PRACTICE EXAM 23 SIMULATION

1. A GPS receiver determines its position by measuring the distance to multiple satellites using:

A. Signal strength

B. Doppler shift only

C. Magnetic bearing

D. The travel time of the satellite signals

2. The minimum number of satellites a GPS receiver needs to compute a three-dimensional position and time is:

A. Four

B. Three

C. Two

D. Five

3. RAIM stands for:

A. Radar-Assisted Integrity Module

B. Random Access Integrity Method

C. Receiver Autonomous Integrity Monitoring

D. Range And Inertial Monitoring

4. RAIM provides the GPS user with:

A. A faster position fix

B. Stronger signals

C. More satellites

D. An independent check on the integrity of the position solution

5. RAIM generally requires at least how many satellites to detect a faulty signal?

A. Five

B. Four

C. Three

D. Six

6. To both detect and exclude a faulty satellite (fault detection and exclusion, FDE), a receiver generally needs at least:

A. Six satellites

B. Four satellites

C. Five satellites

D. Three satellites

7. WAAS (Wide Area Augmentation System) improves basic GPS by providing:

A. More satellites in orbit

B. Correction signals that improve accuracy and integrity

C. Stronger radio transmissions

D. A backup magnetic reference

8. A WAAS receiver typically does not require a separate RAIM prediction because it:

A. Continuously monitors integrity through the augmentation system

B. Uses fewer satellites

C. Cannot fly approaches

D. Relies on ground NAVAIDs

9. Before commencing a GPS approach with a non-WAAS receiver, the pilot must:

A. Verify RAIM availability for the approach

B. Disable the moving map

C. Set the transponder to standby

D. Tune an ILS as a mandatory backup

10. A RAIM prediction performed during flight planning checks whether:

A. The transponder will reply

B. The ILS will be available

C. Sufficient satellite geometry will support the approach at the planned time

D. The database is the correct region

11. If a non-WAAS receiver annunciates "RAIM not available" while approaching the final approach fix, the pilot should:

A. Discontinue the GPS approach and use an alternate means of navigation

B. Continue the approach ignoring it

C. Reset the transponder

D. Descend below the MDA to acquire the runway

12. A current navigation database is required for IFR GPS approaches because an expired database may contain:

A. Incorrect transponder codes

B. Reversed CDI sensing

C. Faulty altimeter settings

D. Outdated procedures, waypoints, or frequencies

13. The navigation database in an IFR GPS unit is typically updated on what cycle?

A. Weekly

B. Daily

C. Annually

D. Every 28 days

14. A pilot finds the GPS navigation database has expired. For IFR approaches, the pilot:

A. May use it without restriction

B. Generally may not fly GPS approaches with the expired database

C. May use it above 18,000 feet only

D. May use it if RAIM is available

15. GPS interference or jamming that may affect navigation is announced to pilots through:

A. AIRMETs

B. SIGMETs

C. NOTAMs for GPS testing and interference

D. Convective outlooks

16. A pilot planning a flight through an area of scheduled GPS interference testing should:

A. Be prepared to revert to ground-based navigation

B. Cancel the flight

C. Climb above the interference

D. Disable the transponder

17. A complete loss of GPS navigation in a GPS-equipped aircraft requires the pilot to:

A. Continue using the failed GPS

B. Squawk 1200

C. Climb to regain satellites

D. Revert to ground-based navigation and advise ATC

18. A GPS receiver that loses a satellite and is left with exactly four can still compute a position but may lose:

A. The moving map

B. Communication

C. The ability to tune the ILS

D. RAIM fault-detection capability

19. The integrity monitoring required for IFR GPS use exists to:

A. Detect a faulty signal that could mislead the aircraft, especially at low altitude

B. Increase signal strength

C. Reduce the satellite count

D. Replace the navigation database

20. WAAS broadcasts its correction signals using:

A. The ILS localizer

B. A network of ground reference stations and geostationary satellites

C. The VOR network

D. Marker beacons

21. A WAAS-capable receiver supports which approach line of minimums with vertical guidance to near-ILS values?

A. LNAV

B. LNAV+V

C. Circling

D. LPV

22. A pilot must verify that the GPS receiver is operating in the correct mode for the phase of flight, since the receiver's sensitivity changes between:

A. Day and night

B. VFR and IFR

C. Enroute, terminal, and approach modes

D. High and low altitude only

23. As a GPS-equipped aircraft transitions from enroute to the approach phase, the CDI sensitivity:

A. Decreases

B. Increases (becomes more sensitive)

C. Remains constant

D. Reverses

24. A pilot loading a GPS approach should verify that the receiver has sequenced to the correct:

A. Transponder code

B. Approach and initial fix

C. Communication frequency

D. Altimeter setting

25. The "RAIM" function differs from WAAS integrity monitoring in that RAIM is:

A. Always more accurate

B. Provided by ground stations

C. Performed autonomously within the receiver using satellite geometry

D. Only available above 18,000 feet

26. A pilot using a non-WAAS GPS for an approach finds RAIM is predicted to be unavailable at the ETA. The pilot should:

A. Fly the approach anyway

B. Ignore the prediction

C. Plan an alternate means of navigation or a different approach

D. Disable RAIM

27. GPS provides position information that is:

A. Limited to line-of-sight of a ground station

B. Worldwide, continuous, and all-weather, independent of ground stations

C. Available only in daylight

D. Dependent on VOR coverage

28. A pilot must confirm the GPS database covers the:

A. Aircraft's weight

B. Geographic region of the flight

C. Transponder code

D. Fuel quantity

29. A pilot experiencing a GPS RAIM annunciation during the enroute phase should:

A. Continue ignoring it

B. Descend immediately

C. Squawk 7600

D. Cross-check position with other navigation sources and be prepared to revert

30. The number of satellites required increases from position-only to RAIM to FDE, reflecting the need for:

A. Faster fixes

B. Lower cost

C. Redundancy to detect and exclude faults

D. Stronger signals

31. A pilot relying solely on GPS without a backup navigation capability is vulnerable to:

A. A single point of failure if GPS is lost or jammed

B. Improved reliability

C. Lower workload always

D. Better integrity

32. A WAAS receiver downgrades from LPV to LNAV minimums if:

A. The database expires

B. Vertical guidance integrity becomes unavailable

C. The transponder fails

D. The aircraft descends

33. When the WAAS approach downgrades, the applicable minimums:

A. Increase (the higher LNAV minimums apply)

B. Decrease

C. Stay the same

D. Are eliminated

34. The pilot should check GPS NOTAMs before flight to learn of:

A. Weather only

B. Runway closures only

C. Fuel prices

D. Scheduled GPS outages, testing, or interference

35. A GPS position solution using only three satellites can provide:

A. A full 3D position and time

B. A 2D position but not a reliable altitude/time solution

C. RAIM

D. FDE

36. A pilot must ensure the aircraft's GPS is approved for IFR use, which requires it to meet the standards of:

A. A handheld VFR GPS

B. A tablet application

C. The appropriate TSO and installation approval

D. A consumer navigation app

37. A handheld or tablet GPS is not approved for IFR navigation because it:

A. Is too expensive

B. Uses different satellites

C. Cannot display a map

D. Lacks the certification, integrity monitoring, and installation approval

38. A pilot flying an RNAV (GPS) approach who loses RAIM after the FAF should:

A. Continue to the MDA

B. Descend below the MDA

C. Execute the missed approach unless visual with the runway, per the receiver annunciation and procedure

D. Ignore the annunciation

39. The fundamental advantage of WAAS over basic GPS for approaches is that WAAS enables:

A. Vertically guided approaches (LPV/LNAV-VNAV) with the integrity to support them

B. More satellites

C. Lower cost

D. A magnetic backup

40. A pilot must verify the currency of the database by checking the:

A. Transponder

B. Database effective and expiration dates displayed by the unit

C. Fuel gauge

D. Altimeter

41. A pilot's responsibility when GPS becomes unreliable is to:

A. Continue on GPS

B. Squawk 1200

C. Land immediately

D. Use available ground-based navigation and notify ATC

42. The geostationary satellites used by WAAS:

A. Replace the GPS constellation

B. Broadcast correction and integrity data to WAAS receivers

C. Provide the position fix directly

D. Are part of the ILS

43. A pilot may use GPS as a substitute for ADF or DME under IFR if the GPS is:

A. A handheld unit

B. A VFR-only unit

C. Properly installed and approved for IFR

D. Disabled

44. A pilot loading an approach into an IFR GPS should brief and verify the:

A. Fuel load

B. Weight and balance

C. Waypoints, sequence, and minimums against the chart

D. Transponder code

45. The reason RAIM requires more satellites than a basic fix is that the extra satellite(s):

A. Increase signal strength

B. Allow the receiver to check the consistency of the position and detect a fault

C. Reduce the cost

D. Improve the display

46. A pilot experiencing intermittent GPS signal loss in an area of known interference should:

A. Continue and hope it clears

B. Disable the transponder

C. Climb above the weather

D. Switch to ground-based navigation and report the interference to ATC

47. GPS integrity is essential on an instrument approach because an undetected position error could:

A. Lead the aircraft off the protected path toward terrain or obstacles

B. Increase fuel burn

C. Improve accuracy

D. Strengthen the signal

48. A pilot must recognize that a current database alone does not guarantee a usable approach; the pilot must also have:

A. Adequate satellite coverage/integrity (RAIM or WAAS) at the time

B. A handheld backup

C. A higher altitude

D. A faster aircraft

49. The transition of CDI sensitivity in a GPS unit from enroute (wide) to approach (narrow) is analogous to the increasing sensitivity of:

A. A VOR over distance

B. The magnetic compass

C. The altimeter

D. A localizer near the runway

50. A pilot planning to use a GPS approach at the destination and the alternate, in a WAAS aircraft, may:

A. Never use GPS at the alternate

B. Use GPS only above FL180

C. Plan GPS approaches at both with appropriate planning

D. Use GPS only with a co-located VOR

51. A non-WAAS aircraft planning an alternate with only GPS approaches must:

A. File it without restriction

B. Ensure RAIM availability and observe the applicable restrictions

C. Use the alternate only in VFR

D. Disregard the alternate requirement

52. A pilot whose GPS database is current but who receives a RAIM warning on approach should understand that:

A. The database currency overrides the RAIM warning

B. The approach is unaffected

C. The integrity of the position cannot be assured, so the approach should not be continued on GPS

D. The transponder is faulty

53. The most basic GPS failure mode a pilot must be ready for is:

A. Total loss of GPS guidance, requiring reversion to other navigation

B. A stronger signal

C. Improved accuracy

D. A database that is too current

54. A pilot must monitor the GPS for annunciations such as "LOI" (loss of integrity), which indicate:

A. The database is current

B. The receiver can no longer assure the integrity of the position

C. The signal is strong

D. The approach is precision

55. The WAAS correction signal accounts for errors such as:

A. Ionospheric delay and satellite clock/orbit errors

B. The aircraft's weight

C. Wind

D. Magnetic variation

56. A pilot must treat the GPS as one component of the navigation system and maintain:

A. A faster cruise

B. A lighter aircraft

C. Awareness and a backup plan if GPS is lost

D. A current weather report only

57. A pilot who flies an RNAV (GPS) approach must ensure the receiver is in the approach mode, indicated by:

A. The transponder code

B. The communication frequency

C. The altimeter setting

D. The receiver annunciation and increased CDI sensitivity

58. A pilot encountering a GPS outage NOTAM affecting the destination approach should:

A. Ignore it

B. Cancel IFR

C. Plan a non-GPS approach or alternate as appropriate

D. Disable the transponder

59. The reason FDE is valuable is that it allows the receiver to not only detect but also:

A. Increase the satellite count

B. Exclude the faulty satellite and continue navigating

C. Strengthen the signal

D. Update the database

60. The fundamental principle of GPS integrity for IFR is that the system must be able to:

A. Increase accuracy without limit

B. Replace all ground navigation

C. Operate without satellites

D. Detect and warn the pilot of a position error that could be hazardous

Answer Key

1. D — A GPS receiver determines position by measuring the travel time of the satellite signals. The travel times yield the distances used to compute position.

2. A — A GPS receiver needs at least four satellites to compute a three-dimensional position and time. The fourth resolves the timing solution.

3. C — RAIM stands for Receiver Autonomous Integrity Monitoring. It is the receiver's self-check on position integrity.

4. D — RAIM provides an independent check on the integrity of the position solution. It warns the pilot if the position may be unreliable.

5. A — RAIM generally requires at least five satellites to detect a faulty signal. A sixth is needed to exclude the fault.

6. A — Fault detection and exclusion (FDE) generally requires at least six satellites. Five suffices for detection alone.

7. B — WAAS improves basic GPS by providing correction signals that improve accuracy and integrity. This enables vertically guided approaches.

8. A — A WAAS receiver continuously monitors integrity through the augmentation system, so a separate RAIM prediction is generally not required. The augmentation provides the integrity assurance.

9. A — Before a non-WAAS GPS approach, the pilot must verify RAIM availability for the approach. Without RAIM the integrity cannot be assured.

10. C — A RAIM prediction checks whether sufficient satellite geometry will support the approach at the planned time. It verifies integrity-monitoring availability.

11. A — A "RAIM not available" annunciation approaching the FAF requires discontinuing the GPS approach and using an alternate means of navigation. Continuing without integrity is not permitted.

12. D — A current database is required because an expired one may contain outdated procedures, waypoints, or frequencies. Stale data could mislead the approach.

13. D — The IFR GPS navigation database is typically updated every 28 days. This matches the chart revision cycle.

14. B — With an expired database, the pilot generally may not fly GPS approaches. The database must be current for IFR approaches.

15. C — GPS interference or jamming is announced through NOTAMs for GPS testing and interference. Pilots check these in planning.

16. A — Planning through scheduled GPS interference, the pilot should be prepared to revert to ground-based navigation. A backup capability is essential.

17. D — A complete loss of GPS requires reverting to ground-based navigation and advising ATC. Continuing on the failed unit is inappropriate.

18. D — With exactly four satellites, the receiver can compute a position but may lose RAIM fault-detection capability, which needs five. Integrity monitoring requires the extra satellites.

19. A — Integrity monitoring exists to detect a faulty signal that could mislead the aircraft, especially at low altitude on approach. This is what makes GPS legal for IFR.

20. B — WAAS broadcasts its correction signals using a network of ground reference stations and geostationary satellites. Ground stations measure error and the corrections are uplinked.

21. D — A WAAS-capable receiver supports the LPV line of minimums with vertical guidance to near-ILS values. LPV is the most capable WAAS line.

22. C — The receiver's sensitivity changes between enroute, terminal, and approach modes, so the pilot must verify the correct mode. The CDI scaling tightens toward the approach.

23. B — Transitioning from enroute to approach, the CDI sensitivity increases (becomes more sensitive). The tighter scaling supports the precision of the approach.

24. B — Loading a GPS approach, the pilot verifies the receiver has sequenced to the correct approach and initial fix. Correct sequencing ensures the right procedure is flown.

25. C — RAIM is performed autonomously within the receiver using satellite geometry, unlike WAAS which uses ground stations and satellites. RAIM is self-contained.

26. C — With RAIM predicted unavailable at the ETA, the pilot plans an alternate means of navigation or a different approach. The approach cannot rely on unavailable integrity.

27. B — GPS provides worldwide, continuous, all-weather position information independent of ground stations. This independence is a key advantage.

28. B — The pilot must confirm the GPS database covers the geographic region of the flight. The correct regional coverage is required.

29. D — A RAIM annunciation enroute calls for cross-checking position with other navigation sources and being prepared to revert. The pilot verifies and prepares a backup.

30. C — The increasing satellite requirement from position to RAIM to FDE reflects the need for redundancy to detect and exclude faults. More satellites enable the integrity functions.

31. A — Relying solely on GPS without a backup is vulnerable to a single point of failure if GPS is lost or jammed. A backup capability mitigates this.

32. B — A WAAS receiver downgrades from LPV to LNAV if the vertical guidance integrity becomes unavailable. The loss of vertical integrity removes the LPV line.

33. A — When the WAAS approach downgrades, the higher LNAV minimums apply, so the applicable minimums increase. The pilot must use the higher minimums.

34. D — GPS NOTAMs are checked to learn of scheduled GPS outages, testing, or interference. These affect GPS availability.

35. B — A three-satellite solution can provide a 2D position but not a reliable altitude/time solution. A fourth satellite is needed for a full 3D fix.

36. C — An IFR-approved GPS must meet the appropriate TSO and installation approval. Certification and approval distinguish it from consumer units.

37. D — A handheld or tablet GPS is not IFR-approved because it lacks the certification, integrity monitoring, and installation approval. It may not be used for IFR navigation.

38. C — Losing RAIM after the FAF, the pilot executes the missed approach unless visual with the runway, per the annunciation and procedure. The integrity loss requires the go-around.

39. A — The fundamental WAAS advantage is enabling vertically guided approaches (LPV/LNAV-VNAV) with the integrity to support them. WAAS provides both the guidance and the integrity.

40. B — Database currency is verified by checking the effective and expiration dates displayed by the unit. The dates confirm the database is current.

41. D — When GPS becomes unreliable, the pilot uses available ground-based navigation and notifies ATC. Reversion and notification are the response.

42. B — The geostationary satellites broadcast correction and integrity data to WAAS receivers. They do not replace the GPS constellation or provide the fix directly.

43. C — GPS may substitute for ADF or DME under IFR if it is properly installed and approved for IFR. The installation and approval are required.

44. C — Loading an approach, the pilot briefs and verifies the waypoints, sequence, and minimums against the chart. This confirms the correct procedure.

45. B — RAIM requires extra satellites so the receiver can check the consistency of the position and detect a fault. The redundancy enables the integrity check.

46. D — Intermittent GPS loss in known interference calls for switching to ground-based navigation and reporting the interference to ATC. Reversion and reporting are appropriate.

47. A — GPS integrity is essential on approach because an undetected position error could lead the aircraft off the protected path toward terrain or obstacles. Integrity protects the approach path.

48. A — A current database alone does not guarantee a usable approach; the pilot must also have adequate satellite coverage/integrity (RAIM or WAAS) at the time. Both currency and integrity are needed.

49. D — The GPS CDI sensitivity transition from enroute to approach is analogous to the increasing sensitivity of a localizer near the runway. Both tighten the scaling as the runway nears.

50. C — A WAAS aircraft may plan GPS approaches at both the destination and the alternate with appropriate planning. WAAS provides the supporting integrity.

51. B — A non-WAAS aircraft planning a GPS-only alternate must ensure RAIM availability and observe the applicable restrictions. RAIM provides the non-WAAS integrity.

52. C — A RAIM warning on approach means the integrity of the position cannot be assured, so the approach should not be continued on GPS, regardless of database currency. Integrity, not currency, governs the approach.

53. A — The most basic GPS failure mode is total loss of GPS guidance, requiring reversion to other navigation. The pilot must be ready to navigate without GPS.

54. B — An "LOI" (loss of integrity) annunciation indicates the receiver can no longer assure the integrity of the position. The pilot must not rely on the GPS position then.

55. A — The WAAS correction signal accounts for errors such as ionospheric delay and satellite clock/orbit errors. Correcting these improves accuracy and integrity.

56. C — The pilot must treat GPS as one component and maintain awareness and a backup plan if GPS is lost. Over-reliance without a backup is the hazard.

57. D — The approach mode is indicated by the receiver annunciation and increased CDI sensitivity. These confirm the receiver is configured for the approach.

58. C — A GPS outage NOTAM affecting the destination approach calls for planning a non-GPS approach or alternate as appropriate. The pilot adapts to the outage.

59. B — FDE is valuable because it allows the receiver to detect and also exclude the faulty satellite and continue navigating. Exclusion preserves navigation after a fault.

60. D — The fundamental principle of GPS integrity for IFR is that the system must detect and warn the pilot of a position error that could be hazardous. Integrity is the ability to alert the pilot to an unsafe error.