

PRACTICE EXAM 29 SIMULATION

1. What principle does a VOR use to provide course guidance to an aircraft?

- A. Measuring the time delay of a pulsed signal returning from the station
- B. Comparing the aircraft's GPS position against a stored navaid database
- C. Detecting the strength of two signals and flying toward the stronger one
- D. Comparing the phase difference between a reference and a variable signal

2. Why is VOR reception limited by altitude and distance from the station?

- A. The signal travels by line of sight and is blocked by the Earth's curvature
- B. The signal weakens because of magnetic interference at higher altitudes
- C. The frequency shifts with distance, requiring constant retuning by the pilot
- D. The station reduces its transmission power automatically during the day

3. What does DME measure to provide distance information to the pilot?

- A. The phase difference between the station's reference and variable signals
- B. The signal strength received from the paired navigation facility nearby
- C. The elapsed time for a pulse to travel to the station and return
- D. The Doppler shift in the frequency of the received ground signal

4. Why does DME indicate "slant range" rather than true horizontal distance?

- A. The DME signal bends around terrain, lengthening the measured path
- B. The measurement is the straight-line distance from aircraft to station

- C. The DME averages several signals, producing a slightly longer reading
- D. The station transmits a corrected distance only at lower altitudes

5. When is DME slant-range error greatest relative to the station?

- A. When the aircraft is far from the station at a low cruising altitude
- B. When the aircraft is at high altitude directly over or near the station
- C. When the aircraft is established on a published airway at any distance
- D. When the aircraft is descending on the final approach to the runway

6. What is a primary limitation of the ADF and NDB navigation system?

- A. The bearing pointer is subject to errors from terrain, weather, and night effect
- B. The system provides no bearing information, only distance to the station
- C. The system requires line-of-sight reception above eighteen thousand feet
- D. The receiver must be recalibrated by a repair station before every flight

7. What does the ADF needle point toward when properly tuned and identified?

- A. The magnetic north pole regardless of the aircraft's current heading
- B. The non-directional beacon station that is tuned on the receiver
- C. The destination airport stored in the navigation database memory
- D. The nearest VOR station transmitting on the selected frequency

8. What are the three components of a standard ILS that provide guidance and position?

- A. Localizer, DME, and a series of compass locators along the approach
- B. Glideslope, marker beacons, and a non-directional beacon for the missed approach

- C. Localizer, glideslope, and marker beacons or equivalent position aids
- D. Localizer, glideslope, and a distance-measuring transponder at the threshold

9. What guidance does the localizer component of an ILS provide?

- A. Vertical guidance defining the proper descent angle to the runway
- B. Distance information from the aircraft to the runway threshold
- C. Lateral guidance aligning the aircraft with the runway centerline
- D. Position fixes marking specific points along the final approach course

10. What is the typical glideslope angle provided by a standard ILS?

- A. About 1.5 degrees above the horizontal for a shallow approach path
- B. About 3 degrees above the horizontal as the standard descent angle
- C. About 6 degrees above the horizontal for a steep approach profile
- D. About 9 degrees above the horizontal for terrain-restricted runways

11. Why must a pilot be cautious of false glideslope signals on an ILS?

- A. False glideslopes exist at higher angles above the true glidepath signal
- B. The localizer transmits false courses that mirror the true centerline
- C. The marker beacons produce false signals during periods of precipitation
- D. The DME associated with the ILS reports a false distance near the runway

12. What does the outer marker of an ILS typically indicate to the pilot?

- A. The point where the aircraft should intercept the glideslope inbound
- B. The runway threshold location for the final landing flare maneuver

- C. The missed approach point where the climb must be initiated
- D. The decision altitude reference for the precision approach segment

13. What is the primary cause of localizer course sensitivity increasing near the runway?

- A. The receiver automatically amplifies the signal as the aircraft descends
- B. The glideslope signal interferes with the localizer at close range
- C. The transmitter increases its power output as the aircraft approaches
- D. The localizer beam is narrow and converges toward the runway end

14. How does a GPS receiver determine the aircraft's three-dimensional position?

- A. By measuring the bearing to three separate ground-based navigation stations
- B. By comparing the phase of signals from multiple ground transmitters
- C. By measuring the distance to multiple satellites and computing position
- D. By detecting the Doppler shift of a single orbiting satellite signal

15. What is the minimum number of satellites a GPS receiver generally needs for a three-dimensional position fix?

- A. Three satellites are sufficient to compute a full three-dimensional fix
- B. Four satellites are needed to determine the three-dimensional position
- C. Five satellites are required for any usable position computation at all
- D. Six satellites must be in view before the receiver can compute position

16. What does RAIM provide for a GPS navigation system?

- A. The most direct routing between two selected waypoints on the flight plan
- B. Automatic tuning of the associated ground-based navigation frequencies

- C. Integrity monitoring to detect and exclude an erroneous satellite signal
- D. Continuous transmission of the aircraft position to air traffic control

17. Why does a VOR require periodic flight inspection and an associated identifier?

- A. The identifier reports the published approach minimums for the station
- B. The Morse code identifier transmits the current weather at the facility
- C. Flight inspection adjusts the frequency the station transmits on each day
- D. Identification confirms the correct station is tuned and operating properly

18. What is the "cone of confusion" associated with a VOR station?

- A. An area of unreliable reception caused by terrain blocking the signal
- B. A region where two VOR signals overlap and produce ambiguous courses
- C. The zone where the localizer and glideslope signals intersect on approach
- D. The area directly above the station where course guidance becomes unreliable

19. What does the term "service volume" describe for a VOR or other navaid?

- A. The total power output the station transmits across all radials
- B. The defined altitude and distance range where the signal is usable
- C. The number of aircraft the station can serve simultaneously
- D. The geographic area covered by the station's Morse identifier signal

20. Why is GPS considered more accurate than traditional ground-based navigation?

- A. It provides precise positioning independent of ground station locations
- B. It transmits a stronger signal that overcomes all terrain interference

- C. It requires no integrity monitoring because the signal is always correct
- D. It automatically corrects for all atmospheric and ionospheric effects alone

21. What does WAAS add to a standard GPS signal?

- A. A backup ground-based localizer transmitter for the final approach
- B. The ability to receive VOR and DME signals through the same receiver
- C. Correction data improving accuracy and enabling vertical guidance
- D. A continuous voice channel to communicate with the controlling facility

22. What error affects an ADF bearing when flying near a coastline?

- A. Mountain effect, where terrain reflects the signal and shifts the bearing
- B. Night effect, where ionospheric refraction distorts the received signal
- C. Coastal refraction, where the signal bends crossing land and water boundaries
- D. Quadrantal error caused by the aircraft structure deflecting the signal

23. What is the function of the variable signal transmitted by a VOR station?

- A. It provides the omnidirectional reference phase against which others compare
- B. It rotates electronically, creating a phase that changes with the radial
- C. It carries the Morse code identifier transmitted continuously by the station
- D. It transmits the distance information used by the paired DME equipment

24. Why can an aircraft receive a usable VOR signal at greater range when at higher altitude?

- A. Higher altitude extends the line-of-sight distance to the transmitting station
- B. The signal frequency increases with altitude, improving the reception range

- C. The station boosts its transmission power for high-altitude aircraft only
- D. Atmospheric refraction at altitude bends the signal toward the aircraft

25. What does a "compass locator" associated with an ILS provide?

- A. A low-powered NDB at a marker beacon usable for ADF bearing guidance
- B. A backup glideslope signal in case the primary glideslope fails on approach
- C. A distance-measuring function from the aircraft to the runway threshold
- D. A localizer course reversal capability for the published missed approach

26. What is a primary advantage of an RNAV system over conventional VOR airways?

- A. It transmits a stronger signal that is immune to terrain interference
- B. It requires no database updates since the routes never change over time
- C. It eliminates the need for any onboard navigation receiver equipment
- D. It allows direct point-to-point routing independent of ground navaid locations

27. What does the Morse code identifier of a navaid confirm to the pilot?

- A. The published minimum altitude for the airway segment being flown
- B. That the correct station is tuned and the signal is suitable for navigation
- C. The distance in nautical miles remaining to reach the tuned station
- D. The current barometric altimeter setting in use at the nearby airport

28. Why might a VOR display a flag or "OFF" indication?

- A. The aircraft is established precisely on the selected course centerline
- B. The aircraft has passed directly over the station during the flight

- C. The selected course leads directly toward the tuned VOR station
- D. The signal is too weak or unreliable for the receiver to use for navigation

29. What does the glideslope transmitter location relative to the runway determine?

- A. The lateral alignment of the localizer course with the runway centerline
- B. The maximum distance at which the localizer signal can be received
- C. The vertical descent path the aircraft follows to the touchdown zone
- D. The frequency on which the marker beacons transmit during the approach

30. What limitation applies to ADF navigation during thunderstorm activity?

- A. The needle may point toward lightning discharges instead of the station
- B. The receiver loses all bearing information until the storm fully passes
- C. The signal frequency shifts, requiring the pilot to retune continuously
- D. The bearing reverses direction, pointing directly away from the station

31. What is the relationship between a VOR radial and a magnetic course?

- A. A radial is always referenced to true north regardless of the location
- B. A radial and a magnetic course are unrelated and measured separately
- C. A radial points toward the station while a course points away from it
- D. A radial is a magnetic course measured outbound from the VOR station

32. Why does GPS require an almanac and ephemeris data from the satellites?

- A. To determine the correct radio frequencies for the ground nav aids
- B. To know the satellite positions and timing for accurate position computation

- C. To receive the weather and traffic information transmitted to the cockpit
- D. To calibrate the barometric altimeter against the satellite altitude data

33. What does a "VOT" facility allow a pilot to do?

- A. Receive vertical guidance similar to an ILS glideslope on approach
- B. Check the accuracy of the aircraft's VOR receiver on the ground
- C. Determine the precise distance from the aircraft to the airport
- D. Transmit the aircraft's position automatically to the control tower

34. When checking a VOR using a VOT, what indication confirms the receiver is accurate?

- A. The needle centers with a TO indication when the course is set to 360
- B. The needle deflects fully left regardless of the omni-bearing selector setting
- C. The needle centers with a FROM indication when 360 is selected on the OBS
- D. The needle oscillates continuously until the correct frequency is tuned

35. What is the typical service range of a terminal-class VOR?

- A. Usable to about 25 nautical miles within a defined altitude band
- B. Usable to about 130 nautical miles at high cruising altitudes
- C. Usable to about 200 nautical miles regardless of the altitude flown
- D. Usable to about 5 nautical miles only during the final approach segment

36. Why is GPS subject to "selective availability" historically and signal degradation concerns?

- A. The satellites transmit at variable power levels that pilots must compensate for
- B. The ground stations periodically shut down for maintenance without notice

- C. The signal frequency drifts with the orbital position of each satellite
- D. Intentional or environmental factors can degrade the accuracy of the signal

37. What does the localizer transmitter position relative to the runway determine?

- A. The vertical descent angle the aircraft follows to the touchdown point
- B. The distance at which the glideslope signal becomes usable inbound
- C. The frequency the associated marker beacons transmit on approach
- D. The lateral course alignment with the extended runway centerline

38. What is a key characteristic of the VHF frequencies used by VOR and localizer signals?

- A. They follow the curvature of the Earth, providing very long-range coverage
- B. They are line-of-sight, limiting reception by terrain and the horizon
- C. They penetrate terrain easily, making reception reliable in valleys
- D. They reflect off the ionosphere, enabling reception beyond the horizon

39. What does the term "minimum operational network" refer to regarding VORs?

- A. The minimum number of satellites required for a GPS position fix
- B. The lowest power setting a VOR may transmit and remain usable
- C. A retained network of VORs maintained as a backup to satellite navigation
- D. The minimum reception altitude published for each VOR airway segment

40. Why might an aircraft experience "scalping" of a VOR course indication?

- A. The receiver is tuned to an incorrect frequency for the desired station
- B. Reflections of the signal from terrain cause the course needle to waver

- C. The aircraft is flying directly over the station in the cone of confusion
- D. The station has reduced its transmission power during the daytime hours

41. What does the glideslope needle indicate when it is centered on an ILS approach?

- A. The aircraft is on the proper vertical descent path to the runway
- B. The aircraft is aligned laterally with the runway centerline course
- C. The aircraft has reached the published decision altitude for landing
- D. The aircraft is crossing the outer marker on the final approach course

42. Why does a localizer provide more precise lateral guidance than a VOR approach?

- A. The localizer transmits on a lower frequency that resists interference
- B. The localizer uses satellite augmentation to refine the course accuracy
- C. The localizer provides distance information that the VOR approach lacks
- D. The localizer course is narrower, giving greater angular sensitivity

43. What is the purpose of the middle marker on an older ILS installation?

- A. To mark the point where the glideslope is initially intercepted inbound
- B. To identify the runway threshold for the final landing flare maneuver
- C. To define the initial approach fix at the start of the procedure
- D. To indicate the approximate decision height point on the approach

44. What does an RNAV "waypoint" represent in area navigation?

- A. A ground-based navaid transmitting a continuous omnidirectional signal
- B. A marker beacon installed along the final approach course inbound

- C. A defined geographic position used for navigation along a route
- D. A radar fix assigned by the controller during the approach sequence

45. Why is the ILS localizer frequency paired with a glideslope frequency automatically?

- A. Tuning the localizer automatically activates the paired glideslope receiver
- B. The pilot must manually tune each frequency separately for the approach
- C. The glideslope transmits on the same frequency as the localizer signal
- D. The marker beacons select the glideslope frequency upon station passage

46. What error can occur if a pilot misidentifies a VOR station before navigating?

- A. The aircraft may track toward the wrong station and deviate off course
- B. The receiver will automatically retune to the correct station immediately
- C. The course needle will lock and provide no guidance until corrected
- D. The DME will display the distance to the correct station regardless

47. What does the term "GNSS" encompass in modern navigation?

- A. A ground-based network of VOR and DME stations for enroute navigation
- B. The global satellite navigation systems including GPS and similar constellations
- C. A single satellite providing position fixes to equipped aircraft worldwide
- D. The localizer and glideslope signals combined into one approach system

48. Why does the ILS glideslope have a limited usable width and angle?

- A. The signal is intentionally broadened to capture aircraft from any direction
- B. Narrow vertical guidance ensures precise tracking of the descent path

- C. The glideslope must overlap with adjacent runways for redundancy
- D. The transmitter rotates the signal to scan for approaching aircraft

49. What does a "low-altitude" VOR airway primarily rely upon for definition?

- A. Satellite-based waypoints connected by computed great-circle routes
- B. Radar vectors provided continuously by the controlling facility
- C. Pilot-selected direct courses between any two airports along the route
- D. VOR radials connecting stations within the low-altitude structure

50. What is the effect of terrain or obstructions on a VOR signal?

- A. The signal increases in strength as it reflects off the terrain features
- B. The signal frequency shifts, requiring the pilot to retune the receiver
- C. The terrain has no effect on a line-of-sight VHF navigation signal
- D. The signal may be blocked or distorted, producing unreliable indications

51. What does the DME "hold" function allow a pilot to do?

- A. Freeze the displayed distance permanently for the remainder of the flight
- B. Pause the distance countdown during a holding pattern at the fix
- C. Retain a DME distance from one station while tuning another frequency
- D. Lock the receiver onto the strongest available signal automatically

52. Why is the ADF still useful despite the prevalence of GPS navigation?

- A. It can provide bearing information from a simple, inexpensive ground beacon
- B. It provides more accurate position fixes than any satellite-based system

- C. It transmits vertical guidance comparable to an ILS glideslope on approach
- D. It functions reliably during thunderstorms when GPS signals are blocked

53. What does a fully deflected VOR course needle indicate about the aircraft's position?

- A. The aircraft is established precisely on the selected course centerline
- B. The aircraft has flown directly over the tuned VOR station ground point
- C. The aircraft is 10 degrees or more off the selected course to the side
- D. The VOR signal has failed completely and shows no usable guidance

54. What is the primary purpose of the reference signal transmitted by a VOR?

- A. To carry the Morse code identifier for the station to the receiver
- B. To transmit the distance information used by the paired DME equipment
- C. To rotate electronically and define the individual radials from the station
- D. To provide a fixed phase that the variable signal is compared against

55. Why does GPS provide continuous position updates rather than periodic fixes?

- A. The receiver constantly recomputes position from the satellite signals
- B. The ground stations transmit updated positions every few seconds to aircraft
- C. The pilot must manually request each position update from the system
- D. The satellites broadcast the aircraft's computed position back to it directly

56. What does the "TACAN" portion of a VORTAC facility provide to civilian aircraft?

- A. The VHF omnidirectional course guidance for civilian navigation use
- B. The distance-measuring function usable by civilian DME-equipped aircraft

- C. The localizer and glideslope signals for the precision approach segment
- D. The non-directional beacon signal used by ADF-equipped aircraft only

57. What limitation applies to GPS during a loss of satellite geometry or coverage?

- A. The receiver automatically switches to ground-based VOR navigation
- B. The accuracy improves because fewer signals reduce computational load
- C. The position remains perfectly accurate regardless of satellite availability
- D. The integrity may be compromised, requiring a RAIM check or alternate navaid

58. What does a localizer "back course" provide when no glideslope is available?

- A. Lateral guidance for an approach to the opposite end of the runway
- B. Vertical guidance equivalent to the front course glideslope signal
- C. Distance information from the aircraft to the runway threshold inbound
- D. A non-directional beacon signal usable for ADF bearing navigation

59. Why must a pilot verify the navigation database currency before an RNAV approach?

- A. An outdated database transmits on incorrect navigation frequencies
- B. The database controls the barometric altimeter correction for the approach
- C. Procedures and waypoints can change, and outdated data may be inaccurate
- D. The database determines the maximum holding airspeed at each fix

60. What is the significance of a VOR's "high-altitude" service volume class?

- A. It is usable only below ten thousand feet for terminal area operations
- B. It provides distance information without any course guidance to aircraft

- C. It provides usable signal coverage at greater distances and higher altitudes
- D. It transmits a non-directional signal usable by ADF-equipped aircraft only

Answer Key

1. D. VOR principle — Provides course guidance by comparing the phase difference between a reference and a variable signal.
2. A. VOR line-of-sight — Reception is limited because the VHF signal travels by line of sight and is blocked by the Earth's curvature.
3. C. DME measurement — Measures the elapsed time for a pulse to travel to the station and return.
4. B. Slant range — DME measures the straight-line (slant) distance from aircraft to station, not horizontal distance.
5. B. Slant-range error — Greatest at high altitude directly over or near the station.
6. A. ADF/NDB limitation — Bearings are subject to errors from terrain, weather, and night effect.
7. B. ADF needle — Points toward the tuned and identified non-directional beacon.
8. C. ILS components — Localizer, glideslope, and marker beacons (or equivalent position aids).
9. C. Localizer — Provides lateral guidance aligning the aircraft with the runway centerline.
10. B. Glideslope angle — Standard ILS glidepath is about 3 degrees.
11. A. False glideslope — False signals exist at higher angles above the true glidepath.

12. A. Outer marker — Indicates the point to intercept the glideslope inbound.
13. D. Localizer sensitivity — The narrow beam converges toward the runway end, increasing sensitivity.
14. C. GPS position — Determined by measuring distance to multiple satellites and computing position.
15. B. GPS satellites — Four satellites are needed for a three-dimensional fix.
16. C. RAIM — Integrity monitoring to detect and exclude an erroneous satellite signal.
17. D. VOR identifier — Confirms the correct station is tuned and operating properly.
18. D. Cone of confusion — The area directly above the station where course guidance becomes unreliable.
19. B. Service volume — The defined altitude and distance range where the signal is usable.
20. A. GPS accuracy — Provides precise positioning independent of ground station locations.
21. C. WAAS — Adds correction data improving accuracy and enabling vertical guidance.
22. C. Coastal refraction — The ADF signal bends crossing land/water boundaries, shifting the bearing.
23. B. VOR variable signal — Rotates electronically, creating a phase that changes with the radial.
24. A. VOR range vs. altitude — Higher altitude extends the line-of-sight distance to the station.
25. A. Compass locator — A low-powered NDB at a marker beacon usable for ADF bearing guidance.

26. D. RNAV advantage — Allows direct point-to-point routing independent of ground navaid locations.
27. B. Morse identifier — Confirms the correct station is tuned and the signal is suitable for navigation.
28. D. VOR flag/OFF — Indicates the signal is too weak or unreliable for navigation.
29. C. Glideslope transmitter — Determines the vertical descent path to the touchdown zone.
30. A. ADF in thunderstorms — The needle may point toward lightning discharges instead of the station.
31. D. Radial definition — A radial is a magnetic course measured outbound from the VOR station.
32. B. Almanac/ephemeris — Needed to know satellite positions and timing for accurate position computation.
33. B. VOT — Allows a pilot to check the accuracy of the aircraft's VOR receiver on the ground.
34. C. VOT check — Needle centers with a FROM indication when 360 is selected (or TO with 180) — "Cessna 182" mnemonic.
35. A. Terminal VOR — Usable to about 25 NM within a defined altitude band.
36. D. GPS degradation — Intentional or environmental factors can degrade signal accuracy.
37. D. Localizer transmitter — Determines the lateral course alignment with the extended runway centerline.

38. B. VHF characteristics — Line-of-sight, limited by terrain and the horizon.
39. C. Minimum operational network — A retained VOR network maintained as a backup to satellite navigation.
40. B. Scalloping — Signal reflections from terrain cause the course needle to waver.
41. A. Centered glideslope — The aircraft is on the proper vertical descent path.
42. D. Localizer precision — The narrower course gives greater angular sensitivity than a VOR approach.
43. D. Middle marker — Indicates the approximate decision height point on the approach.
44. C. RNAV waypoint — A defined geographic position used for navigation along a route.
45. A. Paired frequencies — Tuning the localizer automatically activates the paired glideslope.
46. A. Misidentified VOR — The aircraft may track toward the wrong station and deviate off course.
47. B. GNSS — Encompasses the global satellite navigation systems including GPS and similar constellations.
48. B. Glideslope width — Narrow vertical guidance ensures precise tracking of the descent path.
49. D. Low-altitude airway — Defined by VOR radials connecting stations in the low-altitude structure.
50. D. Terrain effect — The signal may be blocked or distorted, producing unreliable indications.

51. C. DME hold — Retains a DME distance from one station while tuning another frequency.
52. A. ADF usefulness — Provides bearing from a simple, inexpensive ground beacon.
53. C. Full deflection — The aircraft is 10° or more off the selected course to the side.
54. D. VOR reference signal — Provides a fixed phase against which the variable signal is compared.
55. A. GPS continuous fixes — The receiver constantly recomputes position from satellite signals.
56. B. TACAN for civilians — Provides the distance-measuring (DME) function usable by civilian aircraft.
57. D. GPS coverage loss — Integrity may be compromised, requiring a RAIM check or alternate navaid.
58. A. Back course — Provides lateral guidance for an approach to the opposite runway end (no glideslope).
59. C. Database currency — Procedures and waypoints can change; outdated data may be inaccurate.
60. C. High-altitude VOR — Provides usable coverage at greater distances and higher altitudes.