PRACTICE EXAM 19 SIMULATION

1. The center of gravity (CG) of an aircraft is the point at which the:

A. Fuel is stored

B. Engine is mounted

C. Wings attach to the fuselage

D. Entire weight is considered to be concentrated

2. The arm in weight-and-balance computation is the:

A. Total weight of an item

B. Horizontal distance from the datum to the item

C. Vertical height of an item

D. Fuel quantity

3. The moment of an item is computed by multiplying its weight by its:

A. Volume

B. Arm

C. Density

D. Height

4. The empty weight of an aircraft includes the airframe, engine, and:

A. Fixed equipment and unusable fuel

B. The pilot and passengers

C. All usable fuel

D. The baggage

5. Useful load is the difference between the maximum allowable gross weight and the:

A. Fuel weight

B. Payload

C. Empty weight

D. Zero fuel weight

6. Loading an aircraft so the CG is forward of the forward limit results in:

A. Reduced stability

B. Easier flare on landing

C. Higher control forces and difficulty raising the nose for landing

D. Lower stall speed

7. Loading an aircraft so the CG is aft of the aft limit results in:

A. Increased stability

B. Reduced stability and difficulty recovering from stalls

C. Higher stall speed

D. Easier control

8. A heavily loaded aircraft, compared with a lightly loaded one, has a:

A. Lower stall speed

B. Higher stall speed and longer takeoff roll

C. Better climb rate

D. Shorter takeoff distance

9. As gross weight increases, the aircraft's stall speed:

A. Decreases

B. Stays the same

C. Increases

D. Becomes zero

10. Total moment divided by total weight yields the:

A. Useful load

B. Empty weight

C. Arm

D. CG location

11. A pilot computes a CG that falls within the published forward and aft limits. The aircraft is:

A. Overweight

B. Tail-heavy

C. Nose-heavy

D. Properly loaded for CG

12. Aviation gasoline (avgas) grade 100LL is dyed which color?

A. Blue

B. Green

C. Red

D. Clear

13. Using a lower-than-specified grade of fuel in a piston engine can cause:

A. Improved performance

B. Detonation and engine damage

C. Lower operating temperature

D. Increased range

14. Fuel contamination by water is checked during preflight by:

A. Listening to the engine

B. Draining fuel samples from the sumps

C. Checking the oil level

D. Reading the fuel gauge only

15. Detonation in a piston engine is:

A. An uncontrolled explosion of the fuel-air mixture

B. Normal combustion

C. A cooling process

D. The starting sequence

16. Preignition occurs when the fuel-air mixture ignites:

A. Before the normal timed spark, often from a hot spot

B. After the spark only

C. During shutdown

D. Never during operation

17. Leaning the mixture at altitude is done to:

A. Increase fuel flow

B. Cool the exhaust

C. Enrich the mixture

D. Maintain the proper fuel-air ratio as air density decreases

18. High density altitude reduces engine power because the:

A. Fuel is colder

B. Propeller spins faster

C. Mixture is too rich automatically

D. Air is less dense, reducing the mass of air and oxygen available

19. On a hot, high-elevation day, takeoff performance is degraded, requiring a:

A. Shorter ground roll

B. Steeper climb

C. Longer takeoff roll and reduced climb rate

D. Higher stall speed only

20. True airspeed for a given indicated airspeed increases with altitude because the:

A. Engine produces more power

B. Wings generate more lift

C. Air is less dense at altitude

D. Pitot tube freezes

21. A pilot exceeding the maximum gross weight on takeoff risks:

A. Better climb performance

B. Inability to climb or clear obstacles, and structural overstress

C. A lower stall speed

D. Improved maneuverability

22. The basic empty weight plus the useful load equals the:

A. Zero fuel weight

B. Payload

C. Fuel weight

D. Maximum gross weight (when fully loaded)

23. Aviation gasoline weighs approximately how many pounds per gallon?

A. 6 pounds

B. 8 pounds

C. 7.5 pounds

D. 5 pounds

24. A pilot adding 30 gallons of avgas adds approximately how much weight?

A. 240 pounds

B. 150 pounds

C. 120 pounds

D. 180 pounds

25. Shifting weight aft within an aircraft moves the CG:

A. Forward

B. Down

C. Aft

D. It does not move

26. A forward CG, while increasing stability, also:

A. Reduces the stall speed

B. Increases the stall speed slightly and may lengthen the takeoff

C. Improves climb performance

D. Reduces control forces

27. The effect of a tailwind on takeoff is to:

A. Shorten the ground roll

B. Improve climb

C. Increase the ground roll and reduce performance

D. Lower the stall speed

28. A headwind on takeoff:

A. Lengthens the ground roll

B. Has no effect

C. Reduces climb

D. Shortens the ground roll and improves the climb angle over obstacles

29. An aircraft loaded aft of limits will be:

A. More stable and easy to recover

B. Unstable and difficult to recover from stalls or spins

C. Nose-heavy

D. Slower to stall

30. The maximum range of an aircraft, for a given fuel load, is generally reduced when the aircraft is:

A. Flown at best glide speed

B. Lightly loaded

C. Heavily loaded, requiring more power and fuel

D. At the most efficient altitude

31. A pilot computing weight and balance must ensure both the total weight and the:

A. Fuel grade

B. Oil quantity

C. Tire pressure

D. CG are within limits

32. The datum in weight-and-balance is the:

A. CG location

B. Heaviest point

C. Engine firewall always

D. Reference point from which all arms are measured

33. A station in weight-and-balance refers to a:

A. Location along the aircraft expressed as distance from the datum

B. Fuel type

C. Weight value

D. Moment value

34. A pilot must recompute weight and balance when:

A. The weather changes

B. The loading changes (passengers, baggage, or fuel)

C. The altimeter is set

D. The radio frequency changes

35. Carburetor icing can occur even on warm days because the:

A. Engine is too hot

B. Fuel is contaminated

C. Temperature drop in the carburetor venturi can cause ice to form

D. Mixture is too lean

36. The application of carburetor heat:

A. Routes warm air to the carburetor to melt or prevent ice

B. Increases engine power directly

C. Leans the mixture

D. Cools the engine

37. A fuel injection system, compared with a carburetor, is:

A. More prone to carburetor icing

B. Generally not susceptible to carburetor icing

C. Unable to operate at altitude

D. Dependent on carburetor heat

38. The useful load of an aircraft is consumed by the weight of the:

A. Pilot, passengers, baggage, and usable fuel

B. Airframe only

C. Engine only

D. Empty weight items

39. A pilot loads an aircraft to its maximum gross weight but finds the CG is aft of the aft limit. The pilot should:

A. Depart anyway

B. Add fuel

C. Ignore the CG

D. Redistribute the load to bring the CG within limits

40. The performance charts in the aircraft flight manual provide takeoff and landing distances based on:

A. Fuel grade

B. Oil type

C. Weight, density altitude, wind, and runway conditions

D. Radio equipment

41. As an aircraft burns fuel in flight, its weight decreases and the CG:

A. Always stays the same

B. Always moves forward

C. May shift, depending on the fuel tank location relative to the CG

D. Always moves aft

42. A pilot must use the most current empty weight and CG from the:

A. Aircraft's weight-and-balance records

B. Sectional chart

C. Enroute chart

D. ATIS

43. A pilot flying at high density altitude should expect the true airspeed on approach to be:

A. Lower than indicated

B. Higher than the indicated airspeed

C. Equal to indicated

D. Zero

44. The standard weight used for aviation gasoline in weight-and-balance is approximately:

A. 5 pounds per gallon

B. 8 pounds per gallon

C. 7 pounds per gallon

D. 6 pounds per gallon

45. A pilot adds baggage to the rear baggage compartment, which has a long arm from the datum. This produces a:

A. Small moment change

B. No moment change

C. Forward CG shift

D. Large moment change, shifting the CG aft

46. The maximum landing weight may be lower than the maximum takeoff weight to:

A. Limit structural loads on touchdown

B. Increase range

C. Improve climb

D. Reduce stall speed

47. A pilot computing the CG finds total weight 2,400 pounds and total moment 230,400 pound-inches. The CG is at:

A. 90 inches

B. 100 inches

C. 96 inches

D. 110 inches

48. The most efficient cruise for maximum range is generally flown at the airspeed and altitude that yield the:

A. Highest true airspeed

B. Best lift-to-drag ratio and lowest fuel burn per mile

C. Lowest altitude

D. Maximum power

49. Excess weight degrades nearly every aspect of performance, including:

A. Only the cruise speed

B. Only the stall speed

C. Only the range

D. Takeoff distance, climb rate, cruise, and landing distance

50. A pilot operating from a short runway at high density altitude on a hot day should:

A. Add maximum fuel and passengers

B. Ignore performance charts

C. Reduce weight and consult the performance charts

D. Increase the takeoff weight

51. A pilot must verify fuel quantity visually because fuel gauges:

A. Are always perfectly accurate

B. Read in liters

C. May be inaccurate and are required to be accurate only at empty

D. Are not installed

52. The proper fuel grade for an aircraft is specified in the:

A. Aircraft flight manual or placards

B. Sectional chart

C. Enroute chart

D. Weather report

53. Carburetor heat enriches the mixture because the warmer, less dense air:

A. Increases engine power

B. Cools the cylinders

C. Reduces the mass of air entering the engine for the same fuel flow

D. Leans the mixture

54. A pilot who suspects carburetor ice and applies carb heat may notice a:

A. Permanent power loss

B. No change at all

C. Engine shutdown

D. Brief further drop, then a rise in power as the ice melts

55. The total usable fuel is the fuel available for flight planning, excluding:

A. The unusable fuel that cannot be drawn by the engine

B. The reserve fuel

C. The taxi fuel

D. The alternate fuel

56. A pilot calculating endurance divides the usable fuel by the:

A. Fuel consumption rate

B. True airspeed

C. Aircraft weight

D. Density altitude

57. A pilot finds the aircraft is within weight limits but the CG is slightly forward of the forward limit. The aircraft will:

A. Be unstable

B. Require more elevator force and may be hard to flare

C. Stall at a lower speed

D. Climb better

58. The effect of weight on maneuvering speed (V_A) is that a heavier aircraft has a:

A. Higher maneuvering speed

B. Lower maneuvering speed

C. Maneuvering speed unaffected by weight

D. Zero maneuvering speed

59. A pilot computing the total weight sums the empty weight, the occupants, the baggage, and the:

A. Usable fuel weight

B. Oil temperature

C. Density altitude

D. Wind component

60. The fundamental purpose of weight-and-balance computation is to ensure the aircraft is loaded:

A. For maximum speed

B. Within both weight and CG limits for safe flight

C. With minimum fuel

D. For the shortest route

Answer Key

1. D — The CG is the point at which the entire weight of the aircraft is considered to be concentrated. The aircraft balances about this point.

2. B — The arm is the horizontal distance from the datum to the item. It is measured in inches in most light-aircraft computations.

3. B — The moment of an item is its weight multiplied by its arm. Moments are summed to find the total moment.

4. A — Empty weight includes the airframe, engine, fixed equipment, and unusable fuel. It excludes occupants, baggage, and usable fuel.

5. C — Useful load is the maximum allowable gross weight minus the empty weight. It is the weight available for fuel, occupants, and baggage.

6. C — A CG forward of the forward limit produces higher control forces and difficulty raising the nose for landing. The increased tail download effectively raises required elevator force.

7. B — A CG aft of the aft limit reduces stability and makes stall recovery difficult. An aft CG is the more dangerous out-of-limits condition.

8. B — A heavily loaded aircraft has a higher stall speed and a longer takeoff roll. The greater weight requires more lift and more runway.

9. C — As gross weight increases, the stall speed increases. The wing must produce more lift, raising the stall speed.

10. D — Total moment divided by total weight yields the CG location. This is the basic CG computation.

11. D — A CG within the forward and aft limits means the aircraft is properly loaded for CG. The loading is acceptable for flight.

12. A — Avgas grade 100LL is dyed blue. This color coding helps identify the correct fuel.

13. B — Using a lower-than-specified fuel grade can cause detonation and engine damage. The fuel cannot withstand the engine's compression without detonating.

14. B — Water contamination is checked by draining fuel samples from the sumps during preflight. Water settles to the bottom and appears as droplets or a separate layer.

15. A — Detonation is an uncontrolled explosion of the fuel-air mixture rather than a smooth burn. It can damage the engine.

16. A — Preignition is ignition of the mixture before the normal timed spark, often from a hot spot in the cylinder. It can cause severe engine damage.

17. D — Leaning the mixture at altitude maintains the proper fuel-air ratio as air density decreases. Without leaning, the mixture becomes too rich.

18. D — High density altitude reduces engine power because the less dense air reduces the mass of air and oxygen available for combustion. Less oxygen means less power.

19. C — On a hot, high day, takeoff performance is degraded, requiring a longer takeoff roll and giving a reduced climb rate. The thin air hurts both.

20. C — True airspeed for a given indicated airspeed increases with altitude because the air is less dense. The aircraft moves faster for the same indicated reading.

21. B — Exceeding maximum gross weight risks inability to climb or clear obstacles, and structural overstress. Overweight operation is dangerous and illegal.

22. D — Basic empty weight plus useful load equals the maximum gross weight when fully loaded. The useful load fills the gap between empty and maximum weight.

23. A — Aviation gasoline weighs approximately 6 pounds per gallon. This is the standard figure for weight-and-balance.

24. D — Thirty gallons of avgas at 6 pounds per gallon adds about 180 pounds. Weight equals gallons times 6.

25. C — Shifting weight aft moves the CG aft. The CG moves in the direction of the weight shift.

26. B — A forward CG increases the stall speed slightly and may lengthen the takeoff, while improving stability. The increased tail download raises effective wing loading.

27. C — A tailwind on takeoff increases the ground roll and reduces performance. The aircraft must reach a higher groundspeed to fly.

28. D — A headwind on takeoff shortens the ground roll and improves the climb angle over obstacles. The aircraft reaches flying airspeed at a lower groundspeed.

29. B — An aircraft loaded aft of limits is unstable and difficult to recover from stalls or spins. The aft CG is hazardous.

30. C — Maximum range for a given fuel load is reduced when the aircraft is heavily loaded, since more power and fuel are required. Greater weight increases drag and fuel burn.

31. D — Weight-and-balance must confirm both the total weight and the CG are within limits. Both conditions must be satisfied.

32. D — The datum is the reference point from which all arms are measured. It is established by the manufacturer.

33. A — A station is a location along the aircraft expressed as a distance from the datum. Stations identify where items are placed.

34. B — Weight and balance must be recomputed when the loading changes, such as passengers, baggage, or fuel. Each loading configuration must be checked.

35. C — Carburetor icing can occur even on warm days because the temperature drop in the venturi can cause ice to form. The pressure and fuel-vaporization cooling drop the temperature below freezing.

36. A — Carburetor heat routes warm air to the carburetor to melt or prevent ice. It is the remedy for carburetor icing.

37. B — A fuel injection system is generally not susceptible to carburetor icing. It has no carburetor venturi to form ice.

38. A — The useful load is consumed by the pilot, passengers, baggage, and usable fuel. These are the variable-load items.

39. D — If the CG is aft of the aft limit at max gross weight, the pilot should redistribute the load to bring the CG within limits. Moving weight forward corrects the CG.

40. C — Performance charts provide takeoff and landing distances based on weight, density altitude, wind, and runway conditions. These factors determine the distances.

41. C — As fuel burns, the CG may shift depending on the fuel tank location relative to the CG. The direction of shift depends on where the fuel is carried.

42. A — The pilot uses the most current empty weight and CG from the aircraft's weight-and-balance records. These are updated after equipment changes.

43. B — At high density altitude, the true airspeed on approach is higher than the indicated airspeed. The aircraft is moving faster over the ground for the same indicated speed.

44. D — The standard weight for avgas in weight-and-balance is about 6 pounds per gallon. This is the figure used in loading computations.

45. D — Baggage in a rear compartment with a long arm produces a large moment change, shifting the CG aft. The long arm magnifies the moment.

46. A — Maximum landing weight may be lower than maximum takeoff weight to limit structural loads on touchdown. The landing impact stresses the structure.

47. C — CG equals total moment divided by total weight: 230,400 ÷ 2,400 = 96 inches. The CG is located 96 inches aft of the datum.

48. B — Maximum range is flown at the airspeed and altitude that yield the best lift-to-drag ratio and lowest fuel burn per mile. This is the most efficient cruise condition.

49. D — Excess weight degrades takeoff distance, climb rate, cruise, and landing distance. Nearly every performance parameter suffers.

50. C — Operating from a short runway at high density altitude on a hot day, the pilot should reduce weight and consult the performance charts. Reducing weight and verifying the numbers ensures adequate performance.

51. C — Fuel quantity is verified visually because gauges may be inaccurate and are required to be accurate only at the empty (zero usable) reading. A visual check confirms the actual quantity.

52. A — The proper fuel grade is specified in the aircraft flight manual or on placards. The manufacturer defines the correct fuel.

53. C — Carburetor heat enriches the mixture because the warmer, less dense air reduces the mass of air entering the engine for the same fuel flow. Less air mass with the same fuel makes the mixture richer.

54. D — Applying carb heat with ice present causes a brief further drop, then a rise in power as the ice melts. The melting water passes through the engine before power recovers.

55. A — Total usable fuel excludes the unusable fuel that cannot be drawn by the engine. Only usable fuel is available for flight planning.

56. A — Endurance is computed by dividing the usable fuel by the fuel consumption rate. This yields the time the fuel will last.

57. B — A CG slightly forward of the forward limit requires more elevator force and may make the aircraft hard to flare. The forward CG increases required pitch control force.

58. A — A heavier aircraft has a higher maneuvering speed. The greater weight means the wing stalls (relieving the load) at a higher speed, raising V_A.

59. A — Total weight is the sum of the empty weight, occupants, baggage, and usable fuel weight. These components make up the loaded weight.

60. B — The fundamental purpose of weight-and-balance computation is to ensure the aircraft is loaded within both weight and CG limits for safe flight. Both must be satisfied for safe handling and performance.