AIRCRAFT WEIGHT & BALANCE PRACTICE TEST (SAMPLE)

STUDY GUIDE

SAMPLE STUDY GUIDE WITH LIMITED QUESTIONS

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Introduction

Preparing for a certification exam can feel overwhelming, but with the right tools, it becomes an opportunity to build confidence, sharpen your skills, and move one step closer to your goals. At Examzify, we believe that effective exam preparation isn't just about memorization, it's about understanding the material, identifying knowledge gaps, and building the test-taking strategies that lead to success.

This guide was designed to help you do exactly that.

Whether you're preparing for a licensing exam, professional certification, or entry-level qualification, this book offers structured practice to reinforce key concepts. You'll find a wide range of multiple-choice questions, each followed by clear explanations to help you understand not just the right answer, but why it's correct.

The content in this guide is based on real-world exam objectives and aligned with the types of questions and topics commonly found on official tests. It's ideal for learners who want to:

- Practice answering questions under realistic conditions,
- Improve accuracy and speed,
- Review explanations to strengthen weak areas, and
- Approach the exam with greater confidence.

We recommend using this book not as a stand-alone study tool, but alongside other resources like flashcards, textbooks, or hands-on training. For best results, we recommend working through each question, reflecting on the explanation provided, and revisiting the topics that challenge you most.

Remember: successful test preparation isn't about getting every question right the first time, it's about learning from your mistakes and improving over time. Stay focused, trust the process, and know that every page you turn brings you closer to success.

Let's begin.

How to Use This Guide

This guide is designed to help you study more effectively and approach your exam with confidence. Whether you're reviewing for the first time or doing a final refresh, here's how to get the most out of your Examzify study guide:

1. Start with a Diagnostic Review

Skim through the questions to get a sense of what you know and what you need to focus on. Your goal is to identify knowledge gaps early.

2. Study in Short, Focused Sessions

Break your study time into manageable blocks (e.g. 30 – 45 minutes). Review a handful of questions, reflect on the explanations.

3. Learn from the Explanations

After answering a question, always read the explanation, even if you got it right. It reinforces key points, corrects misunderstandings, and teaches subtle distinctions between similar answers.

4. Track Your Progress

Use bookmarks or notes (if reading digitally) to mark difficult questions. Revisit these regularly and track improvements over time.

5. Simulate the Real Exam

Once you're comfortable, try taking a full set of questions without pausing. Set a timer and simulate test-day conditions to build confidence and time management skills.

6. Repeat and Review

Don't just study once, repetition builds retention. Re-attempt questions after a few days and revisit explanations to reinforce learning. Pair this guide with other Examzify tools like flashcards, and digital practice tests to strengthen your preparation across formats.

There's no single right way to study, but consistent, thoughtful effort always wins. Use this guide flexibly, adapt the tips above to fit your pace and learning style. You've got this!

Questions

1. LEMAC and TEMAC are defined in terms of distance from which reference point?

A. From the datum.

B. From the wing leading edge.

C. From the tail.

D. From the aircraft center of gravity.

2. Which of the following statements correctly describes the calculation to obtain CG when weights are at multiple stations?

A. CG = total weight ÷ total moment

B. CG = sum of moments ÷ total weight

C. CG = total moment ÷ total weight

D. CG = average of weights

3. The maximum weight of an aircraft is defined as which of the following?

A. Empty weight plus useful load.

B. Empty weight plus fuel.

C. Basic empty weight plus payload.

D. Maximum takeoff weight minus basic empty weight.

4. If you distribute weight toward the mid-arms, what happens to CG position?

A. Move CG toward the tail

B. Move CG toward the forward limit

C. Move CG toward the middle of the aircraft, near the center CG

D. Move CG does not change

5. What is the purpose of a CG envelope in flight operations?

A. To determine allowed engine configurations

B. To schedule fuel stops

C. To visualize safe combinations of weight and CG for safe operation

D. To set landing gear retraction schedules

6. How is the moment for a given weight and its location determined?

A. Moment = weight × arm

B. Moment = weight × distance from datum

C. Moment = weight ÷ arm

D. Moment = arm − weight

7. Which reference point does a CG location expressed as a percentage of MAC relate to when measuring distance?

A. LEMAC

B. Datum

C. MAC

D. Wing root

8. If the datum is placed at the nose rather than the firewall, what is the effect on the sign of all measurement arms?

A. All measurement arms will be in positive numbers.

B. All measurement arms will be in negative numbers.

C. Arms will be zero.

D. Arms become undefined.

9. Residual fuel is defined as the fuel remaining in which parts after draining?

A. The fuel remaining in the tanks after draining

B. The fuel remaining in the tanks, lines, and engine after draining

C. The fuel that cannot be burned

D. The fuel used in flight

10. In weight and balance, which unit is used for weight?

A. Pounds (lb)

B. Kilograms

C. Newtons

D. Tons

Answers

1. A
2. C
3. A
4. C
5. C
6. A
7. A
8. A
9. B
10. A

Explanations

1. LEMAC and TEMAC are defined in terms of distance from which reference point?

A. From the datum.

B. From the wing leading edge.

C. From the tail.

D. From the aircraft center of gravity.

In weight and balance, all arm measurements are taken from a fixed reference point called the datum. LEMAC (Leading Edge Mean Aerodynamic Chord) and TEMAC are defined by their distances from that datum, which sets the reference line for locating the leading-edge positions on the wing and tail used in moment calculations. The datum is the zero point; the CG is not used as the reference for these measurements but is the outcome you determine from the computed moments. So the correct understanding is that LEMAC and TEMAC are defined in terms of distance from the datum.

2. Which of the following statements correctly describes the calculation to obtain CG when weights are at multiple stations?

A. CG = total weight ÷ total moment

B. CG = sum of moments ÷ total weight

C. CG = total moment ÷ total weight

D. CG = average of weights

When weights are at multiple stations, the center of gravity is the distance from the reference datum where the entire aircraft's weight could be considered to act. You determine it by using moments. A moment is produced by each weight times its arm (the distance from the datum). Add up all those individual moments to get the total moment. Then divide that total moment by the sum of all weights (the total weight). The result is the CG location. In other words, CG equals total moment divided by total weight. This reflects the idea that the CG is the weighted average position of all the weights. For example, if you have two weights: one of 100 units at an arm of 5 units, and another of 50 units at an arm of 15 units, the total moment is 100×5 + 50×15 = 500 + 750 = 1250. The total weight is 150. The CG is 1250 ÷ 150 ≈ 8.33 units from the datum. Dividing total weight by total moment would give an inverse quantity with units of 1/length, not a distance. Averaging weights alone ignores how far each weight is from the datum, so it doesn't locate CG.

3. The maximum weight of an aircraft is defined as which of the following?

A. Empty weight plus useful load.

B. Empty weight plus fuel.

C. Basic empty weight plus payload.

D. Maximum takeoff weight minus basic empty weight.

Maximum takeoff weight is the most the airplane is certified to weigh for a safe takeoff. It is found by adding the weight of the aircraft in its empty condition to the useful load, which is the weight of everything it's allowed to carry—payload (people, baggage, cargo) and usable fuel. So empty weight plus useful load equals the maximum takeoff weight. The other options miss a required component or mix up what's being added, for example excluding payload, excluding fuel, or subtracting BEW from MTOW to get only the usable load.

4. If you distribute weight toward the mid-arms, what happens to CG position?

A. Move CG toward the tail

B. Move CG toward the forward limit

C. Move CG toward the middle of the aircraft, near the center CG

D. Move CG does not change

Distributing weight toward the mid-arms shifts the balance point toward the aircraft's center. The center of gravity is the weighted average location of all loads, so placing more weight near the center pulls that average toward the center of the aircraft. In practice, moving weight away from the forward or aft extremes toward the middle reduces the moments those extreme weights contribute, causing the CG to move inward, toward the middle near the aircraft's center of gravity. It won't move toward the tail or toward the forward limit unless weight is actually moved in those directions, and it will change as soon as weight is redistributed.

5. What is the purpose of a CG envelope in flight operations?

A. To determine allowed engine configurations

B. To schedule fuel stops

C. To visualize safe combinations of weight and CG for safe operation

D. To set landing gear retraction schedules

The CG envelope is all about keeping the airplane controllable and within safe structural limits by restricting how it can be loaded. It maps the permissible combinations of total weight and forward or aft center of gravity, showing the regions where the airplane has enough longitudinal stability and enough elevator authority to fly safely, take off, maneuver, and land. Sticking inside this envelope ensures you won't end up with a weight distribution that makes the aircraft nose-heavy or tail-heavy, which could lead to excessive stick forces, loss of control authority, or reaching structural limits. It also accounts for how weight shifts during phases of flight (fuel burn, payload changes) and for different configurations (such as flaps or gear down), so loading plans, fuel planning, and preflight weight/ balance calculations all aim to keep the aircraft within these boundaries. This concept isn't about choosing engine configurations, planning fuel stops, or scheduling landing gear retraction—the envelope specifically defines safe weight and CG combinations for flight.

6. How is the moment for a given weight and its location determined?

A. Moment = weight × arm

B. Moment = weight × distance from datum

C. Moment = weight ÷ arm

D. Moment = arm − weight

Moment is the turning effect produced by a weight about a reference point. For weight placed somewhere in the airplane, the moment about the datum is found by multiplying the weight (a force) by how far that weight's line of action is from the datum—the lever arm. That distance is defined as the arm. So the moment equals weight times arm. This directly expresses the rotational effect: a larger weight or a longer arm increases the moment, while a shorter arm or lighter weight reduces it. In practice, you'll see moments added together to get total moment, and then total weight and CG are found from those totals. For example, 2000 lb located 6 ft from the datum produces a moment of 12,000 ft-lb. The other forms don't match how moment is defined or yield nonsensical units, so they aren't used.

7. Which reference point does a CG location expressed as a percentage of MAC relate to when measuring distance?

A. LEMAC

B. Datum

C. MAC

D. Wing root

When CG is expressed as a percentage of the mean aerodynamic chord (MAC), the distance is measured from the Leading Edge of the MAC (the LEMAC) along the MAC to the CG, then divided by the MAC length and multiplied by 100. This reference from the LEMAC provides a consistent, aerodynamically meaningful scale for comparing balance across different aircraft and wings. The LEMAC is the starting point because the MAC represents the spanwise distribution of aerodynamic forces, and using its leading edge as the zero point keeps the percent-of-MAC value meaningful regardless of wing shape or size. Other references like the datum or wing root are used for raw arm computations, but they do not define the percent-of-MAC CG location.

8. If the datum is placed at the nose rather than the firewall, what is the effect on the sign of all measurement arms?

A. All measurement arms will be in positive numbers.

B. All measurement arms will be in negative numbers.

C. Arms will be zero.

D. Arms become undefined.

When you choose a datum, the arm is the distance from that datum to the weight station, and its sign follows the direction from the datum to the item. If the datum is at the nose, every load station is behind the datum (aft). Distances measured aft are taken as positive, so all measurement arms become positive values. There are no items forward of the datum to create negative arms, hence every arm stays positive.

9. Residual fuel is defined as the fuel remaining in which parts after draining?

A. The fuel remaining in the tanks after draining

B. The fuel remaining in the tanks, lines, and engine after draining

C. The fuel that cannot be burned

D. The fuel used in flight

Residual fuel is the fuel that remains in the entire fuel system after draining, including the tanks, the lines, and the engine. This accounts for fuel that can stay trapped in pipelines and combustion components even after a draining procedure, and it matters in weight and balance because it adds to the aircraft's remaining weight and can affect center of gravity. The option that includes tanks, lines, and engine captures all parts of the fuel system that can retain fuel after draining, making it the correct definition. The other descriptions are incomplete or off the mark: only tanks misses the fuel that remains in lines and the engine; describing it as fuel that cannot be burned doesn't fit how residual fuel is defined for draining purposes; and the fuel used in flight is what is consumed, not what stays behind after draining.

10. In weight and balance, which unit is used for weight?

A. Pounds (lb)

B. Kilograms

C. Newtons

D. Tons

In weight and balance, weight is tracked in the unit that represents the force of gravity on an object, and in aviation practice the standard for this in the U.S. is pounds. The word "pounds" here refers to pounds-force as the weight value used for items like fuel, passengers, and baggage, and it aligns with the customary moment calculations (inch-pounds) and the widely used W&B forms. Kilograms measure mass, not weight, so they aren't the conventional unit for weight in this context. Newtons are the SI unit of force, which isn't the standard for typical U.S. weight-and-balance charts, and tons are simply too large for most aircraft weights.

Next Steps

Congratulations on reaching the final section of this guide. You've taken a meaningful step toward passing your certification exam and advancing your career.

As you continue preparing, remember that consistent practice, review, and self-reflection are key to success. Make time to revisit difficult topics, simulate exam conditions, and track your progress along the way.

If you need help, have suggestions, or want to share feedback, we'd love to hear from you. Reach out to our team at hello@examzify.com.

Or visit your dedicated course page for more study tools and resources:

https://aircraftweightandbal.examzify.com

We wish you the very best on your exam journey. You've got this!