

FAA KNOWLEDGE TEST WEATHER QUESTIONS

BASIC WEATHER THEORY

Earth's atmosphere is composed of;

1. 78% Nitrogen, 21% Oxygen, 1% other gases
2. 21% Nitrogen, 1% oxygen, 78% other gases
3. Even % of Nitrogen, Oxygen, and Carbon Dioxide

Every physical process of weather is accompanied by, or is the result of, a

1. movement of air.
2. pressure differential
3. heat exchange.

What causes variations in altimeter settings between weather reporting points?

1. Unequal heating of the Earth's surface.
2. Variation of terrain elevation.
3. Coriolis force.

WEATHER PATTERNS

A temperature inversion would most likely result in which weather condition?

1. An increase in temperature as altitude is increased.
2. Clouds with extensive vertical development above an inversion aloft.
3. Good visibility in the lower levels of the atmosphere and poor visibility above an inversion aloft.

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

1. terrestrial radiation on a clear, relatively still night.
2. the movement of colder air under warm air, or the movement of warm air over cold air.
3. warm air being lifted rapidly aloft in the vicinity of mountainous terrain.

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

1. Smooth air, poor visibility, fog, haze, or low clouds.
2. Turbulent air, poor visibility, fog, low stratus type clouds, and showery precipitation.

3. Light wind shear, poor visibility, haze, and light rain.

What are the standard temperature and pressure values for sea level?

1. 15 °C and 29.92 in. Hg.
2. 59 °C and 1013.2 millibars.
3. 59 °F and 29.92 millibars.

If a pilot changes the altimeter setting from 30.11 to 29.96, what is the approximate change in indication?

1. Altimeter will indicate .15 in. Hg higher.
2. Altimeter will indicate 150 feet lower.
3. Altimeter will indicate 150 feet higher.

Under which condition will pressure altitude be equal to true altitude?

1. When the atmospheric pressure is 29.92 in. Hg
2. When standard atmospheric conditions exist.
3. When indicated altitude is equal to the pressure altitude.

Under what condition is pressure altitude and density altitude the same value?

1. At sea level, when the temperature is 0 °F.
2. At standard temperature.
3. When the altimeter has no installation error.

If a flight is made from an area of low pressure into an area of high pressure without the altimeter setting being adjusted, the altimeter will indicate

1. lower than the actual altitude above sea level.
2. the actual altitude above sea level.
3. higher than the actual altitude above sea level.

If a flight is made from an area of high pressure into an area of lower pressure without the altimeter setting being adjusted, the altimeter will indicate

1. the actual altitude above sea level.
2. lower than the actual altitude above sea level.
3. higher than the actual altitude above sea level.

Under what condition will true altitude be lower than indicated altitude?

1. In colder than standard air temperature.
2. When density altitude is higher than indicated altitude.
3. In warmer than standard air temperature.

Which condition would cause the altimeter to indicate a lower altitude than true altitude?

1. Air temperature warmer than standard.
2. Atmospheric pressure lower than standard.

3. Air temperature lower than standard.

Which factor would tend to increase the density altitude at a given airport?

1. An increase in ambient temperature.
2. A decrease in relative humidity.
3. An increase in barometric pressure.

The wind at 5,000 feet AGL is southwesterly while the surface wind is southerly. This difference in direction is primarily due to

1. friction between the wind and the surface.
2. stronger pressure gradient at higher altitudes.
3. stronger Coriolis force at the surface.

What condition does a rising barometer indicate for balloon operations?

1. Approaching frontal activity.
2. Decreasing clouds and wind.
3. Chances of thunderstorms.

What is meant by the term 'dewpoint'?

1. The temperature to which air must be cooled to become saturated.
2. The temperature at which condensation and evaporation are equal.
3. The temperature at which dew will always form.

The amount of water vapor which air can hold depends on the

1. stability of the air.
2. air temperature.
3. dewpoint.

Clouds, fog, or dew will always form when

1. water vapor condenses.
2. relative humidity reaches 100 percent.
3. water vapor is present.

What are the processes by which moisture is added to unsaturated air?

1. Supersaturation and evaporation.
2. Heating and condensation.
3. Evaporation and sublimation.

Which conditions result in the formation of frost?

1. The temperature of the collecting surface is at or below the dewpoint of the adjacent air and the dewpoint is below freezing.
2. The temperature of the surrounding air is at or below freezing when small drops of moisture fall on the collecting surface.
3. The temperature of the collecting surface is at or below freezing when small droplets of moisture fall on the surface.

The presence of ice pellets at the surface is evidence that there

1. are thunderstorms in the area.
2. has been cold frontal passage.
3. is a temperature inversion with freezing rain at a higher altitude.

What measurement can be used to determine the stability of the atmosphere?

1. Actual lapse rate.
2. Atmospheric pressure.
3. Surface temperature.

What would decrease the stability of an air mass?

1. Decrease in water vapor.
2. Cooling from below.
3. Warming from below.

What is a characteristic of stable air?

1. Stratiform clouds.
2. Cumulus clouds.
3. Unlimited visibility.

Moist, stable air flowing upslope can be expected to

1. cause showers and thunderstorms.

2. develop convective turbulence.
3. produce stratus type clouds.

If an unstable air mass is forced upward, what type clouds can be expected?

1. Stratus clouds with little vertical development.
2. Stratus clouds with considerable associated turbulence.
3. Clouds with considerable vertical development and associated turbulence.

What feature is associated with a temperature inversion?

1. Chinook winds on mountain slopes.
2. An unstable layer of air.
3. A stable layer of air.

What is the approximate base of the cumulus clouds if the surface air temperature at 1,000 feet MSL is 70 °F and the dewpoint is 48 °F?

1. 4,000 feet MSL.
2. 5,000 feet MSL.
3. 6,000 feet MSL.

At approximately what altitude above the surface would the pilot expect the base of cumuliform clouds if the surface air temperature is 82 °F and the dewpoint is 38 °F?

1. 10,000 feet AGL.
2. 11,000 feet AGL.
3. 9,000 feet AGL.

What early morning weather observations indicate the possibility of good weather conditions for balloon flight most of the day?

1. Low moving, scattered cumulus clouds and surface winds, 5 knots or less.
2. Overcast with stratus clouds and surface winds, 5 knots or less.
3. Clear skies and surface winds, 10 knots or less.

What are characteristics of a moist, unstable air mass?

1. Poor visibility and smooth air.
2. Cumuliform clouds and showery precipitation.
3. Stratiform clouds and showery precipitation.

What are characteristics of unstable air?

1. Turbulence and good surface visibility.

2. Nimbostratus clouds and good surface visibility.
3. Turbulence and poor surface visibility.

A stable air mass is most likely to have which characteristic?

1. Turbulent air.
2. Showery precipitation.
3. Smooth air.

The suffix 'nimbus,' used in naming clouds, means

1. a rain cloud.
2. a middle cloud containing ice pellets.
3. a cloud with extensive vertical development.

Clouds are divided into four families according to their

1. outward shape.
2. height range.
3. composition.

An almond or lens-shaped cloud which appears stationary, but which may contain winds of 50 knots or more, is referred to as

1. a lenticular cloud.
2. an inactive frontal cloud.
3. a funnel cloud.

Crests of standing mountain waves may be marked by stationary, lens-shaped clouds known as

1. standing lenticular clouds.
2. mammatocumulus clouds.
3. roll clouds.

What clouds have the greatest turbulence?

1. Cumulonimbus.
2. Towering cumulus.
3. Nimbostratus.

What cloud types would indicate convective turbulence?

1. Towering cumulus clouds.
2. Nimbostratus clouds.
3. Cirrus clouds.

The boundary between two different air masses is referred to as a

1. frontolysis.
2. front.
3. frontogenesis.

One of the most easily recognized discontinuities across a front is

1. a change in temperature.
2. an increase in cloud coverage.
3. an increase in relative humidity.

One weather phenomenon which will always occur when flying across a front is a change in the

1. type of precipitation.
2. wind direction.
3. stability of the air mass.

Steady precipitation preceding a front is an indication of

1. stratiform clouds with little or no turbulence.
2. cumuliform clouds with little or no turbulence.
3. stratiform clouds with moderate turbulence.

Possible mountain wave turbulence could be anticipated when winds of 40 knots or greater blow

1. down a mountain valley, and the air is unstable.
2. across a mountain ridge, and the air is stable.
3. parallel to a mountain peak, and the air is stable.

Where does wind shear occur?

1. Only at lower altitudes.
2. At all altitudes, in all directions.
3. Only at higher altitudes.

When may hazardous wind shear be expected?

1. When stable air crosses a mountain barrier where it tends to flow in layers forming lenticular clouds
2. Following frontal passage when stratocumulus clouds form indicating mechanical mixing.
3. In areas of low-level temperature inversion, frontal zones, and clear air turbulence.

A pilot can expect a wind-shear zone in a temperature inversion whenever the windspeed at 2,000 to 4,000 feet above the surface is at least

1. 10 knots.
2. 15 knots.
3. 25 knots.

ICING

One in-flight condition necessary for structural icing to form is

1. stratiform clouds.
2. small temperature/dewpoint spread.
3. visible moisture.

In which environment is aircraft structural ice most likely to have the highest accumulation rate?

1. Freezing drizzle.
2. Cumulus clouds with below freezing temperatures.
3. Freezing rain.

Why is frost considered hazardous to flight?

1. Frost slows the airflow over the airfoils, thereby increasing control effectiveness.
2. Frost changes the basic aerodynamic shape of the airfoils, thereby decreasing lift.
3. Frost spoils the smooth flow of air over the wings, thereby decreasing lifting capability.

How does frost affect the lifting surfaces of an airplane on takeoff?

1. Frost may cause the airplane to become airborne with a lower angle of attack at a lower indicated airspeed.
2. Frost may prevent the airplane from becoming airborne at normal takeoff speed.
3. Frost will change the camber of the wing, increasing lift during takeoff.

THUNDERSTORMS

The conditions necessary for the formation of cumulonimbus clouds are a lifting action and

1. unstable air containing an excess of condensation nuclei.
2. either stable or unstable air.
3. unstable, moist air.

What feature is normally associated with the cumulus stage of a thunderstorm?

1. Roll cloud.
2. Frequent lightning.
3. Continuous updraft.

Which weather phenomenon signals the beginning of the mature stage of a thunderstorm?

1. Maximum growth rate of the clouds.

2. Precipitation beginning to fall.
3. The appearance of an anvil top.

What conditions are necessary for the formation of thunderstorms?

1. Lifting force, moist air, and extensive cloud cover.
2. High humidity, high temperature, and cumulus clouds.
3. High humidity, lifting force, and unstable conditions.

During the life cycle of a thunderstorm, which stage is characterized predominately by downdrafts?

1. Mature.
2. Dissipating.
3. Cumulus.

Thunderstorms reach their greatest intensity during the

1. downdraft stage.
2. mature stage.
3. cumulus stage.

Thunderstorms which generally produce the most intense hazard to aircraft are

1. squall line thunderstorms.
2. steady-state thunderstorms.
3. warm front thunderstorms.

A nonfrontal, narrow band of active thunderstorms that often develop ahead of a cold front is a known as a

1. squall line.
2. prefrontal system.
3. dry line.

If there is thunderstorm activity in the vicinity of an airport at which you plan to land, which hazardous atmospheric phenomenon might be expected on the landing approach?

1. Precipitation static.
2. Wind-shear turbulence.
3. Steady rain.

Upon encountering severe turbulence, which flight condition should the pilot attempt to maintain?

1. Constant altitude and airspeed.
2. Level flight attitude.
3. Constant angle of attack.

FOG

What situation is most conducive to the formation of radiation fog?

1. The movement of cold air over much warmer water.
2. Warm, moist air over low, flatland areas on clear, calm nights.
3. Moist, tropical air moving over cold, offshore water.

If the temperature/dewpoint spread is small and decreasing, and the temperature is 62 °F, what type weather is most likely to develop?

1. Fog or low clouds.
2. Thunderstorms.
3. Freezing precipitation.

In which situation is advection fog most likely to form?

1. A light breeze blowing colder air out to sea.
2. An air mass moving inland from the coast in winter.
3. A warm, moist air mass on the windward side of mountains.

What types of fog depend upon wind in order to exist?

1. Steam fog and ground fog.
2. Advection fog and upslope fog.
3. Radiation fog and ice fog.

Low-level turbulence can occur and icing can become hazardous in which type of fog?

1. Steam fog.
2. Upslope fog.
3. Rain-induced fog.

The development of thermals depends upon

1. temperature inversions.
2. a counterclockwise circulation of air.
3. solar heating.

Convective circulation patterns associated with sea breezes are caused by

1. cool, dense air moving inland from over the water.
2. warm, dense air moving inland from over the water.
3. water absorbing and radiating heat faster than the land.

During which period is a sea breeze front most suitable for soaring flight?

1. During the early forenoon.
2. During the afternoon.
3. Shortly after sunrise.

Which weather phenomenon is always associated with a thunderstorm?

1. Heavy rain.
2. Lightning.
3. Hail.

INTEERPRETING THE WEATHER

Individual forecasts for specific routes of flight can be obtained from which weather source?

1. Terminal Forecasts.
2. Transcribed Weather Broadcasts (TWEB's).
3. Area Forecasts.

Transcribed Weather Broadcasts (TWEB's) may be monitored by tuning the appropriate radio receiver to certain

1. VOR and NDB frequencies.
2. airport advisory frequencies.
3. ATIS frequencies.

To get a complete weather briefing for the planned flight, the pilot should request

1. an abbreviated briefing.\
2. a general briefing.
3. a standard briefing.

Which type weather briefing should a pilot request, when departing within the hour, if no preliminary weather information has been received?

1. Outlook briefing.
2. Standard briefing.
3. Abbreviated briefing.

Which type of weather briefing should a pilot request to supplement mass disseminated data?

1. An outlook briefing.
2. An abbreviated briefing.
3. A supplemental briefing.

To update a previous weather briefing, a pilot should request

1. a standard briefing.
2. an abbreviated briefing.
3. an outlook briefing.

A weather briefing that is provided when the information requested is 6 or more hours in advance of the proposed departure time is

1. a prognostic briefing.
2. a forecast briefing.
3. an outlook briefing.

When requesting weather information for the following morning, a pilot should request

1. an abbreviated briefing.
2. an outlook briefing.
3. a standard briefing.
- 4.

METAR

METAR KINK 121845Z 11012G18KT 15SM SKC 25/17 A3000.

METAR KBOI 121854Z 13004KT 30SM SCT150 17/6 A3015.

METAR KLAX 121852Z 25004KT 6SM BR SCT007 SCT250 16/15 A2991.

SPECI KMDW 121856Z 32005KT 1 1/2SM RA OVC007 17/16 A2980 RMK RAB35.

SPECI KJFK 121853Z 18004KT 1/2SM FG R04/2200 OVC005 20/18 A3006

Which of the reporting stations have VFR weather?

1. All.
2. KINK, KBOI, and KJFK.
3. KINK, KBOI, and KLAX.

For aviation purposes, ceiling is defined as the height above the Earth's surface of the

1. lowest broken or overcast layer or vertical visibility into an obscuration.
2. lowest layer of clouds reported as scattered, broken, or thin.

3. lowest reported obscuration and the highest layer of clouds reported as overcast.

Refer to METAR above. The wind direction and velocity at KJFK is from

1. 180° magnetic at 4 knots.
2. 040° true at 18 knots.
3. 180° true at 4 knots.

Refer to METAR above. What are the wind conditions at Wink, Texas (KINK)?

1. 111° at 2 knots, gusts 18 knots.
2. 110° at 12 knots, gusts 18 knots.
3. Calm.

Refer to METAR above. The remarks section for KMDW has RAB35 listed. This entry means

1. the barometer has risen .35 in. Hg.
2. rain began at 1835Z.
3. blowing mist has reduced the visibility to 1-1/2 SM.

Refer to METAR above. What are the current conditions depicted for Chicago Midway Airport (KMDW)?

1. Sky 7000 feet overcast, visibility 1-1/2SM, heavy rain.
2. Sky 700 feet overcast, visibility 11, occasionally 2SM, with rain.
3. Sky 700 feet overcast, visibility 1-1/2SM, rain.

Refer to METAR above. The base and tops of the overcast layer reported by a pilot are

1. 5,500 feet AGL and 7,200 feet MSL.
2. 7,200 feet MSL and 8,900 feet MSL.
3. 1,800 feet MSL and 5,500 feet MSL.

Refer to METAR above. The wind and temperature at 12,000 feet MSL as reported by a pilot are

1. 090° at 21 knots and -9 °C.
2. 009° at 121 MPH and 90 °F.
3. 090° at 21 knots and -9 °F.

TERMINAL AERODROME FORECAST

TAF

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KMEM 121720Z 121818 20012KT 5SM HZ BKN030 PROB40 2022 1SM TSRA OVC008CB
FM2200 33015G20KT P6SM BKN015 OVC025 PROB40 2202 3SM SHRA
FM0200 35012KT OVC008 PROB40 0205 2SM -RASN BECMG 0608 02008KT NSW
BKN012
    BECMG 1012 00000KT 3SM BR SKC TEMPO 1214 1/2SM FG
    FM 1600 VRB04KT P6SM NSW SKC=

KOKC 051130Z 051212 14008KT 5SM BR BKN030 TEMPO 1316 1 1/2SM BR
FM 1600 16010KT P6SM NSW SKC BECMG 2224 20013G20KT 4SM SHRA OVC020
PROB40 0006 2SM TSRA OVC008CB BECMG 0608 21015KT P6SM NSW SCT040=
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Refer to TAF above. What is the valid period for the TAF for KMEM?

1. 1200Z to 1800Z.
2. 1200Z to 1200Z.
3. 1800Z to 1800Z.

Refer to TAF above. In the TAF for KMEM, what does 'SHRA' stand for?

1. Rain showers.
2. A significant change in precipitation is possible.
3. A shift in wind direction is expected.

Refer to TAF above. Between 1000Z and 1200Z the visibility at KMEM is forecast to be?

1. 1/2 statute mile.
2. 6 statute miles.
3. 3 statute miles.

Refer to TAF above. What is the forecast wind for KMEM from 1600Z until the end of the forecast?

1. 020° at 8 knots.
2. No significant wind.
3. Variable in direction at 4 knots.

Refer to TAF above. In the TAF from KOKC, the 'FM (FROM) Group' is

1. forecast for the hours from 1600Z to 2200Z with the wind from 160° at 10 knots, becoming 220° at 13 knots with gusts to 20 knots.

2. forecast for the hours from 1600Z to 2200Z with the wind from 160° at 10 knots.
3. forecast for the hours from 1600Z to 2200Z with the wind from 160° at 10 knots, becoming 210° at 15 knots.

Refer to TAF above. In the TAF from KOKC, the clear sky becomes

1. overcast at 200 feet with a 40% probability of becoming overcast at 600 feet during the forecast period between 2200Z and 2400Z.
2. overcast at 200 feet with the probability of becoming overcast at 400 feet during the forecast period between 2200Z and 2400Z.
3. overcast at 2,000 feet during the forecast period between 2200Z and 2400Z.

Refer to TAF above. During the time period from 0600Z to 0800Z, what significant weather is forecast for KOKC?

1. Visibility - possibly 6 statute miles with scattered clouds at 4,000 feet.
2. No significant weather is forecast for this time period.
3. Wind - 210° at 15 knots.

Refer to TAF above. The only cloud type forecast in TAF reports is

1. Nimbostratus.
2. Cumulonimbus.
3. Scattered cumulus.