

Section A Study Aid Questions

1. The weight of an aircraft, and how that weight is distributed, or balanced, is important for _____ and _____.
2. A heavy aircraft with a small wing will require relatively _____ airspeeds for takeoff.
 - A. High
 - B. Low
 - C. Cannot be determined.
3. Aircraft weight must be considered, as well as the balance point of that weight. An aircraft that is nose heavy will require excessive control deflections, and increased control pressures, to control the aircraft. This results in increased drag and fuel burn.
 - A. True
 - B. False
 - C. Cannot be determined..
4. An aircraft balanced so that the center of gravity, and the center of _____, are close to each other is in optimum balance.
 - A. the fuselage
 - B. the tail
 - C. lift
5. Each aircraft that is manufactured receives a weight and balance report to become part of the?
 - A. Aircraft data plate.
 - B. Aircraft bill of sale.
 - C. Aircraft records.
6. Adding equipment such as radios, or GPS receivers, will require the weight and balance records be?
 - A. Revised to reflect the change.
 - B. Sent to the FAA.
 - C. Discarded.
7. The datum of an aircraft is _____.
 - A. Determined by the owner and may be changed periodically.
 - B. An imaginary vertical plane for reference during weight and balance calculations.
 - C. An acronym for performance increases from various weight changes.
8. The term arm, in relation to weight and balance, is _____.
 - A. A horizontal distance from the datum in inches + or -.
 - B. A vertical distance from the datum to a particular piece of equipment.
 - C. A horizontal distance from the spinner to the front seat.
9. The term moment, in relation to aircraft weight and balance, is?
 - A. The sum of the arm and datum.
 - B. The sum of the weight and the arm.
 - C. The product of the weight and arm.
10. The center of gravity is _____.
 - A. A point on the aircraft, if lifted at that point, an aircraft would hang level.
 - B. The point on the aircraft that represents the sum of the arms.
 - C. The point ahead of the aircraft that measurements are taken from.
11. Maximum, or gross weight, varies from empty weight in that _____.
 - A. Maximum weight includes empty weight and useful load items.
 - B. Maximum weight Cannot be determined..
 - C. Useful load Cannot be determined..

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12. Fuel and baggage are considered part of the _____.
- A. useful load.
 - B. empty weight center of gravity.
 - C. Cannot be determined..
13. Tare weight is subtracted from the weight shown on the scales and usually consists of chocks, jacks or other equipment used to level, or secure, the aircraft.
- A. True
 - B. False
 - C. Cannot be determined..
14. The most important reason for performing a weight and balance procedure on an aircraft is _____.
- A. determining tare weight.
 - B. determining gross weight.
 - C. determining empty weight and empty weight center of gravity.
15. Calculating the _____ for each scale reading is the most practical way to determine aircraft weight and balance.
- A. arm length
 - B. moment sum
 - C. moment value
16. To determine center of gravity the following formula is used:
- A. total arm \times total weight
 - B. total moment \div total weight
 - C. total moment \times total weight
17. Center of gravity is defined as the point that all _____ are equal.
- A. arms
 - B. moments
 - C. datums
18. One location for weight and balance information, for a particular aircraft, is the Type Certificate Data Sheets.
- A. True
 - B. False
 - C. Cannot be determined..
19. Aircraft maximum, or gross weight, must be known to safely operate an aircraft and can usually be found in the Type Certificate Data Sheets.
- A. True
 - B. False
 - C. Cannot be determined..
20. Two types of scales are used to weigh aircraft. What are they?
- A. Motorized and linear.
 - B. Mechanical and electronic.
 - C. Scales are not commonly used in aviation.
21. Load cell scales are commonly found to be the platform type and placed on top of the aircraft _____.
- A. fuselage
 - B. wing
 - C. jacks
22. The aircraft must be _____ in order to perform weighing operations.
- A. level
 - B. fully loaded
 - C. outside

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23. Unusable fuel is included in the aircraft empty weight.
- A. True
 - B. False
 - C. Cannot be determined.
24. _____ weigh an aircraft with partially filled fuel tanks.
- A. Never
 - B. Always
 - C. Sometimes
25. Typical aircraft weighing points are _____.
- A. wings, tail, and fuselage.
 - B. jack locations, or tires in the case of platform type scales.
 - C. fuselage only.
26. A center of gravity range is the forward and aft limits within which the aircraft must balance.
- A. True
 - B. False
 - C. Cannot be determined.
27. An equipment change from an older, heavier radio to a newer light weight system will require _____.
- A. the aircraft be test flown to determine adverse handling conditions.
 - B. the pilot to be notified in writing within 30 days.
 - C. the aircraft weight and balance records be updated accordingly.
28. Ballast may be used in an aircraft to obtain the desired balance condition for safe operation. Ballast may be temporary or permanent in nature.
- A. True
 - B. False
 - C. Cannot be determined.
29. Helicopters have _____ and _____ center of gravity limits.
- A. fore and aft
 - B. vertical and horizontal
 - C. longitudinal and lateral
30. _____ is used when establishing center of gravity for aircraft with tapered and/or swept back wings.
- A. Mean aerodynamic chord
 - B. Mean average span
 - C. Percent constant chord

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Section B

Knowledge Application Questions

1. A tail-wheel type aircraft is placed on scales for weighing and leveled. The weight of the tail stand is 25 pounds and it is placed on top of the rear scale. The rear scale reads 235 pounds. What is the actual tail weight used in the weight and balance calculations?
2. A pilot fuels and loads an aircraft for a cross country trip. He finds when doing the weight and balance calculations that the aircraft is out of the safe center of gravity (CG) range forward. The pilot moves some baggage towards the tail of the aircraft. Will this help or hinder the proper CG location?
3. A UAS with tricycle landing gear is weighed and the following results obtained: Nose wheel 274 pounds, left main gear 435 pounds, and right main gear 434 pounds. The datum is ahead of the aircraft 14 inches. It is 34 inches from the datum to the nose wheel and 67 inches from the nose wheel to the main gear. What is the empty weight center of gravity?
4. The UAS in question 3 is then fueled for flight with 50 gallons of gasoline. The fuel tank is 55 inches aft of the datum. What is the new center of gravity for the UAS?
5. A light aircraft weighs 2,767 pounds empty weight and the center of gravity is 34 inches aft of the leading edge of the wing. The datum is the firewall which is 48 inches ahead of the leading edge. A new engine is installed that weighs 23 pounds less than the old engine. The engine weight is centered 22 inches ahead of the firewall. What is the new empty weight CG?
6. The empty weight CG of a helicopter is found to be out of limits to the rear of the aircraft according to the Type Certificate. What must be done prior to flight of this helicopter?
7. What two things must be known about a piece of equipment that is removed or added from an aircraft in order to perform weight and balance calculations?
8. An autonomous crop spraying aircraft has a tank capacity of 200 gallons of water. The tank is located on the center of gravity of the aircraft. The aircraft gross weight is 4356 pounds. All the spray is applied to the field. What effect does this have on CG and how much does the aircraft now weigh?

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9. An aircraft technician removes 2 radios from a light aircraft. The radios weigh 7 pounds each. The datum of the aircraft is the leading edge of the wing. The empty weight CG of the aircraft is 26.76 inches aft of the datum. The total empty weight of the aircraft is 2556 pounds. What is the new empty weight CG for this aircraft?
10. Utilizing the graph below, a loaded aircraft weighs 2,230 pounds and has a moment of 92,000 in-lbs. Is this aircraft safe for flight in the Normal Category?

