE BALLOON — HOT AIR

1. Propane is preferred over butane for fuel in hot air balloons because

- A—it has a higher boiling point.
- B—it has a lower boiling point.
- C—butane is very explosive under pressure.

Answer B Subject Matter Code: O02. Taming the Gentle Giant by Amogene Norwood; Chapter 2, Propane Fuel Source and Supply, page 19 in part states:

“Fortunately, today's fuel for hot air balloons is much cleaner, easier to handle, and certainly much more efficient — liquid petroleum gas (LPG), or propane, as it is commonly called. Propane is preferred over butane or other hydrocarbons because it has a lower boiling point — example, -44 F for propane vs. 32 F for butane.”

2.. It may be possible to make changes in the direction of flight in a hot air balloon by

- A—using the maneuvering vent.
- B—operating at different flight altitudes.
- C—flying a constant atmospheric pressure gradient.

Answer B Subject Matter Code: O02. Taming the Gentle Giant by Amogene Norwood; Ballooning Flight Tips, page 104 in part states:.

“9. The pilot might accomplish a change in direction in flight by changing altitudes.”

Local wind direction may vary a number of degrees within a few feet of one another.

FREE BALLOON — GAS

1. To perform a normal descent in a gas balloon, it is necessary to

- A—valve air.
- B—valve gas.
- C—release ballast.

Answer B Subject Matter Code: O05. Balloon Digest, Theory and Practice of Balloon Flight, page 9 in part states:

“A gas balloon is controlled by venting the gas to lose lift and lightening the balloon by releasing sand or ballast.”

2. What would cause a gas balloon to start a descent if a cold air mass is encountered and the envelope becomes cooled?

- A—The expansion of the gas.
- B—The contraction of the gas.
- C—A barometric pressure differential.

Answer B Subject Matter Code: O05. Balloon Digest, Theory and Practice of Balloon Flight, page 9 in part states:

“...the change which is most often encountered is a temperature change, either because of colder air encountered, loss of solar heating, or normal because of a later hour of the day. As the balloon cools, the gas contracts and the balloon starts to descend...”

LIGHTER-THAN-AIR — AIRSHIP

1. The pressure height with any airship is that height at which

- A—both ballonets are empty.
- B—both ballonets are inflated.
- C—gas pressure is 3 inches of water.

Answer A Subject Matter Code: P01. Goodyear Airship Operations, Chapter 4, page 4-42 in part states:

“The “pressure height” of a nonrigid or semirigid airship is the height at which the ballonets become completely emptied of air and the envelope completely filled with gas, which is also determined by the percentage of gas fullness at the surface and atmospheric conditions....”

2. For airship IFR operations off established airways, ROUTE OF FLIGHT portion of an IFR flight plan should list VOR navigational aids which are no more than

- A—40 miles apart.
- B—70 miles apart.
- C—80 miles apart.

Answer C Subject Matter Code: J15. AIM Chapter 5: Air Traffic Control Procedures; Section 1: Preflight, paragraph 5-71 in part states:

“FLIGHT PLAN – IFR FLIGHTS...

The azimuth feature of VOR aids and the azimuth and distance (DME) features of VORTAC and TACAN aids are assigned certain frequency protected areas of airspace which are intended for application to established airway and route use, and to provide guidance for planning flights outside of established airways or routes. These areas of airspace are expressed in terms of cylindrical service volumes of specified dimensions called “class limits” or “categories.” (Reference—NAVAID Service Volumes, paragraph 1-8). An operational service volume has been established for each class in which adequate signal coverage and frequency protection can be assured. To facilitate use of VOR, VORTAC, or TACAN aids, consistent with their operational service volume limits, pilot use of such aids for defining a direct route of flight in controlled airspace should not exceed the following:

(a) Operations above FL 450—Use aids not more than 200 NM apart. These aids are depicted in En route High Altitude Charts.

(b) Operation off established routes from 18,000 feet MSL to FL 450—Use aids not more than 260 NM apart. These aids are depicted on En route High Altitude Charts.

(c) Operation off established airways below 18,000 feet MSL—Use aids not more than 80 NM apart. These aids are depicted on En route Low Altitude Charts.

(d) Operation off established airways between 14,500 feet MSL and 17,999 feet MSL in the conterminous U.S.—(H) facilities not more than 200 NM....”

MILITARY COMPETENCE — AIRPLANE

1. If the operational category of an airplane is listed as utility, it would mean that this airplane could be operated in which of the following maneuvers?

- A—Limited acrobatics, excluding spins.
- B—Limited acrobatics, including spins.
- C—Any maneuver except acrobatics or spins.

Answer B Subject Matter Code: A10. FAR Part 23.3 in part states:

“Airplane categories....

- (3) Lazy eights, chandelles, and steep turns, in which the angle of bank is not more than 60 degrees.*
- (b) The utility category is limited to airplanes that have a seating configuration, excluding pilot seats, of nine or less, a maximum certificated takeoff weight of 12,500 pounds or less, and intended for limited acrobatic operation. Airplanes certificated in the utility category may be used in any of the operations covered under paragraph (a) of this section and in limited acrobatic operations. Limited acrobatic operation includes:
 - (1) Spins (if approved for the particular type of airplane); and*
 - (2) Lazy eights, chandelles, and steep turns, in which the angle of bank is more than 60 degrees.”**

2. To act as pilot in command of an airplane that is equipped with a retractable landing gear, if no pilot-in-command time in such an airplane was logged prior to November 1, 1973, a person is required to

- A—hold a multiengine airplane class rating.
- B—make at least six takeoffs and landings in such an airplane within the preceding 6 months.
- C—receive flight instruction in such an airplane and obtain a logbook endorsement of competency.

Answer C Subject Matter Code: A20. FAR Part 61.31 in part states:

“General limitations....

- (d) (2)...by a certificated flight instructor who found him competent to solo that category and class of aircraft and has so endorsed his pilot logbook.*
- (3) He has soloed and logged pilot-in-command time in that category and class of aircraft before November 1, 1973.*
- (e) High performance airplanes. A person holding a private or commercial pilot certificate may not act as pilot in command of an airplane that has more than 200 horsepower, or that has a retractable landing gear, flaps, and a controllable propeller, unless he has received flight instruction from an authorized flight instructor who has certified in his logbook that he is competent to pilot an airplane that has more than 200 horsepower, or that has a retractable landing gear, flaps, and a controllable propeller, as the case may be. However, this instruction is not required if he has logged flight time as pilot in command in high performance airplanes before November 1, 1973.”*

MILITARY COMPETENCE — HELICOPTER

1. While in flight, a helicopter and an airplane are converging at a 90 ° angle, and the helicopter is located to the right of the airplane. Which aircraft has the right-of-way, and why?

A—The helicopter, because it is to the right of the airplane.

B—The helicopter, because helicopters have the right-of-way over airplanes.

C—The airplane, because airplanes have the right-of-way over helicopters.

Answer A Subject Matter Code: B08. FAR Part 91.113 in part states:

“Right-of-way rules: Except water operations...

(d) Converging. When aircraft of the same category are converging at approximately the same altitude (except head-on, or nearly so), the aircraft to the other's right has the right-of-way. If the aircraft are of different categories –

(1) A balloon has the right-of-way over any other category of aircraft;

(2) A glider has the right-of-way over an airship, airplane, or rotorcraft; and

(3) An airship has the right-of-way over an airplane or rotorcraft....

Although fixed and rotor-wing aircraft are a different category by definition, for the purpose of section 91.113 interpretation, they are considered to have similar maneuverability in forward, converging flight; especially when compared to aircraft of the different categories in (d), (1)(2) and (3) above.

2. What transponder equipment is required for helicopter operations within Class B airspace? A transponder

A—with 4096 code and Mode C capability.

B—as required for helicopter operations when visibility is less than 1 mile.

C—with 4096 code capability is required except when operating at or below 1,000 feet AGL under the terms of a letter of agreement.

Answer A—Subject Matter Code: B08. FAR Part 91.215 in part states:

“ATC transponder and altitude reporting equipment and use....

(b) All airspace. Unless otherwise authorized or directed by ATC, no person may operate an aircraft in the airspace described in paragraphs (b)(1) through (b)(5) of this section, unless that aircraft is equipped with an operable coded radar beacon transponder having either Mode 3/A 4096 code capability, replying to Mode 3/A interrogations with the code specified by ATC, or a Mode S capability, replying to Mode 3/A interrogations with the code specified by ATC and intermode and Mode S interrogations in accordance with the applicable provisions specified in TSO C-112, and that aircraft is equipped with automatic pressure altitude reporting equipment having a Mode C capability that automatically replies to Mode C interrogations by transmitting pressure altitude information in 100-foot increments. This requirement applies –

(1) All aircraft. In Class A, Class B, and Class C airspace areas;...”

APPENDIX 1

LIST OF REFERENCE MATERIALS AND SUBJECT MATTER KNOWLEDGE CODES

The publications listed in the following pages contain study material you need to be familiar with when preparing for the commercial pilot knowledge tests. All of these publications can be purchased through U.S. Government bookstores, commercial aviation supply houses, or industry organizations. The latest revision of the listed references should be requested. Additional study material is also available through these sources that may be helpful in preparing for commercial pilot knowledge tests. All publications listed would be excellent for a pilot to have in a personal reference library.

The subject matter knowledge codes establish the specific reference for the knowledge standard. When reviewing results of your knowledge test, you should compare the subject matter knowledge code(s) on your airman test report to the ones found below. This will be helpful for both review and preparation for the practical test.

FAR 1 Definitions and Abbreviations

- A01 General Definitions
- A02 Abbreviations and Symbols

FAR 61 Certification: Pilots and Flight Instructors

- A20 General
- A21 Aircraft Ratings and Special Certificates
- A22 Student Pilots
- A24 Commercial Pilots
- A26 Flight Instructors

FAR 71 Designation of Federal Airways, Area Low Routes, Controlled Airspace, and Reporting Points

- A60 General
- A61 Airport Radar Service Areas
- A64 Control Areas and Extensions

FAR 91 General Operating Rules

- B07 General
- B08 Flight Rules – General
- B09 Visual Flight Rules
- B12 Special Flight Operations
- B13 Maintenance, Preventive Maintenance, and Alterations

FAR 125 Certification and Operations: Airplanes Having a Seating Capacity of 20 or More Passengers or a Maximum Payload Capacity of 6,000 Pounds or More

- D30 General
- D31 Certification Rules and Miscellaneous Requirements
- D38 Flight Crewmember Requirements

FAR 135 Air Taxi Operators and Commercial Operators

- E01 General
- E02 Flight Operations
- E03 Aircraft and Equipment
- E04 VFR/IFR Operating Limitations and Weather Requirements
- E05 Flight Crewmember Requirements

AC 61-23 Pilot's Handbook of Aeronautical Knowledge

- H01 Principles of Flight
- H02 Airplanes and Engines
- H03 Flight Instruments
- H04 Airplane Performance
- H05 Weather
- H06 Basic Calculations Using Navigational Computers or Electronic Calculators
- H07 Navigation
- H09 Appendix 1: Obtaining FAA Publications

AC 91-23 Pilot's Weight and Balance Handbook

- H10 Weight and Balance Control
- H11 Terms and Definitions
- H12 Empty Weight Center of Gravity
- H13 Index and Graphic Limits
- H14 Change of Weight
- H15 Control of Loading—General Aviation
- H16 Control of Loading—Large Aircraft

AC 60-14 Aviation Instructor's Handbook

- H20 The Learning Process
- H21 Human Behavior
- H22 Effective Communication
- H23 The Teaching Process
- H24 Teaching Methods
- H25 The Instructor as a Critic
- H26 Evaluation
- H27 Instructional Aids
- H30 Flight Instructor Characteristics and Responsibilities
- H31 Techniques of Flight Instruction
- H32 Planning Instructional Activity

AC 61-21 Flight Training Handbook

- H50 Introduction to Flight Training
- H51 Introduction to Airplanes and Engines
- H52 Introduction to the Basics of Flight
- H53 The Effect and Use of Controls
- H54 Ground Operations
- H55 Basic Flight Maneuvers

- H56 Airport Traffic Patterns and Operations
- H57 Takeoffs and Departure Climbs
- H58 Landing Approaches and Landings
- H59 Faulty Approaches and Landings
- H60 Proficiency Flight Maneuvers
- H61 Cross-Country Flying
- H62 Emergency Flight by Reference to Instruments
- H63 Night Flying
- H64 Seaplane Operations
- H65 Transition to Other Airplanes
- H66 Principles of Flight and Performance Characteristics

AC 61-13 Basic Helicopter Handbook

- H70 General Aerodynamics
- H71 Aerodynamics of Flight
- H72 Loads and Load Factors
- H73 Function of the Controls
- H74 Other Helicopter Components and Their Functions
- H75 Introduction to the Helicopter Flight Manual
- H76 Weight and Balance
- H77 Helicopter Performance
- H78 Some Hazards of Helicopter Flight
- H79 Precautionary Measures and Critical Conditions
- H80 Helicopter Flight Maneuvers
- H81 Confined Area, Pinnacle, and Ridgeline Operations
- H82 Glossary

Gyroplane Flight Training Manual— McCulloch

- H90 Gyroplane Systems
- H91 Gyroplane Terms
- H92 Use of Flight Controls (Gyroplane)
- H93 Fundamental Maneuvers of Flight (Gyroplane)
- H94 Basic Flight Maneuvers (Gyroplane)

AC 61-27 Instrument Flying Handbook

- I04 Basic Flight Instruments
- I05 Attitude Instrument Flying—Airplanes
- I08 Using the Navigation Instruments
- I09 Radio Communications Facilities and Equipment
- I10 The Federal Airways System and Controlled Airspace

AC 00-6 Aviation Weather

- I20 The Earth's Atmosphere
- I21 Temperature
- I22 Atmospheric Pressure and Altimetry
- I23 Wind
- I24 Moisture, Cloud Formation, and Precipitation

- I25 Stable and Unstable Air
- I26 Clouds
- I27 Air Masses and Fronts
- I28 Turbulence
- I29 Icing
- I30 Thunderstorms
- I31 Common IFR Producers
- I32 High Altitude Weather
- I33 Arctic Weather
- I34 Tropical Weather
- I35 Soaring Weather
- I36 Glossary of Weather Terms

AC 00-45 Aviation Weather Services

- I40 The Aviation Weather Service Program
- I41 Surface Aviation Weather Reports
- I42 Pilot and Radar Reports and Satellite Pictures
- I43 Aviation Weather Forecasts
- I44 Surface Analysis Chart
- I45 Weather Depiction Chart
- I46 Radar Summary Chart
- I47 Significant Weather Prognostics
- I48 Winds and Temperatures Aloft
- I49 Composite Moisture Stability Chart
- I50 Severe Weather Outlook Chart
- I51 Constant Pressure Charts
- I52 Tropopause Data Chart
- I53 Tables and Conversion Graphs

AIM Airman's Information Manual

- J01 Air Navigation Radio Aids
- J02 Radar Services and Procedures
- J03 Airport Lighting Aids
- J04 Air Navigation and Obstruction Lighting
- J05 Airport Marking Aids and Signs
- J06 Airspace— General
- J07 Class G Airspace
- J08 Controlled Airspace
- J09 Special Use Airspace
- J10 Other Airspace Areas
- J11 Service Available to Pilots
- J12 Radio Communications Phraseology and Techniques
- J13 Airport Operations
- J14 ATC Clearance/Separations
- J15 Preflight
- J16 Departure Procedures
- J17 En Route Procedures
- J18 Arrival Procedures
- J19 Pilot/Controller Roles and Responsibilities

- J20 National Security and Interception Procedures
- J21 Emergency Procedures— General
- J22 Emergency Services Available to Pilots
- J23 Distress and Urgency Procedures
- J24 Two-Way Radio Communications Failure
- J25 Meteorology
- J26 Altimeter Setting Procedures
- J27 Wake Turbulence
- J28 Bird Hazards, and Flight Over National Refuges, Parks, and Forests
- J29 Potential Flight Hazards
- J30 Safety, Accident, and Hazard Reports
- J31 Fitness for Flight
- J32 Type of Charts Available
- J33 Pilot Controller Glossary
- J34 Airport/Facility Directory
- J35 En Route Low Altitude Chart
- J36 En Route High Altitude Chart
- J37 Sectional Chart
- J40 Standard Instrument Departure (SID) Chart
- J41 Standard Terminal Arrival (STAR) Chart
- J42 Instrument Approach Procedures
- J43 Helicopter Route Chart

AC 67-2 Medical Handbook for Pilots

- J52 Hypoxia
- J53 Hyperventilation
- J55 The Ears
- J56 Alcohol
- J57 Drugs and Flying
- J58 Carbon Monoxide
- J59 Vision
- J60 Night Flight
- J61 Cockpit Lighting
- J62 Disorientation (Vertigo)
- J63 Motion Sickness
- J64 Fatigue
- J65 Noise
- J66 Age
- J67 Some Psychological Aspects of Flying
- J68 The Flying Passenger

ADDITIONAL ADVISORY CIRCULARS

- K01 AC 00-24, Thunderstorms
- K02 AC 00-30, Rules of Thumb for Avoiding or Minimizing Encounters with Clear Air Turbulence
- K03 AC 00-34, Aircraft Ground Handling and Servicing
- K04 AC 00-54, Pilot Wind Shear Guide
- K11 AC 20-34, Prevention of Retractable Landing Gear Failure
- K12 AC 20-32, Carbon Monoxide (CO) Contamination in Aircraft Detection and Prevention
- K13 AC 20-43, Aircraft Fuel Control

- K20 AC 20-103, Aircraft Engine Crankshaft Failure
- K40 AC 25-4, Inertial Navigation System (INS)
- L05 AC 60-22, Aeronautical Decision Making
- L10 AC 61-67, Stall and Spin Awareness Training
- L15 AC 61-107, Operations of Aircraft at Altitudes Above 25,000 Feet MSL and/or MACH numbers (Mmo) Greater Than .75
- L34 AC 90-48, Pilots' Role in Collision Avoidance
- L42 AC 90-87, Helicopter Dynamic Rollover
- L50 AC 91-6, Water, Slush, and Snow on the Runway
- L52 AC 91-13, Cold Weather Operation of Aircraft
- L53 AC 91-14, Altimeter Setting Sources
- L57 AC 91-43, Unreliable Airspeed Indications
- L59 AC 91-46, Gyroscopic Instruments— Good Operating Practices
- L61 AC 91-50, Importance of Transponder Operation and Altitude Reporting
- L62 AC 91-51, Airplane De-ice and Anti-ice Systems
- L70 AC 91-67, Minimum Equipment Requirements for General Aviation Operations Under FAR Part 91
- L80 AC 103-4, Hazard Associated with Sublimation of Solid Carbon Dioxide (Dry Ice) on Board Aircraft
- L90 AC 105-2, Sport Parachute Jumping
- M01 AC 120-12, Private Carriage Versus Common Carriage of Persons or Property
- M02 AC 120-27, Aircraft Weight and Balance Control
- M08 AC 120-58, Large Aircraft Ground Deicing
- M13 AC 121-195-1, Operational Landing Distances for Wet Runways; Transport Category Airplanes
- M51 AC 20-117, Hazards Following Ground Deicing and Ground Operations in Conditions Conducive to Aircraft Icing
- M52 AC 00-2, Advisory Circular Checklist

American Soaring Handbook— Soaring Society of America

- N01 A History of American Soaring
- N02 Training
- N03 Ground Launch
- N04 Airplane Tow
- N05 Meteorology
- N06 Cross-Country and Wave Soaring
- N07 Instruments and Oxygen
- N08 Radio, Rope, and Wire
- N09 Aerodynamics
- N10 Maintenance and Repair

Soaring Flight Manual— Jeppesen-Sanderson, Inc.

- N20 Sailplane Aerodynamics
- N21 Performance Considerations
- N22 Flight Instruments
- N23 Weather for Soaring
- N24 Medical Factors
- N25 Flight Publications and Airspace
- N26 Aeronautical Charts and Navigation
- N27 Computations for Soaring
- N28 Personal Equipment
- N29 Preflight and Ground Operations

- N30 Aerotow Launch Procedures
- N31 Ground Launch Procedures
- N32 Basic Flight Maneuvers and Traffic
- N33 Soaring Techniques
- N34 Cross-Country Soaring

Taming The Gentle Giant— Taylor Publishing

- O01 Design and Construction of Balloons
- O02 Fuel Source and Supply
- O03 Weight and Temperature
- O04 Flight Instruments
- O05 Balloon Flight Tips
- O06 Glossary

Propane Systems— Balloon Federation of America, 1991

- O20 Propane Glossary
- O21 Tanks
- O22 Burners, Valves, and Hoses
- O23 Refueling, Contamination, and Fuel Management

Powerline Excerpts— Balloon Federation of America

- O30 Excerpts

Goodyear Airship Operations Manual

- P01 Buoyancy
- P02 Aerodynamics
- P03 Free Ballooning
- P04 Aerostatics
- P05 Envelope
- P06 Car
- P07 Powerplant
- P08 Airship Ground Handling
- P11 Operating Instructions
- P12 History
- P13 Training

AC 00-2, Advisory Circular Checklist, lists the status of all FAA advisory circulars (AC's), as well as FAA internal publications and miscellaneous flight information such as Airman's Information Manual (AIM), Airport/Facility Directory, practical test standards, and other material directly related to a certificate or rating. To obtain a free copy of AC 00-2, send your request to:

U.S. Department of Transportation
General Services Section, M45.3
Washington, DC 20590

COMPUTER TESTING DESIGNEES

The following is a list of the computer testing designees authorized to give FAA knowledge tests. This list should be helpful in choosing where to register for a test or for requesting additional information.

Aviation Business Services
1-800-947-4228
outside U.S. (415) 259-8550

Drake Prometric
1-800-359-3278
outside U.S. (612) 896-7702

Sylvan Learning Systems, Inc.
1-800-967-1100
outside U.S. (410) 880-080, Extension 8890

The latest listing of computer testing designees and computer testing center locations is available by calling the local Flight Standards District Office or the Examiners Bulletin Board, by computer modem, at (405) 954-4530 or 1-800-858-2107