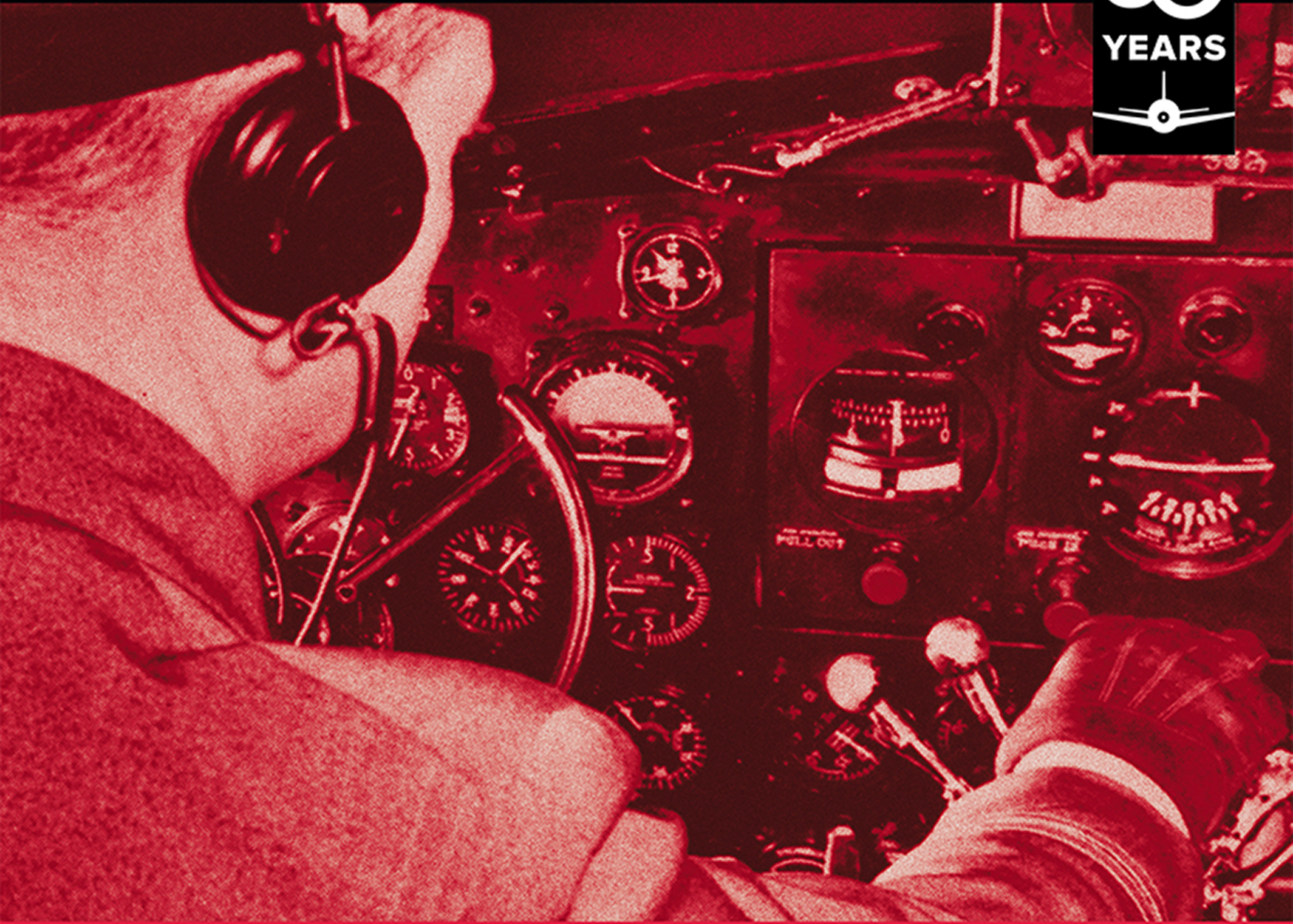

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About the Contributors

Jackie Spanitz

General Manager
Aviation Supplies & Academics, Inc.

As General Manager of Aviation Supplies & Academics, Jackie Spanitz oversees maintenance and development of more than 1,000 titles and pilot supplies in the ASA product. Ms. Spanitz has worked with airman training and testing for more than 25 years, including participation in the ACS development committees. Jackie holds a Bachelor of Science degree in aviation technology from Western Michigan University, a Masters degree from Embry Riddle Aeronautical University, and Instructor and Commercial Pilot certificates. She is the author of *Guide to the Flight Review*, and the technical editor for ASA's *Test Prep* and *FAR/AIM* series.

James Johnson

Product Specialist
Aviation Supplies & Academics, Inc.

James Johnson holds a Bachelor of Science degree in aeronautics and minors in Aviation Safety and Airport Management from Embry-Riddle Aeronautical University (ERAU). He has worked as a flight and ground instructor with both Part 141 and 61 flight schools and as a pilot for corporate flight departments and media outlets covering breaking news and traffic. As product specialist with ASA, James provides ongoing product research, development and support of aviation training curriculum and pilot supplies. He is a regular contributor to ASA's Learn To Fly Blog and part of the editorial team for the Pilot's Manual textbook series. James holds a Commercial Pilot Certificate with Instrument rating and Advanced and Instrument Ground Instructor Certificates.

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Cross References

Preface

Welcome to ASA's Test Prep Series. ASA's test books have 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 any of the instrument rating tests.

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The FAA Instrument Rating questions have been arranged into chapters based on subject matter. Topical study, in which similar material is covered under a common subject heading, promotes better understanding, aids recall, and thus provides a more efficient study guide. Study and place emphasis on those questions most likely to be included in your test (identified by the aircraft category above each question). For example: a pilot preparing for the Instrument Airplane test (or Flight Instructor — Instrument, Airplane) would focus on the questions marked "ALL" and "AIR," and a pilot preparing for the Instrument Helicopter test (or Flight Instructor — Instrument, Helicopter) would focus on the questions marked "ALL" and "RTC." Those people preparing for the Instrument Ground Instructor need to study all the questions.

It is important to answer every question assigned on your FAA Knowledge Test. If in their ongoing review, the FAA authors decide 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 unless you have 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 process. You might see similar although not exactly the same questions on your official FAA exam. Answer stems may be rearranged from the A, B, C order you see in this book. Therefore, be careful to fully understand the intent of each question and corresponding answer while studying, rather than memorize the A, B, C answer. 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 or concerns:

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7005 132nd Place SE — Voice: 425.235.1500 — Fax: 425.235.0128
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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-8083-25 *Pilot's Handbook of Aeronautical Knowledge*
FAA-H-8083-15 *Instrument Flying Handbook*
FAA-H-8083-16 *Instrument Procedures Handbook*
FAA-H-8083-2 *Risk Management Handbook*
FAA-H-8083-1 *Aircraft Weight and Balance Handbook*

FAA-H-8083-3 *Airplane Flying Handbook*
FAA-H-8083-13 *Glider Flying Handbook*
FAA-H-8083-21 *Helicopter Flying Handbook*

AC 00-6 *Aviation Weather*
AC 00-45 *Aviation Weather Services*
AC 00-54 *Pilot Wind Shear Guide*
AC 60-28 *English Language Skill Standards Required by 14 CFR Parts 61, 63, and 65*
AC 91-74 *Pilot Guide: Flight in Icing Conditions*

FAA-S-ACS-8 *Instrument Rating Airman Certification Standards, Airplane*
FAA-S-8081-4 *Instrument Rating Practical Test Standards, Helicopter Powered Lift*
FAA-S-8081-9 *Instrument Flight Instructor Practical Test Standards*

Aeronautical Information Manual (AIM)
14 CFR Parts 1, 61, 68, 91

Chart Supplements U.S. (previously Airport/Facility Directory or A/FD)
Low Altitude Enroute Chart
U.S. Terminal Procedures

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ASA Test Prep Layout

The sample FAA questions have been sorted into chapters according to subject matter. Within each chapter, the questions have been further classified and all similar questions grouped together with a concise discussion of the material covered in each group. This discussion material of "Chapter text" is printed in a larger font and spans the entire width of the page. Immediately following the sample FAA Question is ASA's Explanation in *italics*. The last line of the Explanation contains the Learning Statement Code and further reference (if applicable). *See* the EXAMPLE below.

Figures referenced by the Chapter text only are numbered with the appropriate chapter number, i.e., "Figure 1-1" is Chapter 1's first chapter-text figure.

Some Questions refer to Figures or Legends immediately following the question number, i.e., "4201. (Refer to Figure 14.)." These are FAA Figures and Legends which can be found in the separate booklet: *Computer Testing Supplement* (CT-8080-XX). This supplement is bundled with the Test Prep and is the exact material you will have access to when you take your computerized test. We provide it separately, so you will become accustomed to referring to the FAA Figures and Legends as you would during the test.

Figures referenced by the Explanation and pertinent to the understanding of that particular question are labeled by their corresponding Question number. For example: the caption "Questions 4245 and 4248" means the figure accompanies the Explanations for both Question 4245 and 4248.

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

4201. (Refer to Figure 14.) The four forces acting on an airplane in flight are

See separate book: *Computerized Testing Supplement* (CT-8080-XX)

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. (PLT235) — FAA-H-8083-25

Explanation

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.

Code line. FAA Learning Statement Code in parentheses, followed by references for further study.

Incorrect answer explanation. 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** **RTC = Rotorcraft (helicopter)**

Chapter 1
Weather

The Earth's Atmosphere

We classify the atmosphere into layers, or spheres, by characteristics exhibited in these layers. The troposphere is the layer from the surface to an average altitude of about 7 miles (37,000 feet). It is characterized by an overall decrease of temperature with increasing altitude. The height of the troposphere varies with latitude and season. It 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.

At the top of the troposphere is the tropopause, a very thin layer marking the boundary between the troposphere and the layer above. It is characterized by an abrupt change in temperature lapse rate.

Above the tropopause is the stratosphere. This layer is typified by relatively small changes in temperature with height except for a warming trend near the top. *See* Figure 1-1.

ALL
4097. A characteristic of the stratosphere is

A— an overall decrease of temperature with an increase in altitude.
B— a relatively even base altitude of approximately 35,000 feet.
C— relatively small changes in temperature with an increase in altitude.

Above the tropopause is the stratosphere. This layer is typified by relatively small changes in temperature with height except for a warming trend near the top. (PLT203) — AC 00-6

Answer (A) is incorrect because temperature increases (not decreases) with an increase in altitude. Answer (B) is incorrect because the stratosphere fluctuates in altitude, as the base is higher at the equator compared to the poles.

ALL
4154. The average height of the troposphere in the middle latitudes is

A— 20,000 feet.
B— 25,000 feet.
C— 37,000 feet.

The height of the troposphere varies with latitude and seasons. It slopes from about 20,000 feet over the poles, to an average of 37,000 feet over the mid-latitudes, to about 65,000 feet over the Equator, and it is higher in summer than in winter. (PLT203) — AC 00-6

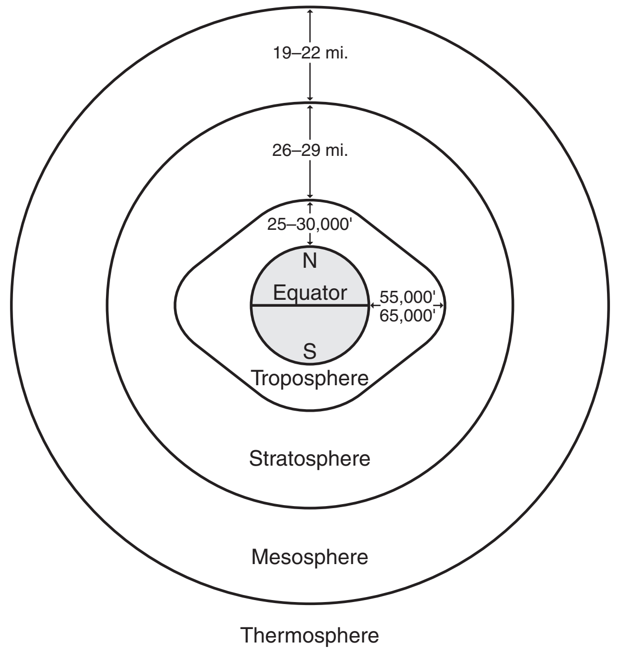

Figure 1-1. Layers of the atmosphere

ALL
4227. Which feature is associated with the tropopause?

A— Absence of wind and turbulent conditions.
B— Absolute upper limit of cloud formation.
C— Abrupt change in temperature lapse rate.

Temperature over the tropical tropopause increases with height, but temperatures over the polar tropopause remain almost constant. An abrupt change in temperature lapse rate characterizes the tropopause. (PLT203) — AC 00-6

Answer (A) is incorrect because the winds are usually very strong in the tropopause. Answer (B) is incorrect because clouds can form above the tropopause.

Answers

4097 [C]	4154 [C]	4227 [C]

High Altitude Weather

The jet stream is a river of high speed winds (50 knots or more) associated with the tropopause. The location of the jet stream changes seasonally. In the winter, the jet stream moves south and increases in velocity. During the summer, the jet stream moves north and slows.

ALL
4155. A jet stream is defined as wind of

A—30 knots or greater.
B—40 knots or greater.
C—50 knots or greater.

A jetstream occurs in an area of intensified temperature gradients characteristic of the break in the tropopause. The concentrated winds, by arbitrary definition, must be 50 knots or greater to classify as a jetstream. (PLT302) — AC 00-6

ALL
4168. The strength and location of the jet stream is normally

A—stronger and farther north in the winter.
B—weaker and farther north in the summer.
C—stronger and farther north in the summer.

In mid-latitudes, wind speed in the jetstream averages considerably stronger in winter than in summer. Also the jet shifts farther south in winter than in summer. (PLT302) — AC 00-6

Temperature

The major source of all weather is the sun. Changes or variations of weather patterns are caused by the unequal heating of the Earth's surface. In aviation, surface and aloft temperature is measured in degrees Celsius (°C).

Standard temperature is 15°C at sea level. To calculate International Standard Atmosphere (ISA), use the average lapse rate of 2°C per 1,000 feet.

ALL
4096. The primary cause of all changes in the Earth's weather is

A—variation of solar energy received by the Earth's regions.
B—changes in air pressure over the Earth's surface.
C—movement of the air masses.

Every physical process of weather is accompanied by or is the result of a heat exchange. Differences in solar energy create temperature variations. These temperature variations create forces that drive the atmosphere in its endless motion. (PLT510) — AC 00-6

Answer (B) is incorrect because changes in air pressure are due to temperature variations. Answer (C) is incorrect because movement of air masses is a result of varying temperatures and pressures.

ALL
4095. How much colder than standard temperature is the forecast temperature at 9,000 feet, as indicated in the following excerpt from the Winds and Temperature Aloft Forecast?

FT	6000	9000
	0737-04	1043-10

A—3°C.
B—10°C.
C—7°C.

According to the winds and temperatures aloft forecast, the temperature is -10°C at 9,000 feet. Using the average lapse rate of 2°C per 1,000 feet, the temperature change from sea level to 9,000 feet is 18°C. Standard sea level temperature is 15°C. Subtract 18°C from 15°C to get -3°C. Compared to the winds and temperatures aloft forecast for 9,000 feet, the difference is 7°C (10 – 3). (PLT492) — AC 00-45

Answer (A) is incorrect because 3°C is the standard temperature at 9,000 feet, which is not what the question is asking for. Answer (B) is incorrect because 10°C is the given temperature at 9,000 feet, which is not what the question is asking for.

Answers

4155 [C] 4168 [B] 4096 [A] 4095 [C]

ALL

4113. If the air temperature is +8°C at an elevation of 1,350 feet and a standard (average) temperature lapse rate exists, what will be the approximate freezing level?

A— 3,350 feet MSL.
B— 5,350 feet MSL.
C— 9,350 feet MSL.

Temperature normally decreases with increasing altitude throughout the troposphere. This decrease of temperature with altitude is defined as lapse rate. The average decrease of temperature (average lapse rate) in the troposphere is 2°C per 1,000 feet. An 8°C loss is necessary to reach 0°C, or freezing, in this situation. At 2°/1,000 feet the amount of altitude gain necessary would be:

1. 8°C ÷ 2 = 4 or 4,000 ft

2. 1,350 ft MSL (altitude at +8°C)
+ 4,000 ft (altitude gain necessary to reach 0°C)
5,350 ft MSL (approximate freezing level)

(PLT492) — AC 00-6

ALL

4094. A common type of ground or surface based temperature inversion is that which is produced by

A— warm air being lifted rapidly aloft in the vicinity of mountainous terrain.
B— the movement of colder air over warm air, or the movement of warm air under cold air.
C— ground radiation on clear, cool nights when the wind is light.

An increase in temperature with altitude is defined as an inversion. An inversion often develops near the ground on clear, cool nights when wind is light. The ground radiates and cools much faster than the overlying air. Air in contact with the ground becomes cold while the temperature a few hundred feet above changes very little. Thus, temperature increases with height. (PLT301) — AC 00-6

Answer (A) is incorrect because when warm air is lifted, an unstable situation occurs, and a temperature inversion requires stable conditions. Answer (B) is incorrect because warm air over cold air constitutes an inversion (not cold air over warm air).

ALL

4112. The most frequent type of ground- or surface-based temperature inversion is that produced by

A— 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.

An inversion often develops near the ground on clear, cool nights when wind is light. The ground radiates and cools much faster than the overlying air. Air in contact with the ground becomes cold while the temperature a few hundred feet above changes very little. Thus, temperature increases with height. (PLT301) — AC 00-6

Answer (B) is incorrect because it describes orographic lifting. Answer (C) is incorrect because it describes fronts.

ALL

4114. What feature is associated with a temperature inversion?

A— A stable layer of air.
B— An unstable layer of air.
C— Air mass thunderstorms.

A temperature inversion occurs when the temperature increases with altitude. A stable layer of air is characterized by warmer air lying above colder air. With an inversion, the layer is stable and convection is suppressed. (PLT301) — AC 00-6

Answer (B) is incorrect because unstable air is characterized by a decrease in temperature with an increase in altitude. Answer (C) is incorrect because air mass thunderstorms are characteristic of unstable conditions.

ALL

4125. A temperature inversion will normally form only

A— in stable air.
B— in unstable air.
C— when a stratiform layer merges with a cumuliform mass.

If the temperature increases with altitude through a layer (an inversion), the layer is stable and convection is suppressed. Air may be unstable beneath the inversion. (PLT301) — AC 00-6

Answer (B) is incorrect because unstable air has warmer air below colder air. Answer (C) is incorrect because when a stratiform layer merges with a cumuliform mass it is associated with a cold front occlusion.

Answers

4113 [B]	4094 [C]	4112 [A]	4114 [A]	4125 [A]

ALL

4200. Which weather conditions should be expected beneath a low-level temperature inversion layer when the relative humidity is high?

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

A ground-based inversion favors poor visibility by trapping fog, smoke, and other restrictions into low levels of the atmosphere. Wind just above the inversion may be relatively strong. A wind shear zone develops between the calm and the stronger winds above. Eddies in the shear zone cause airspeed fluctuations as an aircraft climbs or descends through the inversion. (PLT301) — AC 00-6

Answer (B) is incorrect because wind shear may be expected within (not beneath) a low-level temperature inversion. Answer (C) is incorrect because inversions cause steady precipitation and create a stable layer of air, thus making it smooth (not turbulent).

Wind

The rules in the Northern Hemisphere are:

1. Air circulates in a clockwise direction around a high pressure system.
2. Air circulates in a counterclockwise direction around a low pressure system.
3. The closer the isobars are together, the stronger the wind speed.
4. Due to surface friction (up to about 2,000 feet AGL), surface winds do not exactly parallel the isobars, but move outward from the center of the high toward lower pressure.
5. Coriolis force is at a right angle to wind direction and directly proportional to wind speed. The force deflects air to the right in the Northern Hemisphere.

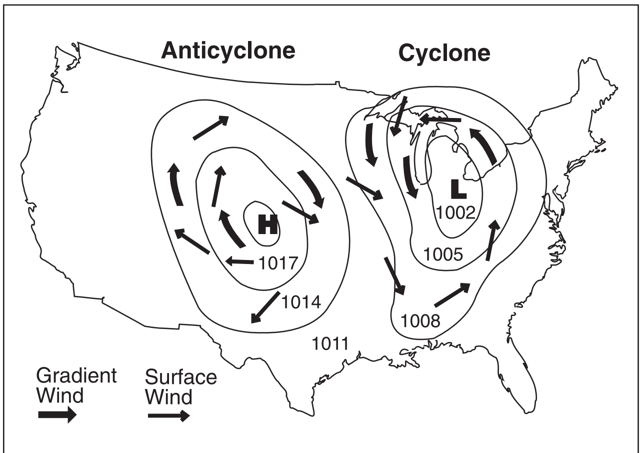

Figure 1-2. Gradient and surface wind

ALL

4105. What causes surface winds to flow across the isobars at an angle rather than parallel to the isobars?

A— Coriolis force.
B— Surface friction.
C— The greater density of the air at the surface.

Friction between the wind and the surface slows the wind. As frictional force slows the wind speed, Coriolis force decreases. However, friction does not affect pressure gradient force. Pressure gradient and Coriolis forces are no longer in balance. The stronger pressure gradient force turns the wind at an angle across the isobars toward lower pressure until the three forces balance. The angle of surface wind to isobars is about 10° over water, increasing with roughness of terrain. (PLT516) — AC 00-6

Answer (A) is incorrect because as wind decreases, so does the Coriolis force. Answer (C) is incorrect because the density of the air has little effect on the relation to the winds and the isobars.

Answers

4200 [A] 4105 [B]

ALL
4106. 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— a stronger pressure gradient at higher altitudes.
B— friction between the wind and the surface.
C— stronger Coriolis force at the surface.

Surface winds and winds at altitude can differ due to friction. Friction between the wind and the surface slows the wind. (PLT516) — AC 00-6

Answer (A) is incorrect because the pressure gradient is relatively uniform at altitudes. Answer (C) is incorrect because the winds are weaker at the surface, therefore the Coriolis force is weaker.

ALL
4107. What relationship exists between the winds at 2,000 feet above the surface and the surface winds?

A— The winds at 2,000 feet and the surface winds flow in the same direction, but the surface winds are weaker due to friction.
B— The winds at 2,000 feet tend to parallel the isobars while the surface winds cross the isobars at an angle toward lower pressure and are weaker.
C— The surface winds tend to veer to the right of the winds at 2,000 feet and are usually weaker.

Close to the earth, wind direction is modified by the contours over which it passes and wind speed is reduced by friction with the surface. Also, the winds at the surface are at an angle across the isobars due to the stronger pressure gradient. At levels 2,000 feet above the surface, the speed is greater and the direction is usually parallel to the isobars. (PLT516) — AC 00-6

Answer (A) is incorrect because the winds at 2,000 feet and those at the surface flow in different directions due to the Coriolis force being weaker at the surface. Answer (C) is incorrect because surface winds do not veer to the right of the winds at 2,000 feet, the winds at 2,000 feet veer to the right of the surface winds.

ALL
4108. Which force, in the Northern Hemisphere, acts at a right angle to the wind and deflects it to the right until parallel to the isobars?

A— Centrifugal.
B— Pressure gradient.
C— Coriolis.

Coriolis force is at a right angle to wind direction and directly proportional to wind speed. In the Northern Hemisphere, the air is deflected to the right. (PLT510) — AC 00-6

Answer (A) is incorrect because centrifugal force acts outwardly to any moving objective in a curved path. Answer (B) is incorrect because pressure gradient causes the wind to move perpendicular to the isobars, but it is then deflected by Coriolis force.

Moisture and Precipitation

Air contains moisture (water vapor). The water vapor content of air can be expressed in two different ways: relative humidity and dew point.

Relative humidity relates the actual water vapor present in the air to that which could be present. Temperature largely determines the maximum amount of water vapor the air can hold. Warm air can hold more water vapor than cold air can. Air with 100% relative humidity is said to be saturated, and air with less than 100% is unsaturated.

Dew point is the temperature to which air must be cooled to become saturated by the water already present in the air.

When water vapor condenses on large objects, such as leaves, windshields, or airplanes, it will form dew. When it condenses on microscopic particles, such as salt, dust, or combustion by-products (condensation nuclei), it will form clouds or fog.

If the temperature and dew point spread is small and decreasing, condensation is about to occur. If the temperature is above freezing, fog or low clouds will be most likely to develop.

The growth rate of precipitation is enhanced by upward currents. Cloud particles collide and merge into a larger drop in the more rapid growth process. This process produces larger precipitation particles and does so more rapidly than the simple condensation growth process. Upward currents also support larger drops.

Continued

Answers

4106 [B]	4107 [B]	4108 [C]

If wet snow is encountered at your flight altitude, then the temperature is above freezing at your altitude. Since melting snow has been encountered, the freezing level must be at a higher altitude.

The presence of ice pellets at the surface is evidence that there is freezing rain at a higher altitude. Rain falling through colder air may become supercooled, freezing on impact as freezing rain; or it may freeze during its descent, falling as ice pellets.

ALL
4104. Clouds, fog, or dew will always form when

A— water vapor condenses.
B— water vapor is present.
C— the temperature and dew point are equal.

When temperature reaches the dew point, water vapor can no longer remain invisible but is forced to condense, becoming visible on the ground as dew, appearing in the air as fog or clouds, or falling to the earth as rain. (PLT512) — AC 00-6

Answer (B) is incorrect because there is almost always water vapor present. Answer (C) is incorrect because even when the temperature and dew point are equal (100% humidity), sufficient condensation nuclei must be present for water vapor to condense.

ALL
4101. To which meteorological condition does the term "dew point" refer?

A— The temperature to which air must be cooled to become saturated.
B— The temperature at which condensation and evaporation are equal.
C— The temperature at which dew will always form.

Dew point is the temperature to which air must be cooled to become saturated by the water vapor already present in the air. Aviation weather reports normally include the air temperature and dew point temperature. Dew point, when related to air temperature, reveals qualitatively how close the air is to saturation. (PLT512) — AC 00-6

Answer (B) is incorrect because it takes higher temperatures for water to evaporate, and lower temperatures for water vapor to condense. Answer (C) is incorrect because the formation of dew depends upon the temperatures of the surface and the relative humidity.

ALL
4103. The amount of water vapor which air can hold largely depends on

A— relative humidity.
B— air temperature.
C— stability of air.

Temperature largely determines the maximum amount of water vapor air can hold. Warm air can hold more water vapor than cool air. (PLT512) — AC 00-6

Answer (A) is incorrect because relative humidity does not determine the amount of water vapor air can hold, but rather measures the existing amount of water vapor compared to the amount that could be held. Answer (C) is incorrect because stability of air pertains to the temperature lapse rate, not moisture.

ALL
4159. What enhances the growth rate of precipitation?

A— Advective action.
B— Upward currents.
C— Cyclonic movement.

Cloud particles collide and merge into a larger drop in the more rapid growth process. This process produces larger precipitation particles and does so more rapidly than the simple condensation growth process. Upward currents enhance the growth rate and also support larger drops. (PLT344) — AC 00-6

ALL
4102. What temperature condition is indicated if wet snow is encountered at your flight altitude?

A— The temperature is above freezing at your altitude.
B— The temperature is below freezing at your altitude.
C— You are flying from a warm air mass into a cold air mass.

Wet snow at your altitude means that the temperature is above freezing since the snow has begun to melt. For snow to form, water vapor must go from the vapor state to the solid state (known as sublimation) with the temperature below freezing. Since melting snow has been encountered, the freezing level must be at a higher altitude. (PLT512) — AC 00-6

Answer (B) is incorrect because wet snow requires a temperature above freezing (not below). Answer (C) is incorrect because the temperature is colder above you, but not necessarily in front of you.

Answers

4104	[A]	4101	[A]	4103	[B]	4159	[B]	4102	[A]

ALL

4099. The presence of ice pellets at the surface is evidence that

A— there are thunderstorms in the area.
B— a cold front has passed.
C— there is freezing rain at a higher altitude.

Rain falling through colder air may become supercooled, freezing on impact as freezing rain; or it may freeze during its descent, falling as ice pellets. Ice pellets always indicate freezing rain at higher altitude. (PLT344) — AC 00-6

Answers (A) and (B) are incorrect because thunderstorms and cold fronts do not necessarily cause ice pellets.

ALL

4161. Which precipitation type normally indicates freezing rain at higher altitudes?

A— Snow.
B— Hail.
C— Ice pellets.

Ice pellets always indicate freezing rain at higher altitudes. (PLT344) — AC 00-6

Answer (A) is incorrect because snow indicates that the air above is already below freezing. Answer (B) is incorrect because hail indicates instability where supercooled water droplets have begun to freeze.

Stable and Unstable Air

Atmospheric stability is defined as the resistance of the atmosphere to vertical motion. A stable atmosphere resists any upward or downward movement. An unstable atmosphere allows an upward or downward disturbance to grow into a vertical (convective) current.

Characteristics of unstable air are: cumuliform clouds, showery precipitation, rough air (turbulence), and good visibility, except in blowing obstructions. Characteristics of stable air are: stratiform clouds and fog, continuous precipitation, smooth air, and fair to poor visibility in haze and smoke.

Determining the stability of the atmosphere requires measuring the difference between the actual existing (ambient) temperature lapse rate of a given parcel of air and the dry adiabatic (3°C per 1,000 feet) lapse rate.

ALL

4121. Stability can be determined from which measurement of the atmosphere?

A— Low-level winds.
B— Ambient lapse rate.
C— Atmospheric pressure.

A change in ambient temperature lapse rate of an air mass can tip the balance between stable or unstable air. The ambient lapse rate is the rate of decrease in temperature with altitude. (PLT173) — AC 00-6

Answer (A) is incorrect because stability cannot be determined from low-level winds. Answer (C) is incorrect because the atmospheric pressure does not affect the stability of the air.

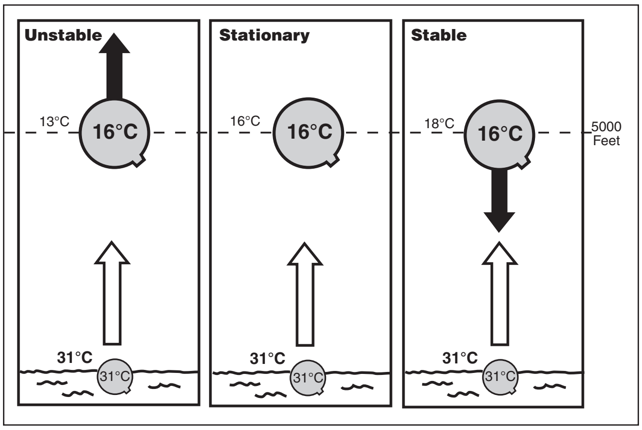

Figure 1-3

Answers

4099	[C]	4161	[C]	4121	[B]

ALL

4122. What determines the structure or type of clouds which form as a result of air being forced to ascend?

A— The method by which the air is lifted.
B— The stability of the air before lifting occurs.
C— The amount of condensation nuclei present after lifting occurs.

Cloud type or structure is determined by whether the air is stable or unstable within the layer forced upward. When stable air is forced upward, the air tends to retain horizontal flow and any cloudiness is flat and stratified. When unstable air is forced upward, the disturbance grows, and resulting cloudiness shows "heaped" or cumulus development. (PLT511) — AC 00-6

Answers (A) and (C) are incorrect because the method in which air is lifted and the nuclei present do not determine cloud structure or type.

ALL

4124. Unsaturated air flowing up slope will cool at the rate of approximately (dry adiabatic lapse rate)

A— 3°C per 1,000 feet.
B— 2°C per 1,000 feet.
C— 2.5°C per 1,000 feet.

Unsaturated air moving upward and downward cools and warms at about 3°C (5.4°F) per 1,000 feet. (PLT173) — AC 00-6

Answer (B) is incorrect because 2°C per 1,000 feet is the lapse rate for stable air. Answer (C) is incorrect because 2.5°C per 1,000 feet is the rate of converging temperature and dew point in a convective current of unsaturated air.

ALL

4115. What type of clouds will be formed if very stable moist air is forced up slope?

A— First stratified clouds and then vertical clouds.
B— Vertical clouds with increasing height.
C— Stratified clouds with little vertical development.

When stable air is forced upward, the air tends to retain horizontal flow and any cloudiness is flat and stratified. When unstable air is forced upward, the disturbance grows and any resulting cloudiness shows extensive vertical development. (PLT511) — AC 00-6

Answers (A) and (B) are incorrect because vertical clouds are not characteristic of stable air.

ALL

4118. What type clouds can be expected when an unstable air mass is forced to ascend a mountain slope?

A— Layered clouds with little vertical development.
B— Stratified clouds with considerable associated turbulence.
C— Clouds with extensive vertical development.

When stable air is forced upward, the air tends to retain horizontal flow and any cloudiness is flat and stratified. When unstable air is forced upward, the disturbance grows and any resulting cloudiness shows extensive vertical development. (PLT511) — AC 00-6

Answers (A) and (B) are incorrect because layered and stratified clouds are characteristic of stable air.

ALL

4123. Which of the following combinations of weather producing variables would likely result in cumuliform-type clouds, good visibility, rain showers, and possible clear-type icing in clouds?

A— Unstable, moist air, and no lifting mechanism.
B— Stable, dry air, and orographic lifting.
C— Unstable, moist air, and orographic lifting.

Unstable air favors convection. A cumulus cloud forms in a convective updraft and builds upward. The initial lifting that triggers a cumuliform cloud can be either orographic (topographical, i.e., mountains) or by surface heating. For convective cumuliform clouds to develop, the air must be unstable after saturation. (PLT511) — AC 00-6

Answer (A) is incorrect because without a lifting mechanism, clouds will not have vertical development, resulting in showery rain and icing in clouds. Answer (B) is incorrect because stable conditions result in stratiform clouds, and dry air does not result in showery rain or icing when lifted.

Answers

4122 [B]	4124 [A]	4115 [C]	4118 [C]	4123 [C]

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