

# PRACTICE EXAM 10 (60 QS)

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1. In steady, unaccelerated, straight-and-level flight, lift is:

- A. Greater than weight
- B. Equal to weight
- C. Less than thrust

2. According to Newton's third law, a wing generates lift by:

- A. Deflecting air downward, producing an upward reaction
- B. Eliminating all pressure beneath the wing
- C. Compressing air until it solidifies

3. The angle between the wing's chord line and the relative wind is called the:

- A. Pitch attitude
- B. Dihedral angle
- C. Angle of attack

4. A wing stalls when it exceeds its:

- A. Critical angle of attack
- B. Maximum structural cruising speed
- C. Never-exceed speed

5. Parasite drag changes with airspeed in what way?

- A. It decreases as airspeed increases
- B. It increases as airspeed increases
- C. It is unaffected by airspeed

6. Induced drag is greatest at:

- A. Low airspeed and high angle of attack
- B. High airspeed and low angle of attack
- C. Cruise airspeed only

7. The airspeed at which total drag is lowest, providing the best glide, is known as:

- A. L/Dmax (best lift-to-drag ratio)
- B. Never-exceed speed
- C. Maximum flap-extended speed

8. Rotation about the longitudinal axis (roll) is controlled by the:

- A. Rudder
- B. Elevator
- C. Ailerons

9. Rotation about the vertical axis (yaw) is controlled by the:

- A. Ailerons
- B. Rudder
- C. Elevator

10. Static stability is best described as the aircraft's:

- A. Behavior over time after a disturbance
- B. Tendency to oscillate indefinitely
- C. Initial tendency to return after a disturbance

11. A forward center of gravity makes an airplane:

- A. More stable but with a higher stall speed
- B. Less stable with a lower stall speed
- C. Unaffected in stability and stall speed

12. Adverse yaw during a turn is counteracted by:

- A. Adding opposite aileron
- B. Reducing power
- C. Applying coordinated rudder in the direction of the turn

13. A spin requires two conditions to occur: a stalled wing and:

- A. High airspeed
- B. A coordinated turn
- C. Yaw

14. Load factor in a coordinated level turn at  $60^\circ$  of bank is approximately:

- A. 1.0 G
- B. 2.0 G

C. 4.0 G

15. The standard spin recovery sequence (PARE) begins with:

- A. Power to idle
- B. Full aft elevator
- C. Aileron into the spin

16. Ground effect reduces induced drag when the aircraft is within approximately:

- A. Ten wingspans of the surface
- B. Five wingspans of the surface
- C. One wingspan of the surface

17. Wake turbulence is most severe behind an aircraft that is:

- A. Heavy, clean, and slow
- B. Light, dirty, and fast
- C. On the ground at idle power

18. The four left-turning tendencies are most pronounced during:

- A. High-speed cruise
- B. A high-power, high-angle-of-attack climb
- C. A power-off glide

19. Maneuvering speed ( $V_A$ ) as the aircraft's weight decreases:

- A. Decreases
- B. Increases
- C. Remains constant

20. Most training airplanes use which type of engine?

- A. A horizontally opposed, air-cooled, four-stroke reciprocating engine
- B. A two-stroke rotary engine
- C. A turbine jet engine

21. In the four-stroke cycle, the stroke that actually produces power is the:

- A. Intake stroke
- B. Compression stroke
- C. Power stroke

22. Aircraft engines use dual ignition with two magnetos and two spark plugs per cylinder primarily for:

- A. Reduced fuel consumption only
- B. Redundancy and more complete combustion
- C. Lower engine weight

23. Carburetor ice is most likely to form at outside temperatures of:

- A. Below 0°F regardless of humidity
- B. Above 80°F only
- C. 20°F to 70°F with high humidity

24. The first indication of carburetor ice in a fixed-pitch propeller airplane is typically:

- A. An increase in oil pressure
- B. A rise in manifold pressure
- C. A gradual loss of RPM

25. The color of 100LL aviation fuel is:

- A. Green
- B. Blue
- C. Red

26. Detonation in an engine can be caused by:

- A. Using a fuel grade higher than recommended
- B. An excessively rich mixture at idle
- C. Using a fuel grade that is too low or an excessively lean mixture

27. A pilot leans the mixture at altitude primarily to:

- A. Increase fuel flow for more power
- B. Restore the proper fuel-air ratio as air density decreases
- C. Cool the engine by adding fuel

28. Carbon monoxide entering the cabin most commonly comes from:

- A. A crack or leak in the exhaust system feeding the cabin heater
- B. The fuel tank vents

C. Normal propeller operation

29. A constant-speed propeller is controlled by managing:

A. The throttle alone

B. The mixture and throttle only

C. Both the throttle (manifold pressure) and the propeller (RPM)

30. If the alternator fails in flight, the engine will:

A. Stop immediately without electrical power

B. Lose half its power output

C. Continue running because the magnetos are self-powered

31. A vacuum pump failure will most directly affect the:

A. Airspeed indicator and altimeter

B. Attitude indicator and heading indicator

C. Magnetic compass and tachometer

32. Tricycle landing gear is more stable on the ground than tailwheel gear because:

A. It has larger wheels

B. The tailwheel provides better braking

C. The center of gravity is ahead of the main wheels

33. Anti-ice systems are designed to:

- A. Remove ice after it has formed
- B. Prevent ice from forming
- C. Melt ice only after landing

34. Even a thin layer of frost on the wings before takeoff must be removed because it:

- A. Adds significant weight only
- B. Disrupts airflow and increases stall speed
- C. Has no measurable effect on performance

35. Density altitude is best defined as:

- A. The aircraft's height above the terrain
- B. The altitude shown with the local altimeter setting
- C. Pressure altitude corrected for nonstandard temperature

36. Density altitude increases with high elevation, high temperature, and:

- A. High humidity
- B. Low humidity
- C. Increased aircraft weight

37. Takeoff distance at a high density altitude airport will:

- A. Decrease compared to a standard day
- B. Increase compared to a standard day
- C. Remain unchanged

38. The best angle of climb speed ( $V_X$ ) provides:

- A. The most altitude gained per unit of time
- B. The most altitude gained per unit of horizontal distance
- C. The fastest cruise speed

39. The best rate of climb speed ( $V_Y$ ) provides:

- A. The most altitude gained per unit of time
- B. The most altitude gained over the shortest distance
- C. The slowest controllable airspeed

40. The center of gravity is calculated by:

- A. Dividing total moment by total weight
- B. Multiplying total weight by the datum
- C. Subtracting empty weight from gross weight

41. A moment in weight-and-balance calculations equals:

- A. Weight divided by arm
- B. Weight multiplied by arm
- C. Arm divided by weight

42. Being within maximum gross weight but with the CG aft of limits means the loading is:

- A. Legal, since weight is the only requirement
- B. Legal, since CG limits are advisory

C. Illegal and must be corrected before flight

43. An aft CG beyond limits is dangerous because it:

A. Reduces longitudinal stability and can hinder stall recovery

B. Increases the stall speed excessively

C. Requires excessive forward elevator in cruise

44. The center of gravity shifts during flight primarily because:

A. The aircraft's empty weight changes

B. Fuel burns from tanks located at a specific arm

C. The altimeter setting changes

45. On the airspeed indicator, the white arc represents the:

A. Flap operating range

B. Caution range

C. Never-exceed limit

46. The bottom of the green arc on the airspeed indicator marks:

A. The stall speed in a clean configuration ( $V_{S1}$ )

B. The maximum flap-extended speed ( $V_{FE}$ )

C. The never-exceed speed ( $V_{NE}$ )

47. Lift increases with the square of which variable?

- A. Aircraft weight
- B. Air temperature
- C. Airspeed

48. A magneto check showing no RPM drop on one magneto most likely indicates:

- A. A perfectly tuned ignition system
- B. A fouled spark plug improving performance
- C. A grounding problem with that magneto

49. Fuel-injected engines, unlike carbureted engines, are:

- A. More susceptible to carburetor icing
- B. Not subject to carburetor icing
- C. Unable to operate at high altitude

50. Stall speed increases with all of the following EXCEPT:

- A. A decrease in load factor
- B. An increase in aircraft weight
- C. Wing contamination by frost or ice

51. A pilot increasing power with a constant-speed propeller should generally:

- A. Increase propeller RPM first, then throttle (manifold pressure)
- B. Increase throttle first, then reduce RPM
- C. Increase both simultaneously to redline

52. The vertical speed indicator (VSI) has an inherent characteristic of:

- A. Instantaneous, lag-free response
- B. Displaying pitch attitude directly
- C. Lag, because it senses the rate of static-pressure change

53. A high-performance airplane, for endorsement purposes, has an engine of more than:

- A. 180 horsepower
- B. 200 horsepower
- C. 150 horsepower

54. When applying carburetor heat to clear ice, the pilot should expect:

- A. An immediate, permanent increase in RPM
- B. No change in engine operation
- C. A brief additional RPM drop and roughness as ice melts

55. Pressure altitude is the altitude indicated when the altimeter is set to:

- A. The local altimeter setting
- B. 29.92 in. Hg
- C. The field elevation

56. The turn coordinator is typically powered by the:

- A. Electrical system
- B. Vacuum system

C. Pitot-static system

57. A wing's lift can be increased without changing angle of attack by:

- A. Reducing airspeed
- B. Extending flaps to increase camber
- C. Decreasing wing area

58. Riding the brakes during taxi is discouraged because it:

- A. Causes overheating and excessive wear
- B. Improves directional control
- C. Reduces fuel consumption

59. A pilot must interpolate on a performance chart when the actual conditions:

- A. Exactly match a listed row
- B. Are below the chart's minimum values
- C. Fall between two listed values

60. Best glide speed ( $V_G$ ) provides the:

- A. Steepest possible descent angle
- B. Maximum gliding distance for altitude lost
- C. Minimum controllable airspeed

## Answer Key

1. B — In steady, unaccelerated, straight-and-level flight, lift equals weight and thrust equals drag. This equilibrium defines unaccelerated flight; the relationships change in climbs, descents, and turns.
2. A — By Newton's third law, the wing deflects air downward (downwash), and the equal and opposite reaction is an upward force on the wing. This complements Bernoulli's pressure-difference explanation of lift.
3. C — The angle of attack is the angle between the wing's chord line and the relative wind. It is distinct from pitch attitude, which is the nose position relative to the horizon.
4. A — A wing stalls when it exceeds its critical angle of attack, at which airflow separates from the upper surface. This can occur at any airspeed or attitude.
5. B — Parasite drag increases with airspeed, rising with the square of velocity. Induced drag, by contrast, decreases as airspeed increases.
6. A — Induced drag is greatest at low airspeed and high angle of attack, where the wingtip vortices are strongest. This is why induced drag dominates in slow flight and near the stall.
7. A — The airspeed at which total drag is lowest is  $L/D_{max}$ , the best lift-to-drag ratio, which provides the best glide. Flying faster or slower than  $L/D_{max}$  increases total drag.
8. C — Roll about the longitudinal axis is controlled by the ailerons. The elevator controls pitch and the rudder controls yaw.
9. B — Yaw about the vertical axis is controlled by the rudder. The ailerons control roll and the elevator controls pitch.
10. C — Static stability is the aircraft's initial tendency to return to its original condition after a disturbance. Dynamic stability, by contrast, describes the behavior over time.

11. A — A forward center of gravity makes the airplane more stable but raises the stall speed, because the tail must produce more downforce. It also increases approach and landing speeds.

12. C — Adverse yaw is counteracted by applying coordinated rudder in the direction of the turn. The downward-deflected aileron produces extra drag that yaws the nose away from the turn.

13. C — A spin requires both a stalled wing and yaw, which together produce autorotation. Preventing either condition prevents the spin.

14. B — In a coordinated level turn at  $60^\circ$  of bank, the load factor is approximately 2.0 G. Load factor rises sharply beyond  $60^\circ$ , reaching nearly 4 G at  $75^\circ$ .

15. A — The PARE spin recovery begins with power to idle, followed by ailerons neutral, rudder opposite the rotation, and brisk forward elevator. Reducing power and angle of attack are essential to recovery.

16. C — Ground effect reduces induced drag when the aircraft is within approximately one wingspan of the surface. The ground disrupts the wingtip vortices and downwash.

17. A — Wake turbulence is most severe behind a heavy, clean, and slow aircraft, the configuration of a large jet on takeoff or approach. This combination generates the most intense wingtip vortices.

18. B — The four left-turning tendencies are most pronounced during a high-power, high-angle-of-attack climb. This is why right rudder is needed in the climb.

19. A — Maneuvering speed decreases as the aircraft's weight decreases, because a lighter airplane reaches its limiting load factor at a lower speed. The appropriate  $V_A$  is therefore lower when lightly loaded.

20. A — Most training airplanes use a horizontally opposed, air-cooled, four-stroke reciprocating engine. The pistons reciprocate to turn the propeller through the four-stroke cycle.

21. C — In the four-stroke cycle, the power stroke is the one that produces energy, when the ignited mixture forces the piston down. The intake, compression, and exhaust strokes prepare for or clean up after it.
22. B — Dual ignition with two magnetos and two spark plugs per cylinder provides redundancy and more complete combustion. The redundancy keeps the engine running if one system fails, and two plugs burn the mixture more evenly.
23. C — Carburetor ice is most likely at outside temperatures of 20°F to 70°F with high humidity, even on warm days. Fuel vaporization and venturi expansion can drop the internal temperature below freezing.
24. C — The first indication of carburetor ice in a fixed-pitch propeller airplane is a gradual loss of RPM. A constant-speed propeller would instead show a loss of manifold pressure.
25. B — The color of 100LL aviation fuel is blue. Grade 80 is red and grade 100 is green, and using the wrong fuel can be catastrophic.
26. C — Detonation can be caused by using a fuel grade that is too low or an excessively lean mixture, among other factors. These conditions produce uncontrolled, damaging combustion.
27. B — Leaning the mixture at altitude restores the proper fuel-air ratio as air density decreases. Without leaning, the mixture becomes excessively rich, causing roughness and plug fouling.
28. A — Carbon monoxide most commonly enters the cabin from a crack or leak in the exhaust system that feeds the cabin heater. A headache while using cabin heat is a warning sign.
29. C — A constant-speed propeller is controlled by managing both the throttle (manifold pressure) and the propeller control (RPM). A governor adjusts blade pitch to hold the selected RPM.
30. C — If the alternator fails, the engine continues running because the magnetos are self-powered and independent of the electrical system. The pilot must then shed electrical load to conserve the battery.

31. B — A vacuum pump failure most directly affects the vacuum-driven attitude indicator and heading indicator. The electric turn coordinator remains available as a backup.

32. C — Tricycle gear is more stable on the ground because the center of gravity is ahead of the main wheels. This makes the airplane resistant to ground loops, unlike tailwheel aircraft.

33. B — Anti-ice systems prevent ice from forming, such as heated pitot tubes and windshields. De-ice systems, by contrast, remove ice after it has formed.

34. B — Even thin frost on the wings must be removed because it disrupts smooth airflow and increases stall speed. A contaminated wing can dramatically reduce lift and prevent a safe takeoff.

35. C — Density altitude is pressure altitude corrected for nonstandard temperature, representing the air density as an altitude. Aircraft performance corresponds to density altitude, not field elevation.

36. A — Density altitude increases with high elevation, high temperature, and high humidity—the "three Hs." Water vapor is less dense than dry air, so humidity reduces air density.

37. B — Takeoff distance increases at a high density altitude airport because reduced air density lowers engine power, thrust, and lift. The aircraft needs more runway to reach the higher true airspeed required.

38. B — The best angle of climb speed ( $V_X$ ) provides the most altitude gained per unit of horizontal distance, used for obstacle clearance. It is a slower speed producing a steeper climb path.

39. A — The best rate of climb speed ( $V_Y$ ) provides the most altitude gained per unit of time. It is faster than  $V_X$  and is used when no obstacle is a concern.

40. A — The center of gravity is calculated by dividing total moment by total weight. Each item's moment is its weight multiplied by its arm from the datum.

41. B — A moment equals weight multiplied by arm, measuring the turning effect about the datum. Summing moments and dividing by total weight yields the CG.

42. C — A loading within maximum gross weight but with the CG aft of limits is illegal and must be corrected before flight. Both weight and balance must be within limits.
43. A — An aft CG beyond limits reduces longitudinal stability and can make stall recovery difficult or impossible. The elevator may lack authority to lower the nose and reduce the angle of attack.
44. B — The center of gravity shifts during flight because fuel burns from tanks located at a specific arm. The CG must remain within limits throughout the flight, not just at takeoff.
45. A — The white arc on the airspeed indicator represents the flap operating range, from  $V_{S0}$  to  $V_{FE}$ . The green arc is the normal operating range and the yellow arc is the caution range.
46. A — The bottom of the green arc marks  $V_{S1}$ , the stall speed in a clean configuration. The top of the green arc marks  $V_{NO}$ , the maximum structural cruising speed.
47. C — Lift increases with the square of airspeed, so doubling speed roughly quadruples lift. This squared relationship explains why small airspeed changes have large effects.
48. C — No RPM drop on one magneto most likely indicates a grounding problem, meaning the magneto is not being switched off properly. A normal check shows a small drop.
49. B — Fuel-injected engines are not subject to carburetor icing because they have no carburetor venturi. They can, however, experience vapor lock and induction air-intake icing.
50. A — Stall speed increases with greater weight, higher load factor, and wing contamination, but a decrease in load factor lowers stall speed. Reducing load factor reduces the speed at which the critical angle is reached.
51. A — When increasing power with a constant-speed propeller, the pilot increases RPM (propeller) first, then throttle (manifold pressure). This avoids high manifold pressure with low RPM, which stresses the engine.

52. C — The VSI has inherent lag because it senses the rate of static-pressure change over time. It confirms a stabilized climb or descent rate rather than leading an immediate pitch change.

53. B — A high-performance airplane, for endorsement purposes, has an engine of more than 200 horsepower. A complex airplane, by contrast, is defined by its airframe features.

54. C — Applying carburetor heat to clear ice causes a brief additional RPM drop and roughness as the melting ice passes through the engine. This temporary worsening confirms ice was present and is clearing.

55. B — Pressure altitude is the altitude indicated when the altimeter is set to the standard datum of 29.92 in. Hg. Correcting it for temperature yields density altitude.

56. A — The turn coordinator is typically powered by the electrical system, which is why it remains available when the vacuum system fails. The attitude and heading indicators are vacuum-driven.

57. B — Extending flaps increases the wing's camber, raising lift without changing the angle of attack. Flaps also increase drag, which aids in approach and landing.

58. A — Riding the brakes during taxi causes overheating and excessive wear and can mask a problem. Taxi speed should be controlled with the throttle, using brakes only as needed.

59. C — A pilot must interpolate on a performance chart when the actual conditions fall between two listed values. Interpolation estimates the value proportionally between the entries.

60. B — Best glide speed ( $V_G$ ) provides the maximum gliding distance for the altitude lost, corresponding to the best lift-to-drag ratio. Flying faster or slower than  $V_G$  shortens the glide range.