PRACTICE EXAM 14

1. Windshear is best defined as:

A. A steady wind that remains constant with altitude

B. The gradual warming of air over heated terrain

C. A high-pressure ridge bringing calm conditions

D. A sudden, localized change in wind speed or direction

2. Structural icing requires which two conditions occurring together?

A. Visible moisture and temperatures at or below freezing

B. Clear skies and a temperature below freezing

C. High humidity and a temperature above 20°C

D. Strong winds and a high-pressure system

3. A microburst is most dangerous to an airplane on approach because it:

A. Produces a steady headwind that improves climb

B. Creates smooth lift toward the runway

C. Increases visibility and eases the landing

D. Shifts a headwind to a downdraft to a tailwind, causing a rapid loss of performance

4. Convective turbulence is most associated with:

A. Wind flowing over a mountain ridge at night

B. A stable temperature inversion near the surface

C. The smooth air within a high-pressure center

D. Rising thermals on warm, sunny afternoons

5. A cold front typically brings which weather sequence?

A. Gradual, widespread layered clouds and steady rain

B. Prolonged, unchanging conditions along the boundary

C. A narrow band of intense weather, then rapid clearing

D. Several days of clear, calm skies

6. The correct response to encountering low-level windshear on approach is to:

A. Continue the approach with reduced power

B. Apply power and go around immediately

C. Increase the descent rate to land sooner

D. Maintain the current configuration and ride it out

7. Mechanical turbulence is produced when:

A. Thermals rise from heated terrain at midday

B. Temperature and dewpoint converge near saturation

C. A high-pressure system brings descending stable air

D. Wind flows over terrain and obstructions, forming eddies

8. Most light-sport airplanes are equipped to handle structural icing by:

A. Inflatable de-icing boots on the wing leading edges

B. Heated propeller blades and anti-ice fluid

C. No de-icing equipment, relying on avoidance

D. A bleed-air thermal anti-ice system

9. A warm front is typically associated with:

A. A narrow band of towering cumulus and gusty winds

B. Widespread layered clouds, steady rain, and low ceilings

C. Rapid clearing and improving visibility behind it

D. Severe turbulence followed by immediate clearing

10. Ice accumulating on a wing degrades flight by:

A. Reducing the airplane's weight and improving climb

B. Increasing lift and lowering the stall speed

C. Smoothing the airflow over the wing surface

D. Disrupting airflow, destroying lift, and raising stall speed

11. Windshear can occur near which of the following?

A. Only at high altitudes above 18,000 feet

B. Only directly beneath a clear, calm sky

C. Only over open water far from land

D. Fronts, temperature inversions, and around terrain

12. The most violent form of windshear, often beneath a thunderstorm, is a:

A. Sea breeze front along a coastline

B. Microburst

C. Standing lenticular cloud formation

D. Gentle valley wind at night

13. Wake turbulence is one type of turbulence; it is generated by:

A. Rising thermals over heated terrain

B. The wingtip vortices of other aircraft

C. Wind flowing over a mountain ridge

D. A temperature inversion near the surface

14. When structural ice begins to form on a non-deiced light airplane, the pilot should:

A. Exit the conditions immediately by changing altitude or course

B. Continue the flight unchanged into the icing

C. Climb higher into the colder, moister cloud layer

D. Increase airspeed while remaining in the visible moisture

15. A frontal passage produces low-level windshear and turbulence because of:

A. The wind shift and temperature change across the boundary

B. The complete absence of any wind near the front

C. A steady rise in visibility with no wind change

D. The constant wind direction throughout the passage

16. Clear-air or wind-shear turbulence occurs at:

A. The center of a stable high-pressure system

B. The boundaries between air layers of different wind or temperature

C. Only within visible cumulus clouds

D. The surface on calm, windless mornings

17. A cumulonimbus cloud contains which combination of hazards?

A. Smooth, layered air ideal for cruising

B. Only light rain and good visibility

C. A reliable sign of clearing weather ahead

D. Severe turbulence, lightning, hail, icing, and violent up/downdrafts

18. In turbulence, a pilot should slow to or below maneuvering speed (V_A) to:

A. Protect the airframe by allowing the wing to stall before overstress

B. Increase the airplane's rate of climb

C. Raise the stall speed for a safer margin

D. Improve the airplane's cruise fuel efficiency

19. Downdrafts on the leeward side of a ridge are hazardous because they:

A. Can exceed a light airplane's climb capability

B. Produce smooth, predictable lift toward the summit

C. Occur only at night and never during the day

D. Improve the airplane's climb performance over terrain

20. Structural icing can occur whenever the airplane is in visible moisture and the temperature is:

A. Well above 20°C on a warm day

B. Between 30°C and 40°C in dry air

C. At or below freezing (0°C / 32°F)

D. Only below −20°C at high altitude

21. Standing lenticular clouds near mountains warn of:

A. A stable layer with no turbulence

B. Fair weather ideal for low-level flight

C. The complete absence of wind over the ridge

D. Strong mountain wave activity and severe turbulence

22. A microburst can produce wind changes and downdrafts that:

A. Always improve a light airplane's climb performance

B. Are easily overcome by adding a small amount of power

C. Exceed the climb capability of any light aircraft

D. Have no effect on an airplane near the ground

23. The hazards of a cold-front passage include:

A. Days of unchanging, calm weather

B. Towering cumulus, gusty shifting winds, and brief heavy weather

C. A gradual onset of light, steady drizzle

D. Continuously improving visibility with no turbulence

24. A pilot should avoid a severe thunderstorm by a margin of at least:

A. 1 nautical mile at low altitude

B. 5 nautical miles from the cloud edge

C. No specific distance is necessary

D. 20 nautical miles

25. Why is icing not solely a winter or high-altitude concern?

A. Ice only forms above 18,000 feet in any season

B. It can occur in visible moisture at or below freezing at modest altitudes on a cool day

C. Warm air always contains more ice crystals

D. Icing requires no moisture, only cold temperatures

26. A temperature inversion can contribute to windshear because:

A. Wind speed and direction can change sharply across the inversion layer

B. Inversions eliminate all wind near the surface

C. Inversions only occur at the tops of thunderstorms

D. Inversions guarantee smooth air at all altitudes

27. The safest overall strategy for a non-deiced light airplane regarding icing is:

A. Avoidance — do not fly into visible moisture near or below freezing

B. Climbing into the cloud to shed ice through speed

C. Adding power and continuing through the icing layer

D. Descending slowly while accumulating ice

28. Turbulence from wind flowing over buildings and terrain is strongest on the:

A. Windward side facing into the wind

B. Top of the ridge in calm conditions

C. Leeward (downwind) side of the obstruction

D. Valley floor far from any terrain

29. Encountering a microburst on short final, the pilot's immediate priority is to:

A. Apply maximum available power and execute a go-around

B. Reduce power and continue to the runway

C. Lower the nose to increase the descent

D. Maintain the approach and accept the sink

30. A pilot planning to fly near building cumulus on a hot afternoon should expect:

A. Smooth, layered air with steady conditions

B. Convective turbulence and possible rapid cloud development

C. A guarantee of clearing weather within the hour

D. No turbulence below the cloud bases

31. Which is true of the relationship between thunderstorms and light aircraft?

A. A light airplane may safely fly beneath a mature storm

B. Thunderstorms must be avoided by a wide margin

C. Flying through the center provides the smoothest ride

D. Thunderstorms pose no real hazard to small aircraft

32. Wind-shear-induced loss of a headwind on approach causes the airplane to:

A. Climb above the intended glidepath

B. Gain airspeed and float down the runway

C. Hold its approach path with no change

D. Lose airspeed and sink below the glidepath

33. Icing that blocks the pitot tube will most directly affect the:

A. Magnetic compass indication

B. Engine oil pressure gauge

C. Airspeed indicator

D. Fuel quantity gauges

34. A pilot encountering severe turbulence should maintain:

A. Maximum cruise airspeed to push through quickly

B. A steep bank to exit the area rapidly

C. A level attitude rather than chasing altitude, at or below V_A

D. The never-exceed speed to maintain control

35. Frontal weather differs between cold and warm fronts primarily in:

A. The intensity and duration of the associated weather

B. The complete absence of clouds at both fronts

C. The requirement for an instrument rating at warm fronts only

D. The fact that only cold fronts produce any clouds

36. A pilot should approach a mountain ridge at an angle in order to:

A. Use the tailwind on the leeward side for a faster climb

B. Cross at the lowest possible altitude over the peak

C. Preserve the option to turn toward lower terrain

D. Fly directly into the strongest downdrafts

37. Carburetor-type icing hazards can occur on warm, humid days because:

A. Warm air always contains visible precipitation aloft

B. High pressure accompanies all warm days

C. The temperature drop within the carburetor reaches freezing despite warm outside air

D. Warm air is denser and holds more ice crystals

38. Wingtip vortices (wake turbulence) sink below the flight path and:

A. Rise rapidly and dissipate the instant the aircraft passes

B. Drift downwind with the prevailing wind

C. Remain stationary on the runway centerline

D. Climb steadily into the upper atmosphere

39. A pilot should treat a forecast or report of low-level windshear near the airport by:

A. Delaying or avoiding takeoff and landing in those conditions

B. Departing immediately to beat the developing shear

C. Disregarding it, since light aircraft are unaffected

D. Increasing approach speed to penetrate the shear

40. The greatest icing-related danger for a light-sport airplane with no anti-ice equipment is that:

A. Ice improves the airplane's glide performance

B. A thin layer of ice is always harmless

C. Even a thin layer of ice can be dangerous

D. Ice only affects the airplane at cruise altitude

ANSWER KEY WITH EXPLANATIONS

1. D — A sudden, localized change in wind speed or direction. Windshear is an abrupt, localized shift in wind speed and/or direction over a short distance, hazardous especially near the ground. A steady or gradually warming wind is not windshear.

2. A — Visible moisture and temperatures at or below freezing. Structural icing requires both visible moisture and a temperature at or below freezing occurring together. Either condition alone will not produce airframe ice.

3. D — Shifts a headwind to a downdraft to a tailwind, causing a rapid loss of performance. A microburst on approach gives a brief performance gain (headwind), then a violent downdraft, then a performance-robbing tailwind. This sequence can exceed a light airplane's recovery ability near the ground.

4. D — Rising thermals on warm, sunny afternoons. Convective turbulence comes from thermals rising off heated terrain, producing bumpy afternoons. Mechanical turbulence, by contrast, comes from wind over terrain.

5. C — A narrow band of intense weather, then rapid clearing. A cold front brings brief but violent weather—towering cumulus, gusty winds—followed by clearing and improving visibility. A warm front brings widespread, prolonged poor weather.

6. B — Apply power and go around immediately. Encountering low-level windshear on approach, the correct response is to apply power and go around. Continuing or increasing descent into the shear is dangerous.

7. D — Wind flows over terrain and obstructions, forming eddies. Mechanical turbulence results from wind breaking into eddies as it passes over terrain or obstructions. Thermals cause convective, not mechanical, turbulence.

8. C — No de-icing equipment, relying on avoidance. Most light-sport airplanes lack de-ice equipment and must avoid icing entirely. They are not certified for flight into known icing.

9. B — Widespread layered clouds, steady rain, and low ceilings. A warm front brings gentle but prolonged poor weather: extensive stratiform clouds, steady rain, and low ceilings. The cold front brings the narrow, intense band.

10. D — Disrupting airflow, destroying lift, and raising stall speed. Ice disrupts the airflow over the wing, destroying lift, adding drag and weight, and raising the stall speed. It does not improve any aspect of performance.

11. D — Fronts, temperature inversions, and around terrain. Windshear can occur near fronts, in temperature inversions, around terrain, and at any altitude. It is not limited to high altitude or one location.

12. B — Microburst. The microburst is the most violent windshear form, a powerful localized downdraft often beneath a thunderstorm. A sea breeze, lenticular cloud, or valley wind is far less severe.

13. B — The wingtip vortices of other aircraft. Wake turbulence is generated by the wingtip vortices of other—especially larger—aircraft. It is distinct from thermal, mechanical, or inversion turbulence.

14. A — Exit the conditions immediately by changing altitude or course. With no de-ice equipment, the only safe response to accumulating ice is to leave the conditions at once toward warmer or drier air. Continuing or climbing deeper is dangerous.

15. A — The wind shift and temperature change across the boundary. Fronts produce low-level windshear and turbulence because wind direction and temperature change sharply across the boundary. A front is never a no-wind, unchanging zone.

16. B — The boundaries between air layers of different wind or temperature. Wind-shear turbulence occurs where layers of differing wind or temperature meet. It is not confined to the center of a high or to cumulus clouds.

17. D — Severe turbulence, lightning, hail, icing, and violent up/downdrafts. A cumulonimbus contains every aviation hazard at once and must be avoided by a wide margin. It never indicates smooth or clearing conditions.

18. A — Protect the airframe by allowing the wing to stall before overstress. Slowing to or below V_A in turbulence lets the wing stall and relieve the load before the airframe is overstressed. It does not improve climb or efficiency.

19. A — Can exceed a light airplane's climb capability. Leeward downdrafts off a ridge can sink faster than a light airplane can climb, a serious mountain hazard. They do not aid climb and are not limited to night.

20. C — At or below freezing (0°C / 32°F). Structural icing occurs in visible moisture when the temperature is at or below freezing. It does not require extreme cold or warm temperatures.

21. D — Strong mountain wave activity and severe turbulence. Lenticular clouds mark mountain wave activity and warn of severe turbulence. They are a caution sign, not a fair-weather indicator.

22. C — Exceed the climb capability of any light aircraft. A microburst can produce downdrafts and wind shifts beyond any light airplane's climb ability, making low-altitude recovery impossible. It cannot be overcome by a little extra power.

23. B — Towering cumulus, gusty shifting winds, and brief heavy weather. A cold-front passage brings towering cumulus, gusty shifting winds, and brief but intense weather, then clearing. It is not gradual drizzle or calm.

24. D — 20 nautical miles. Severe thunderstorms should be avoided by at least 20 nautical miles, as hazards extend well beyond the visible cloud. There is a recommended distance, contrary to the other options.

25. B — It can occur in visible moisture at or below freezing at modest altitudes on a cool day. Icing is not limited to winter or high altitude; it can form in clouds at modest altitudes whenever moisture and freezing temperatures coexist. This makes year-round vigilance necessary.

26. A — Wind speed and direction can change sharply across the inversion layer. A temperature inversion can produce windshear because wind speed and direction often change abruptly across the layer. Inversions do not eliminate wind or guarantee smooth air.

27. A — Avoidance — do not fly into visible moisture near or below freezing. The safest strategy for a non-deiced airplane is avoidance: stay out of visible moisture near or below freezing. Climbing or pressing through icing is hazardous.

28. C — Leeward (downwind) side of the obstruction. Mechanical turbulence concentrates on the leeward side of terrain or obstructions as the wind breaks into eddies. The windward side experiences smoother upward flow.

29. A — Apply maximum available power and execute a go-around. Encountering a microburst on short final, the immediate priority is maximum power and a go-around. Reducing power or accepting the sink courts an accident.

30. B — Convective turbulence and possible rapid cloud development. Building cumulus on a hot afternoon signals unstable air with convective turbulence and possible rapid development toward thunderstorms. It is not a sign of smooth or clearing weather.

31. B — Thunderstorms must be avoided by a wide margin. Thunderstorms contain every aviation hazard and must be given a wide berth; flying under, through, or near one in a light airplane is extremely dangerous. They are never safe to penetrate.

32. D — Lose airspeed and sink below the glidepath. Losing a supporting headwind on approach causes a sudden loss of airspeed and a sink below the glidepath. This is a classic windshear hazard requiring an immediate go-around.

33. C — Airspeed indicator. Ice blocking the pitot tube disrupts the ram-air input the airspeed indicator depends on, making it unreliable. The compass, oil pressure, and fuel gauges are unaffected by a pitot blockage.

34. C — A level attitude rather than chasing altitude, at or below V_A. In severe turbulence, the pilot slows to or below V_A and holds a level attitude rather than chasing altitude. Maximum cruise or never-exceed speed would risk structural overstress.

35. A — The intensity and duration of the associated weather. Cold fronts bring brief but intense weather, while warm fronts bring gentler but prolonged weather—the key difference is intensity and duration. Both produce clouds, and neither requires an instrument rating to encounter.

36. C — Preserve the option to turn toward lower terrain. Approaching a ridge at an angle preserves an escape route—the ability to turn away toward lower terrain if downdrafts prevent a climb. A perpendicular, low crossing removes that option.

37. C — The temperature drop within the carburetor reaches freezing despite warm outside air. On warm, humid days the sharp internal temperature drop can reach freezing even though outside air is warm, and the moisture then forms ice. This is why such hazards are not limited to cold days.

38. B — Drift downwind with the prevailing wind. Wingtip vortices sink below the flight path and drift downwind, which is why a following pilot stays above and upwind. They do not rise or remain stationary.

39. A — Delaying or avoiding takeoff and landing in those conditions. Reported or forecast low-level windshear calls for delaying or avoiding takeoff and landing in those conditions. Light aircraft are highly vulnerable, so penetrating the shear is unwise.

40. C — Even a thin layer of ice can be dangerous. For a light-sport airplane with no anti-ice equipment, even a thin layer of ice can dangerously degrade lift and raise stall speed. Ice never improves performance and is not limited to cruise altitude.

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