



2014

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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

A— lift, weight, thrust, and drag.
B— lift, weight, gravity, and thrust. ←
C— lift, gravity, power, and friction.

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

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)

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.

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 00-6A, page 2

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 00-6A, page 2

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 00-6A, page 136

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 00-6A, page 136

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 00-6A, page 137

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 00-6A, page 7

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. $8^{\circ}\text{C} \div 2 = 4$ 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 00-6A, page 9

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 00-6A, page 9

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 00-6A, page 9

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 00-6A, page 52

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 00-6A, page 9

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 00-6A, pages 10 and 88

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.

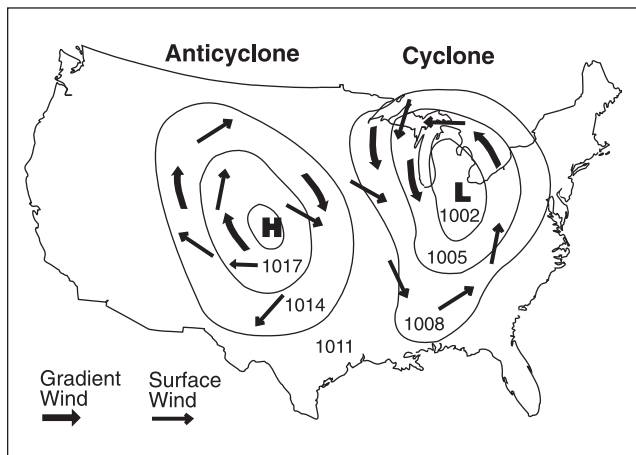


Figure 1-1. Gradient and surface wind

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 00-6A, page 30

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]