



VIRGINIA FLIGHT SCHOOL SAFETY ARTICLE – NO 06/08

GENERAL SAFETY QUIZ

1. As long as a lifting action is present, a thunderstorm can form in dry or moist air.

True

False

2. The three stages of a thunderstorm are _____.

Single-cell, multicell, and super- cell

Stratus, cumulonimbus, and anvil

Cumulus, mature, and dissipating

3. Lightning always occurs with a thunderstorm.

True

False

4. If hail is present in a thunderstorm, you can rely on the nearest automated weather station to report it.

True

False

5. Embedded thunderstorms are uniquely hazardous because they are _____.

- Surrounded by other clouds and are not easily seen
- Often strong, severe and move quickly
- A cluster of thunderstorms in various stages

6. If flying in the vicinity of a weakening thunderstorm, a pilot should be most concerned about _____.

- Heavy rain showers
- Strong downdrafts
- Frequent ground lightning

7. Thunderstorms produce wind shear along _____ of a thunderstorm.

- The upwind side
- The downwind side
- All sides

8. Bright lightning is the best way to identify a thunderstorm at night.

True

False

9. If you accidentally fly into a thunderstorm, what should you do?

Maintain altitude and increase airspeed to get through the thunderstorm more quickly.

Immediately execute a 20-degree bank, decrease airspeed and reverse course to exit the thunderstorm.

Attempt to maintain a level attitude and maintain a cruise airspeed below maneuvering speed (VA).

10. ATC's main responsibility is to provide _____.

Pilots with hazardous weather advisories

Separation between VFR aircraft

Separation between IFR aircraft

ANSWERS ON NEXT PAGES

1. As long as a lifting action is present, a thunderstorm can form in dry or moist air.

True

False

Three components are necessary for a thunderstorm to form — **sufficient moisture, unstable air, and a lifting action**. Without any one of these conditions, a thunderstorm will not develop.

2. The three stages of a thunderstorm are _____.

Single-cell, multicell, and super-cell

Stratus, cumulonimbus, and anvil

Cumulus, mature, and dissipating

Intense vertical development builds the original cloud during the first, or **cumulus**, stage. The **mature** stage begins when precipitation falls from the cloud. Thunder and lightning will also occur. The cloud eventually becomes so saturated with moisture that it is no longer able to support its own weight. Eventually the cloud will reach an altitude at which vertical development will cease. At this point, strong upper-level winds will spread the top of the cloud horizontally, creating an anvil shape. This distinctive shape is an indication of the final, or **dissipating**, stage.

3. Lightning always occurs with a thunderstorm.



True

Lightning will always occur during a thunderstorm. The intense air circulation inside a thunderstorm causes an excessive amount of negative charge that is released in the form of lightning. The extreme heat generated by lightning causes the air to rapidly expand, which we hear as thunder. Pilots should also expect severe turbulence, strong wind gusts, icing, hail, and wind shear, which are also commonly associated with thunderstorms.

False

4. If hail is present in a thunderstorm, you can rely on the nearest automated weather station to report it.

True



False

Significantly warmer temperatures at lower altitudes can melt hail before it reaches the ground, **preventing automated weather systems from detecting hail at higher altitudes**. Hail forms when supercooled water droplets inside a thunderstorm are drawn upward by the strong updrafts, freeze, and then collect more water particles in downdrafts before being forced upward again. This process, called *accretion*, will continue until the hail becomes heavy enough to fall out of the cloud.

5. Embedded thunderstorms are uniquely hazardous because they are _____.



Surrounded by other clouds and are not easily seen

Embedded thunderstorms are not necessarily more hazardous than any other type. However, they are **more difficult to detect because they are hidden among other clouds**. This makes it more common for pilots to inadvertently fly into these storms, especially during instrument meteorological conditions (IMC). Strong, severe and quick moving storms are typically in a squall line. A cluster of thunderstorms in various stages of development are collectively referred to as a multicell thunderstorm.

Often strong, severe and move quickly

A cluster of thunderstorms in various stages

6. If flying in the vicinity of a weakening thunderstorm, a pilot should be most concerned about ____.

- Heavy rain showers
- Strong downdrafts

Hazardous wind conditions may exist within several miles of a dissipating thunderstorm. As the cloud collapses, **the thunderstorm weakens, producing strong downdrafts**, gusty winds, low-level wind shear, and microbursts. AIM 7-1-30 encourages pilots to avoid thunderstorms by at least 20 miles.

- Frequent ground lightning

7. Thunderstorms produce wind shear along ____ of a thunderstorm.

- The upwind side
- The downwind side
- All sides

Wind shear can be found **on all sides** of a thunderstorm. This "shear zone" occurs when the cool air from strong downdrafts expands and collides with the surrounding air outside of the cloud, causing gusty winds and severe turbulence.

8. Bright lightning is the best way to identify a thunderstorm at night.

- True
- False

Although a thunderstorm always produces lightning, **it is sometimes more difficult to recognize a thunderstorm at night or during IMC, especially if it's embedded**. The frequency of lightning flashes depends on the stage and strength of a thunderstorm. Even if a pilot cannot see lightning, the storm may produce severe turbulence and hail that could lead to structural damage.

9. If you accidentally fly into a thunderstorm, what should you do?

- Maintain altitude and increase airspeed to get through the thunderstorm more quickly.
- Immediately execute a 20-degree bank, decrease airspeed and reverse course to exit the thunderstorm.
- Attempt to maintain a level attitude and maintain a cruise airspeed below maneuvering speed (VA).

If you encounter a thunderstorm in flight, it is important to be more concerned about *attitude* than *altitude*. **Attempt to maintain a level attitude and maintain a cruise speed below maneuvering speed (VA)** to avoid structural damage to the aircraft. Remember: VA varies with weight and therefore is found in your POH, not on your airspeed indicator. If able, also contact ATC to advise them of the situation; they may be able to provide further assistance.

Choosing to reverse your course to exit the storm is not advised. By keeping the wings level and "riding" the up and downdrafts, you will reduce the risk of making abrupt control inputs that could lead to a stall, unusual attitude, or damage to the aircraft.

10. ATC's main responsibility is to provide _____.

- Pilots with hazardous weather advisories
- Separation between VFR aircraft
- Separation between IFR aircraft

ATC's main responsibility is to **provide separation for aircraft operating on IFR flight plans**. A variety of radar services are also provided to VFR traffic, including traffic advisories, but only on a workload permitting basis. Although ATC may offer weather advisories, it's not their main responsibility.