

# PRACTICE EXAM 17 SIMULATION

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1. The four forces acting on an aircraft in flight are lift, weight, thrust, and:

- A. Torque
- B. Inertia
- C. Drag
- D. Momentum

2. In unaccelerated, straight-and-level flight, the four forces are:

- A. All increasing together
- B. Unequal and changing
- C. In equilibrium, with opposing forces balanced
- D. Zero

3. Lift is produced primarily by the:

- A. Engine thrust
- B. Pressure difference between the upper and lower surfaces of the wing
- C. Weight of the aircraft
- D. Tail surfaces

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

- A. Angle of attack
- B. Angle of incidence

- C. Dihedral angle
- D. Pitch attitude

5. A wing always stalls when it exceeds its:

- A. Critical angle of attack
- B. Maximum airspeed
- C. Service ceiling
- D. Maximum weight

6. A stall can occur at any airspeed and any attitude because it depends on:

- A. Engine power only
- B. The aircraft's weight only
- C. Altitude only
- D. The angle of attack exceeding the critical value

7. Induced drag is the drag produced as a by-product of:

- A. Engine operation
- B. Parasite surfaces
- C. Lift, increasing as angle of attack increases
- D. Air friction on the skin

8. Parasite drag includes form drag, skin friction, and interference drag, and it:

- A. Decreases with airspeed
- B. Is unrelated to airspeed

- C. Increases with the square of airspeed
- D. Exists only at low speed

9. Total drag is at a minimum, and the lift-to-drag ratio is at a maximum, at the speed for:

- A. Best glide and maximum endurance of range
- B. Maximum airspeed
- C. Stall
- D. Maximum climb rate only

10. Load factor is the ratio of the:

- A. Total lift to the aircraft's weight
- B. Thrust to the drag
- C. Weight to the wing area
- D. Airspeed to the stall speed

11. In a level turn, as the bank angle increases, the load factor:

- A. Decreases
- B. Remains constant
- C. Becomes zero
- D. Increases

12. A coordinated level turn at a 60-degree bank produces a load factor of approximately:

- A. 1.0 G
- B. 1.5 G

- C. 1.15 G
- D. 2.0 G

13. As load factor increases in a turn, the aircraft's stall speed:

- A. Increases
- B. Decreases
- C. Stays the same
- D. Becomes zero

14. An aircraft's stall speed in a 60-degree bank level turn increases by a factor of about:

- A. 1.07
- B. 1.15
- C. 1.26
- D. 1.41

15. Longitudinal stability refers to stability about the:

- A. Vertical axis (yaw)
- B. Longitudinal axis (roll)
- C. Lateral axis (pitch)
- D. Center of gravity only

16. A statically stable aircraft, when displaced from equilibrium, initially tends to:

- A. Continue diverging
- B. Remain in the new attitude

- C. Oscillate without damping
- D. Return toward its original attitude

17. Loading an aircraft so the center of gravity is at the aft limit generally results in:

- A. Increased stability
- B. Easier stall recovery
- C. Higher stall speed
- D. Reduced longitudinal stability

18. Trim is used to:

- A. Increase the airspeed directly
- B. Relieve control pressures and hold an attitude with minimal input
- C. Replace the elevator
- D. Increase engine power

19. The region of reversed command (the "back side of the power curve") is the flight regime where:

- A. More power is required to fly at a slower airspeed
- B. Less power is needed as speed decreases
- C. Power has no effect
- D. The aircraft cannot be controlled

20. Operating on the back side of the power curve, a pilot who needs to maintain altitude at a low airspeed must:

- A. Add power to maintain altitude as speed decreases
- B. Reduce power

- C. Lower the nose only
- D. Maintain idle power

21. During slow flight on the approach, an aircraft is often operating:

- A. At maximum airspeed
- B. In ground effect only
- C. In or near the region of reversed command
- D. At the service ceiling

22. Ground effect is the reduction in induced drag that occurs when an aircraft is within about one:

- A. Mile of the runway
- B. Wingspan of the surface
- C. Thousand feet of the ground
- D. Minute of touchdown

23. During landing, ground effect can cause the aircraft to:

- A. Float during the flare due to reduced drag
- B. Stall immediately
- C. Climb steeply
- D. Lose all lift

24. During takeoff, becoming airborne in ground effect before reaching adequate climb speed can result in:

- A. An immediate stall on the runway
- B. Excessive climb performance

- C. No effect
- D. Settling back to the runway when leaving ground effect

25. The accumulation of structural icing on a wing:

- A. Disrupts airflow, reduces lift, and increases drag and stall speed
- B. Improves lift
- C. Has no aerodynamic effect
- D. Reduces weight

26. Ice on the airfoil raises the stall speed because it:

- A. Alters the airfoil shape and reduces the critical angle of attack
- B. Reduces the aircraft weight
- C. Increases engine power
- D. Improves the lift-to-drag ratio

27. A pilot encountering airframe icing in instrument conditions should:

- A. Increase the angle of attack
- B. Exit the icing conditions by changing altitude or course
- C. Reduce power to idle
- D. Continue without action

28. Density altitude is pressure altitude corrected for:

- A. Wind
- B. Humidity only

- C. Nonstandard temperature
- D. Magnetic variation

29. High density altitude (hot, high, humid conditions) results in:

- A. Reduced engine power, lift, and climb performance
- B. Improved climb performance
- C. Lower stall speed
- D. Increased air density

30. On a hot day at a high-elevation airport, the true airspeed at a given indicated airspeed will be:

- A. Lower than at sea level
- B. Unchanged
- C. Equal to indicated
- D. Higher than at sea level

31. Maneuvering speed ( $V_A$ ) is the maximum speed at which:

- A. The aircraft can be flown level
- B. The flaps may be extended
- C. Full or abrupt control deflection will not overstress the airframe
- D. The landing gear may be lowered

32. Maneuvering speed decreases as the aircraft's weight:

- A. Decreases
- B. Increases

- C. Stays constant
- D. Doubles only

33. Flying faster than maneuvering speed in turbulence risks:

- A. Better control
- B. Lower stall speed
- C. Structural damage from gust or control loads
- D. Improved stability

34. A spin is an aggravated stall that results in:

- A. A coordinated descent
- B. A level turn
- C. Autorotation, with one wing more stalled than the other
- D. A normal glide

35. Recovery from a spin generally requires the pilot to:

- A. Add full power
- B. Pull back on the elevator
- C. Increase the bank
- D. Reduce power, neutralize ailerons, apply opposite rudder, and break the stall

36. The center of gravity forward of limits makes the aircraft:

- A. Less stable
- B. Prone to spinning

- C. Lighter on the controls
- D. More stable but heavier on the controls and harder to flare

37. As airspeed increases in level flight, the angle of attack required to maintain level flight:

- A. Decreases
- B. Increases
- C. Stays the same
- D. Becomes critical

38. A stall during a coordinated turn, if uncoordinated with excess bottom rudder, may develop into a:

- A. Smooth recovery
- B. Level flight
- C. Climb
- D. Spin

39. The lift-to-drag ratio is maximized at the airspeed that provides the:

- A. Maximum airspeed
- B. Highest climb rate
- C. Best glide distance
- D. Lowest stall speed

40. An aircraft's best glide speed provides the:

- A. Steepest descent
- B. Greatest distance for altitude lost

- C. Fastest descent
- D. Highest airspeed

41. In a power-off glide, flying faster or slower than best glide speed will:

- A. Increase glide distance
- B. Reduce the glide distance
- C. Have no effect
- D. Eliminate drag

42. The total drag curve is the sum of:

- A. Thrust and lift
- B. Weight and lift
- C. Induced drag and parasite drag
- D. Power and airspeed

43. At low airspeeds, the dominant form of drag is:

- A. Parasite drag
- B. Induced drag
- C. Interference drag
- D. Skin friction

44. At high airspeeds, the dominant form of drag is:

- A. Induced drag
- B. Parasite drag

- C. Wave drag only
- D. Lift-induced drag

45. A pilot maintaining altitude while slowing down must continually increase the angle of attack until reaching the:

- A. Maximum airspeed
- B. Best glide speed
- C. Critical angle of attack and stall
- D. Service ceiling

46. Dynamic stability describes the aircraft's tendency, over time, to:

- A. Diverge immediately
- B. Dampen out oscillations and return to equilibrium
- C. Remain displaced
- D. Spin

47. A wing with washout (a twist reducing the angle of incidence toward the tip) is designed so the:

- A. Tip stalls first
- B. Entire wing stalls at once
- C. Wing never stalls
- D. Wing root stalls before the tip, preserving aileron control

48. The stall warning in many aircraft activates based on:

- A. The angle of attack approaching the critical value
- B. The airspeed alone

- C. The engine RPM
- D. The altitude

49. An aircraft loaded beyond its maximum gross weight will experience:

- A. Lower stall speed and better climb
- B. Higher stall speed, reduced climb, and longer takeoff
- C. No change in performance
- D. Improved maneuverability

50. The relationship between lift and angle of attack means that, at a constant airspeed, increasing the angle of attack:

- A. Decreases lift
- B. Has no effect on lift
- C. Increases lift up to the critical angle
- D. Eliminates drag

51. A coordinated turn requires the proper balance of:

- A. Power and flaps
- B. Aileron and rudder, with the inclinometer ball centered
- C. Elevator and trim only
- D. Throttle and mixture

52. A slip during a turn is indicated by the inclinometer ball being displaced to the:

- A. Outside of the turn
- B. Inside of the turn

- C. Center
- D. Top of the instrument

53. Increasing back pressure in a level turn is necessary to:

- A. Reduce the bank
- B. Increase airspeed
- C. Lower the nose
- D. Compensate for the loss of vertical lift component and hold altitude

54. The stall speed published in the aircraft manual assumes:

- A. A turning flight condition
- B. Maximum bank
- C. A specific weight and configuration, typically unaccelerated flight
- D. Idle power in a dive

55. A pilot flying an instrument approach in icing conditions should add a safety margin to the approach speed because ice:

- A. Raises the stall speed and degrades handling
- B. Lowers the stall speed
- C. Improves lift
- D. Has no effect on speed

56. The angle of incidence is the fixed angle between the wing chord line and the:

- A. Relative wind
- B. Aircraft's longitudinal axis

- C. Horizon
- D. Flight path

57. A forward center of gravity increases the:

- A. Tendency to spin
- B. Stall speed slightly and control forces, while improving stability
- C. Climb rate
- D. Maneuverability

58. The primary reason a pilot must respect maneuvering speed in turbulence is that exceeding it:

- A. Reduces lift
- B. Improves control authority
- C. Lowers the stall speed
- D. Allows aerodynamic loads to exceed structural limits

59. When an aircraft enters a stall, the correct initial recovery action is to:

- A. Increase back pressure
- B. Add full aileron
- C. Increase the bank
- D. Reduce the angle of attack by lowering the nose

60. The fundamental aerodynamic principle a pilot must remember is that the wing flies as long as the angle of attack remains:

- A. At the maximum airspeed
- B. Below the critical angle of attack

- C. At the service ceiling
- D. Above the critical angle

## Answer Key

1. C — The four forces are lift, weight, thrust, and drag. Lift opposes weight and thrust opposes drag.
2. C — In unaccelerated straight-and-level flight, the four forces are in equilibrium, with opposing forces balanced. Lift equals weight and thrust equals drag.
3. B — Lift is produced primarily by the pressure difference between the upper and lower surfaces of the wing. The accelerated airflow over the top creates lower pressure.
4. A — The angle between the chord line and the relative wind is the angle of attack. It is distinct from the fixed angle of incidence.
5. A — A wing always stalls when it exceeds its critical angle of attack. This is true regardless of airspeed or attitude.
6. D — A stall depends on the angle of attack exceeding the critical value, so it can occur at any airspeed and attitude. Exceeding the critical angle, not a particular speed, causes the stall.
7. C — Induced drag is a by-product of lift and increases as angle of attack increases. It dominates at low airspeeds.
8. C — Parasite drag increases with the square of airspeed. It dominates at high speeds.
9. A — Total drag is minimum and the lift-to-drag ratio maximum at the speed for best glide and maximum range/endurance. This is the most aerodynamically efficient speed.

10. A — Load factor is the ratio of total lift to the aircraft's weight, expressed in G. In level flight it is 1 G.

11. D — As bank angle increases in a level turn, the load factor increases. More lift is required to maintain altitude in the steeper bank.

12. D — A coordinated level turn at 60 degrees of bank produces about 2.0 G. The load factor rises sharply beyond 45 degrees.

13. A — As load factor increases in a turn, the stall speed increases. The wing must produce more lift, raising the speed at which it stalls.

14. D — In a 60-degree bank level turn (2 G), the stall speed increases by a factor of about 1.41 (the square root of the load factor). This is a significant increase.

15. C — Longitudinal stability is stability about the lateral axis (pitch). It governs the aircraft's pitch behavior.

16. D — A statically stable aircraft initially tends to return toward its original attitude when displaced. This initial response defines positive static stability.

17. D — An aft center of gravity reduces longitudinal stability. It can make the aircraft difficult to control and recover from stalls.

18. B — Trim relieves control pressures and holds an attitude with minimal input. It reduces pilot workload.

19. A — The region of reversed command is where more power is required to fly at a slower airspeed. Induced drag rises sharply at low speed.

20. A — On the back side of the power curve, the pilot must add power to maintain altitude as speed decreases. Lowering the nose alone would lose altitude.

21. C — During slow flight on the approach, the aircraft is often in or near the region of reversed command. Power management is critical there.

22. B — Ground effect is the reduction in induced drag within about one wingspan of the surface. The surface interferes with the wingtip vortices.

23. A — During landing, ground effect can cause the aircraft to float during the flare due to reduced drag. The reduced drag lets it carry energy longer.

24. D — Becoming airborne in ground effect before adequate climb speed can result in settling back to the runway when leaving ground effect. The induced drag returns as the aircraft climbs out of ground effect.

25. A — Structural icing disrupts airflow, reduces lift, and increases drag and stall speed. It can rapidly degrade performance.

26. A — Ice raises the stall speed because it alters the airfoil shape and reduces the critical angle of attack. The contaminated wing stalls at a lower angle and higher speed.

27. B — Encountering airframe icing, the pilot should exit the icing conditions by changing altitude or course. Removing the aircraft from the icing is the priority.

28. C — Density altitude is pressure altitude corrected for nonstandard temperature. High temperature raises density altitude.

29. A — High density altitude reduces engine power, lift, and climb performance. The thinner air degrades all three.

30. D — On a hot day at a high-elevation airport, the true airspeed at a given indicated airspeed is higher than at sea level. The thinner air means the aircraft moves faster for the same indicated reading.

31. C — Maneuvering speed ( $V_A$ ) is the maximum speed at which full or abrupt control deflection will not overstress the airframe. Above it, abrupt inputs can cause structural damage.

32. A — Maneuvering speed decreases as weight decreases. A lighter aircraft reaches its structural limit at a lower speed.

33. C — Flying faster than maneuvering speed in turbulence risks structural damage from gust or control loads.  $V_A$  protects against overstress.

34. C — A spin is an aggravated stall resulting in autorotation, with one wing more stalled than the other. The unequal stall drives the rotation.

35. D — Spin recovery generally requires reducing power, neutralizing ailerons, applying opposite rudder, and breaking the stall. Breaking the stall stops the autorotation.

36. D — A forward center of gravity makes the aircraft more stable but heavier on the controls and harder to flare. Stability increases at the cost of control authority.

37. A — As airspeed increases in level flight, the angle of attack required to maintain level flight decreases. Less angle of attack is needed at higher speed to produce the same lift.

38. D — A stall in an uncoordinated turn with excess bottom rudder may develop into a spin. The yaw at the stall drives autorotation.

39. C — The lift-to-drag ratio is maximized at the speed providing the best glide distance. This is the most efficient gliding speed.

40. B — Best glide speed provides the greatest distance for altitude lost. It maximizes the glide ratio.

41. B — Flying faster or slower than best glide speed reduces the glide distance. Best glide is the single speed for maximum range in a glide.

42. C — The total drag curve is the sum of induced drag and parasite drag. Their sum is minimized at the best L/D speed.

43. B — At low airspeeds, the dominant form of drag is induced drag. It rises sharply as speed decreases and angle of attack increases.

44. B — At high airspeeds, the dominant form of drag is parasite drag. It increases with the square of airspeed.

45. C — Maintaining altitude while slowing requires increasing the angle of attack until reaching the critical angle of attack and stall. Eventually the wing can no longer produce enough lift.

46. B — Dynamic stability describes the tendency, over time, to dampen out oscillations and return to equilibrium. It concerns the time history of the response.

47. D — Washout is designed so the wing root stalls before the tip, preserving aileron control. The tip keeps flying as the root stalls.

48. A — The stall warning activates based on the angle of attack approaching the critical value. It warns before the actual stall, independent of airspeed.

49. B — An overweight aircraft has a higher stall speed, reduced climb, and longer takeoff. Exceeding gross weight degrades performance.

50. C — At constant airspeed, increasing the angle of attack increases lift up to the critical angle. Beyond the critical angle, lift drops and the wing stalls.

51. B — A coordinated turn requires the proper balance of aileron and rudder, with the inclinometer ball centered. The centered ball indicates coordination.

52. B — A slip is indicated by the inclinometer ball displaced to the inside of the turn. The correction is to add rudder toward the ball.

53. D — Increasing back pressure in a level turn compensates for the loss of vertical lift component and holds altitude. The banked lift vector has less vertical component.

54. C — The published stall speed assumes a specific weight and configuration, typically unaccelerated flight. Turning or higher weight raises the actual stall speed.

55. A — In icing conditions, the pilot adds a margin to approach speed because ice raises the stall speed and degrades handling. The extra speed guards against an ice-induced stall.

56. B — The angle of incidence is the fixed angle between the wing chord line and the aircraft's longitudinal axis. Unlike the angle of attack, it does not change in flight.

57. B — A forward center of gravity increases the stall speed slightly and the control forces, while improving stability. The increased download on the tail effectively raises the wing loading.

58. D — Exceeding maneuvering speed in turbulence allows aerodynamic loads to exceed structural limits.  $V_A$  is the speed below which the wing stalls before overstressing.

59. D — The correct initial stall recovery is to reduce the angle of attack by lowering the nose. This restores airflow over the wing.

60. B — The fundamental principle is that the wing flies as long as the angle of attack remains below the critical angle of attack. Exceeding it stalls the wing regardless of speed or attitude.