

# PRACTICE EXAM 14 (60 QS)

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1. An aircraft has an empty weight of 1,600 lb with a moment of 64,000 lb-in. A pilot weighing 180 lb sits at arm 37.0 in. What is the running total moment?

- A. 70,660 lb-in
- B. 64,180 lb-in
- C. 66,660 lb-in

2. Using the figures from Question 1 (total weight 1,780 lb, total moment 70,660 lb-in), what is the CG location?

- A. 39.7 in
- B. 41.5 in
- C. 37.0 in

3. A runway is aligned to a magnetic heading of  $184^\circ$ . What is its runway number?

- A. 19
- B. 17
- C. 18

4. An airplane stalls at 60 knots in level (1 G) flight. In a  $60^\circ$  banked level turn (2.0 G), its stall speed becomes approximately:

- A. 85 knots
- B. 120 knots
- C. 60 knots

5. A flight of 210 nautical miles is flown at a groundspeed of 140 knots. The time en route is:

- A. 1 hour 30 minutes
- B. 1 hour 15 minutes
- C. 2 hours 0 minutes

6. An airplane burns 10 gph. For a 3-hour flight plus the 30-minute day VFR reserve, the minimum fuel required is:

- A. 30.0 gallons
- B. 35.0 gallons
- C. 33.0 gallons

7. A true course is  $100^\circ$ . With a  $12^\circ$  right wind correction angle,  $4^\circ$ E variation, and  $3^\circ$ W deviation, the compass heading is:

- A.  $105^\circ$
- B.  $111^\circ$
- C.  $119^\circ$

8. A baggage item weighing 30 lb sits at an arm of 90 in. Its moment is:

- A. 2,700 lb-in
- B. 1,350 lb-in
- C. 3,000 lb-in

9. Maximum gross weight is 2,450 lb; empty weight is 1,550 lb. The useful load is:

- A. 1,100 lb

- B. 1,000 lb
- C. 900 lb

10. Converting a true heading of  $070^\circ$  to magnetic with  $8^\circ W$  variation gives:

- A.  $078^\circ$
- B.  $062^\circ$
- C.  $070^\circ$

11. A pilot must cover 300 nautical miles in 2.5 hours. The required groundspeed is:

- A. 120 knots
- B. 100 knots
- C. 150 knots

12. In a coordinated level turn at  $45^\circ$  of bank, the load factor is approximately:

- A. 2.0 G
- B. 1.0 G
- C. 1.41 G

13. An aircraft departs with 48 gallons usable fuel and burns 12 gph. Ignoring reserves, its endurance is:

- A. 4 hours
- B. 3 hours
- C. 6 hours

14. Total loaded weight is 2,000 lb and total moment is 86,000 lb-in. The CG is:

- A. 40.0 in
- B. 45.0 in
- C. 43.0 in

15. A direct crosswind component of a 20-knot wind blowing at exactly  $90^\circ$  to the runway is:

- A. 0 knots
- B. 20 knots
- C. 10 knots

16. A flight planned for 2 hours 30 minutes burns fuel at 9 gph. The fuel burned en route (excluding reserves) is:

- A. 18.0 gallons
- B. 22.5 gallons
- C. 27.0 gallons

17. Density altitude rises about 120 ft per  $^\circ\text{C}$  above standard. For a temperature  $15^\circ\text{C}$  above standard, density altitude increases approximately:

- A. 1,800 ft
- B. 1,200 ft
- C. 900 ft

18. A runway marked "36" is aligned with which magnetic heading?

- A.  $036^\circ$
- B.  $180^\circ$
- C.  $360^\circ$

19. A true airspeed of 120 knots with a direct 30-knot headwind yields a groundspeed of:

- A. 150 knots
- B. 90 knots
- C. 120 knots

20. Maximum certificated takeoff weight is 2,300 lb; the aircraft is loaded to 2,180 lb. How much more weight may be added?

- A. 200 lb
- B. 80 lb
- C. 120 lb

21. A true course of  $045^\circ$  with  $6^\circ\text{E}$  variation gives a magnetic course of:

- A.  $039^\circ$
- B.  $051^\circ$
- C.  $045^\circ$

22. A pilot computes a CG of 34.0 in. The approved range is 35.0 to 47.3 in. The loading is:

- A. Within limits near the aft edge
- B. Outside limits, forward of the forward limit
- C. Within limits near center

23. An airplane glides 2.0 nautical miles per 1,000 ft of altitude lost in still air. From 5,000 ft AGL, its glide range is about:

- A. 5.0 nautical miles

- B. 10.0 nautical miles
- C. 15.0 nautical miles

24. Converting a magnetic heading of  $200^\circ$  to compass with  $4^\circ\text{E}$  deviation gives:

- A.  $204^\circ$
- B.  $200^\circ$
- C.  $196^\circ$

25. A flight covers 120 nautical miles in 48 minutes. The groundspeed is:

- A. 150 knots
- B. 120 knots
- C. 100 knots

26. Standard sea-level pressure in the International Standard Atmosphere is:

- A. 14.7 in. Hg
- B. 29.92 in. Hg
- C. 1,013 in. Hg

27. A pilot adds 40 gallons of fuel (6 lb/gal) at arm 48 in. The added moment is:

- A. 11,520 lb-in
- B. 1,920 lb-in
- C. 8,640 lb-in

28. An aircraft's  $V_{S0}$  is 50 knots and  $V_{FE}$  is 100 knots. These values mark the boundaries of which arc?

- A. The green arc
- B. The yellow arc
- C. The white arc

29. Total moment is 90,000 lb-in and CG is 45.0 in. The total weight is:

- A. 4,050 lb
- B. 1,800 lb
- C. 2,000 lb

30. A 1°C decrease below standard temperature at a fixed pressure altitude causes density altitude to:

- A. Increase
- B. Decrease
- C. Remain unchanged

31. A 360-nautical-mile flight at a groundspeed of 120 knots takes:

- A. 2 hours 30 minutes
- B. 3 hours 0 minutes
- C. 3 hours 30 minutes

32. Maneuvering speed ( $V_A$ ) published at gross weight is 110 knots. At a lighter weight, the appropriate  $V_A$  is:

- A. Higher than 110 knots
- B. Unchanged at 110 knots
- C. Lower than 110 knots

33. A true airspeed of 90 knots into a 15-knot headwind yields a groundspeed of:

- A. 75 knots
- B. 105 knots
- C. 90 knots

34. Two rear passengers weighing 320 lb total sit at arm 73 in. Their combined moment is:

- A. 23,360 lb-in
- B. 4,380 lb-in
- C. 18,250 lb-in

35. A pressure altitude of 6,000 ft with a temperature 25°C warmer than standard produces a density altitude that is:

- A. Lower than 6,000 ft
- B. Equal to 6,000 ft
- C. Higher than 6,000 ft

36. An aircraft climbs from 2,000 ft to 8,000 ft at 600 ft per minute. The time to climb is:

- A. 10 minutes
- B. 12 minutes
- C. 6 minutes

37. The bottom of the green arc on an airspeed indicator represents:

- A.  $V_{S1}$ , the clean stall speed
- B.  $V_{FE}$ , max flap-extended speed

C.  $V_{NE}$ , never-exceed speed

38. A 60-nautical-mile leg flown at 120 knots groundspeed takes:

A. 45 minutes

B. 60 minutes

C. 30 minutes

39. A true course of  $360^\circ$  with an  $8^\circ$  left wind correction angle gives a true heading of:

A.  $008^\circ$

B.  $352^\circ$

C.  $360^\circ$

40. Empty weight is 1,400 lb; maximum ramp weight is 2,200 lb. With 45 gallons of fuel (6 lb/gal) aboard, the remaining useful load for occupants and baggage is:

A. 800 lb

B. 530 lb

C. 270 lb

41. A flight burns 12 gph and is planned for 2.5 hours. With the 45-minute night VFR reserve, the minimum fuel required is:

A. 39.0 gallons

B. 30.0 gallons

C. 45.0 gallons

42. A wing produces 1,200 lb of lift at 50 knots. If airspeed increases by a factor of about 1.41 (to roughly 71 knots) at the same angle of attack, lift becomes approximately:

- A. 1,200 lb
- B. 2,400 lb
- C. 4,800 lb

43. An aircraft at 8,500 ft MSL over terrain elevation 1,500 ft MSL is at what height AGL?

- A. 10,000 ft AGL
- B. 1,500 ft AGL
- C. 7,000 ft AGL

44. A loaded aircraft has total weight 2,200 lb and total moment 92,400 lb-in. The CG is:

- A. 40.0 in
- B. 42.0 in
- C. 44.0 in

45. A flight plan shows 100 nautical miles remaining at a groundspeed of 100 knots. The time remaining is:

- A. 1 hour 0 minutes
- B. 1 hour 40 minutes
- C. 0 hours 50 minutes

46. Converting a true heading of  $120^\circ$  to a magnetic heading in an area of  $5^\circ$  westerly variation gives:

- A.  $125^\circ$

- B. 120°
- C. 115°

47. A 36-gallon usable fuel load burned at 9 gph yields an endurance (ignoring reserves) of:

- A. 3 hours
- B. 4 hours
- C. 5 hours

48. Moving 40 lb of baggage from arm 40 in to arm 100 in in a 2,400-lb airplane shifts the CG (weight-shift) by about:

- A. 0.5 in aft
- B. 1.0 in aft
- C. 2.0 in aft

49. Standard sea-level temperature in the International Standard Atmosphere is:

- A. 0°C
- B. 25°C
- C. 15°C

50. A 90-nautical-mile flight at 180 knots groundspeed takes:

- A. 30 minutes
- B. 45 minutes
- C. 60 minutes

51. A 50-gallon usable fuel load burned at 10 gph yields an endurance (ignoring reserves) of:

- A. 3 hours
- B. 4 hours
- C. 5 hours

52. A pilot must get at least 70% of 60 scored questions correct to pass. That is:

- A. 40 questions
- B. 45 questions
- C. 42 questions

53. A direct tailwind of 25 knots added to a 95-knot true airspeed yields a groundspeed of:

- A. 70 knots
- B. 120 knots
- C. 95 knots

54. An aircraft cruises 140 knots TAS with a 40-knot direct headwind over 200 nautical miles. The time en route is:

- A. 1 hour 25 minutes
- B. 1 hour 43 minutes
- C. 2 hours 0 minutes

55. A loaded aircraft has total weight 1,900 lb and total moment 80,750 lb-in. The CG is:

- A. 40.0 in
- B. 42.5 in
- C. 44.0 in

56. A pilot climbs at 800 ft per minute from field elevation 600 ft to a cruise altitude of 7,000 ft. The time to reach cruise is:

- A. 6 minutes
- B. 10 minutes
- C. 8 minutes

57. Parallel runways 09L and 09R are aligned with approximately which magnetic heading?

- A. 270°
- B. 009°
- C. 090°

58. A flight of 75 nautical miles flown in 30 minutes has a groundspeed of:

- A. 150 knots
- B. 75 knots
- C. 100 knots

59. Fuel weight for 35 gallons of avgas (6 lb/gal) is:

- A. 175 lb
- B. 210 lb
- C. 245 lb

60. A true course of 270° with a 10° left wind correction angle gives a true heading of:

- A. 270°
- B. 260°

C. 280°

## ANSWER KEY WITH EXPLANATIONS

1. A — Moment equals weight times arm, so the empty-weight moment (64,000) plus the pilot's moment ( $180 \times 37 = 6,660$ ) totals 70,660 lb-in. Summing moments is the first step in locating the CG.
2. A — CG equals total moment divided by total weight:  $70,660 \div 1,780 = 39.7$  in. Dividing the summed moment by the summed weight yields the balance point.
3. C — Runway numbers are the magnetic alignment rounded to the nearest 10° with the last zero dropped, so 184° rounds to 180° and becomes runway 18. The painted number reflects the runway's magnetic heading.
4. A — Stall speed increases with the square root of load factor, so at 2.0 G it is  $60 \times \sqrt{2} \approx 85$  knots. This is why steep turns raise the speed at which the wing stalls.
5. A — Time equals distance divided by groundspeed:  $210 \div 140 = 1.5$  hours, or 1 hour 30 minutes. Groundspeed is the correct value for time over the ground.
6. B — Fuel equals burn rate times time: 3 hours  $\times$  10 = 30 gallons en route, plus the 30-minute (0.5-hour) day reserve  $\times$  10 = 5 gallons, totaling 35 gallons. Day VFR requires the destination fuel plus a 30-minute reserve.
7. B — Apply each correction: true course 100 + 12° right WCA = 112° true heading; subtract 4°E variation = 108° magnetic; add 3°W deviation = 111° compass. "East is least, west is best" governs the signs.
8. A — Moment equals weight times arm:  $30 \times 90 = 2,700$  lb-in. Items far from the datum produce large moments even at modest weight.

9. C — Useful load equals maximum gross weight minus empty weight:  $2,450 - 1,550 = 900$  lb. This is the weight available for fuel, occupants, and baggage.

10. A — Converting a true heading to magnetic with westerly variation means adding ("west is best"):  $070 + 8 = 078^\circ$  magnetic. Westerly variation is always added when going from true to magnetic.

11. A — Required groundspeed equals distance divided by time:  $300 \div 2.5 = 120$  knots. Solving the time-speed-distance relationship for speed gives the needed groundspeed.

12. C — In a coordinated level turn at  $45^\circ$  of bank, the load factor is approximately 1.41 G. Load factor rises with bank angle, reaching 2.0 G at  $60^\circ$ .

13. A — Endurance equals usable fuel divided by burn rate:  $48 \div 12 = 4$  hours. Ignoring reserves, this is the maximum time the fuel supports.

14. C — CG equals total moment divided by total weight:  $86,000 \div 2,000 = 43.0$  in. The division yields the balance point.

15. B — A wind blowing at exactly  $90^\circ$  to the runway is a pure crosswind, so its full 20 knots is the crosswind component (and the headwind component is zero). The crosswind component equals the wind speed when the angle is  $90^\circ$ .

16. B — Fuel burned equals rate times time: 2 hours 30 minutes is 2.5 hours, and  $2.5 \times 9 = 22.5$  gallons. Converting minutes to a decimal fraction of an hour is essential.

17. A — Using about 120 ft of density-altitude change per  $^\circ\text{C}$ ,  $15^\circ\text{C}$  above standard raises density altitude roughly  $15 \times 120 = 1,800$  ft. Hotter-than-standard temperatures increase density altitude.

18. C — A runway numbered "36" is aligned with a magnetic heading of  $360^\circ$  (the number times 10). Runway numbers represent the magnetic alignment in tens of degrees.

19. B — Groundspeed with a direct headwind equals true airspeed minus the wind:  $120 - 30 = 90$  knots. A headwind reduces groundspeed, increasing time over the ground.

20. C — Additional allowable weight equals maximum takeoff weight minus current weight:  $2,300 - 2,180 = 120$  lb. Loading must never exceed the certificated maximum.
21. A — Converting a true course to magnetic with easterly variation means subtracting ("east is least"):  $045 - 6 = 039^\circ$  magnetic. Easterly variation is always subtracted from true.
22. B — A CG of 34.0 in falls below the forward limit of 35.0 in, so the loading is outside limits, forward of the forward limit. Both weight and CG must be within published limits, and this loading must be corrected.
23. B — Glide range equals the glide ratio times altitude:  $2.0 \text{ nm per } 1,000 \text{ ft} \times 5,000 \text{ ft} = 10.0$  nautical miles in still air. Best glide speed maximizes this distance per unit of altitude lost.
24. C — Converting a magnetic heading to compass with easterly deviation means subtracting ("east is least"):  $200 - 4 = 196^\circ$  compass. Deviation follows the same east-subtract, west-add rule.
25. A — Groundspeed equals distance divided by time:  $120 \text{ nm} \div 0.8 \text{ hour (48 minutes)} = 150$  knots. Converting 48 minutes to 0.8 hour is necessary before dividing.
26. B — Standard sea-level pressure in the International Standard Atmosphere is 29.92 in. Hg (1013.2 millibars). This is the standard datum to which the altimeter is set to read pressure altitude.
27. A — Fuel weight is  $40 \times 6 = 240$  lb, and its moment is  $240 \times 48 = 11,520$  lb-in. Fuel must be converted from gallons to pounds before computing its moment.
28. C — The white arc spans from  $V_{S0}$  (50 knots) to  $V_{FE}$  (100 knots), the flap operating range. The green arc, by contrast, is the normal operating range.
29. C — Total weight equals total moment divided by CG:  $90,000 \div 45.0 = 2,000$  lb. Rearranging the CG formula solves for the unknown weight.

30. B — Air colder than standard at a fixed pressure altitude is denser, which lowers density altitude and improves performance. Cooler-than-standard temperatures always decrease density altitude.

31. B — Time equals distance divided by groundspeed:  $360 \div 120 = 3$  hours. The straightforward time-speed-distance relationship gives the en route time.

32. C — Maneuvering speed decreases as weight decreases, because a lighter aircraft reaches its limiting load factor at a lower speed. At reduced weight the appropriate  $V_A$  is lower than the gross-weight figure.

33. A — Groundspeed with a direct headwind equals true airspeed minus the wind:  $90 - 15 = 75$  knots. A headwind reduces groundspeed, increasing time over the ground.

34. A — Moment equals weight times arm:  $320 \times 73 = 23,360$  lb-in. The combined passenger weight at the rear-seat arm produces this moment for the balance computation.

35. C — A temperature  $25^\circ\text{C}$  warmer than standard makes the air less dense, producing a density altitude higher than the 6,000-ft pressure altitude. Warmer-than-standard conditions raise density altitude above the pressure altitude.

36. A — Time to climb equals altitude change divided by climb rate:  $(8,000 - 2,000) \div 600 = 10$  minutes. Dividing the altitude to be gained by the rate gives the climb time.

37. 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.

38. C — Time equals distance divided by groundspeed:  $60 \div 120 = 0.5$  hour, or 30 minutes. Converting the decimal hour to minutes gives the leg time.

39. B — A left wind correction angle is subtracted from the course to find the true heading:  $360 - 8 = 352^\circ$ . The pilot crabs left into the wind, pointing the nose left of the desired course to hold the ground track.

40. B — Fuel weighs  $45 \times 6 = 270$  lb; useful load is  $2,200 - 1,400 = 800$  lb; subtracting fuel leaves  $800 - 270 = 530$  lb for occupants and baggage. Fuel must be accounted for before allocating the remaining useful load.

41. A — Fuel equals rate times time:  $2.5$  hours  $\times 12 = 30$  gallons en route, plus the 45-minute (0.75-hour) night reserve  $\times 12 = 9$  gallons, totaling 39.0 gallons. Night VFR requires destination fuel plus a 45-minute reserve.

42. B — Lift varies with the square of airspeed, so increasing speed by a factor of 1.41 ( $\sqrt{2}$ ) multiplies lift by about 2:  $1,200 \times 2 = 2,400$  lb. A roughly 41% speed increase doubles lift.

43. C — Height AGL equals MSL altitude minus terrain elevation:  $8,500 - 1,500 = 7,000$  ft AGL. Subtracting ground elevation from MSL altitude gives height above the surface.

44. B — CG equals total moment divided by total weight:  $92,400 \div 2,200 = 42.0$  in. The division locates the balance point.

45. A — Time equals distance divided by groundspeed:  $100 \div 100 = 1$  hour. When distance and groundspeed are equal, the time is exactly one hour.

A — Converting a true heading to a magnetic heading with westerly variation means adding the variation, per "west is best":  $120 + 5 = 125^\circ$ . Easterly variation, by contrast, would be subtracted ("east is least").

47. B — Endurance equals usable fuel divided by burn rate:  $36 \div 9 = 4$  hours. Ignoring reserves, this is the maximum time the fuel supports.

48. B — The weight-shift formula gives the CG change as weight moved times distance moved divided by total weight:  $40 \times (100 - 40) \div 2,400 = 2,400 \div 2,400 = 1.0$  in aft. Moving weight rearward shifts the CG aft proportionally.

49. C — Standard sea-level temperature in the International Standard Atmosphere is  $15^\circ\text{C}$  ( $59^\circ\text{F}$ ). This is the baseline temperature used in performance and density-altitude calculations.

50. A — Time equals distance divided by groundspeed:  $90 \div 180 = 0.5$  hour, or 30 minutes. Converting the decimal hour to minutes yields the leg time.

51. C — Endurance equals usable fuel divided by burn rate:  $50 \div 10 = 5$  hours. Ignoring reserves, this is the maximum endurance.

52. C — Seventy percent of 60 questions is  $0.70 \times 60 = 42$  questions, the passing threshold for the PAR exam. A pilot must answer at least 42 of the 60 scored questions correctly.

53. B — Groundspeed with a direct tailwind equals true airspeed plus the wind:  $95 + 25 = 120$  knots. A tailwind increases groundspeed, shortening time over the ground.

54. C — Groundspeed equals TAS minus headwind:  $140 - 40 = 100$  knots; time equals  $200 \div 100 = 2$  hours. The headwind must be subtracted before computing time over the ground.

55. B — CG equals total moment divided by total weight:  $80,750 \div 1,900 = 42.5$  in. The division locates the balance point.

56. C — Time to climb equals altitude change divided by climb rate:  $(7,000 - 600) \div 800 = 8$  minutes. Dividing the altitude to be gained by the climb rate gives the time to reach cruise.

57. C — Parallel runways 09L and 09R are aligned with a magnetic heading of approximately  $090^\circ$  (the number times 10). The L and R designate left and right of the parallel pair.

58. A — Groundspeed equals distance divided by time:  $75 \text{ nm} \div 0.5 \text{ hour (30 minutes)} = 150$  knots. Converting 30 minutes to 0.5 hour is necessary before dividing.

59. B — Fuel weight equals gallons times 6 lb/gal:  $35 \times 6 = 210$  lb. Avgas weighs approximately 6 pounds per gallon, a standard figure for weight-and-balance.

60. B — A left wind correction angle is subtracted from the course to find true heading:  $270 - 10 = 260^\circ$ . The pilot crabs left into the wind, pointing the nose left of the desired course.