PRACTICE EXAM 26 (60 QUESTIONS)

1. An Obstacle Departure Procedure (ODP) is designed primarily to:

A. Sequence departing traffic with arriving aircraft efficiently

B. Provide noise abatement routing over nearby communities

C. Establish holding patterns for aircraft awaiting clearance

D. Provide obstacle clearance from the runway to the en route structure

2. A pilot reviewing a textual ODP finds "Climb runway heading to 1,500 before turning." This instruction exists to:

A. Reduce wear on the aircraft's engine during the climb

B. Align the aircraft with the prevailing surface winds

C. Ensure the aircraft clears obstacles before any turn

D. Sequence the departure with inbound traffic on approach

3. The standard climb gradient assumed for obstacle clearance on a departure procedure, absent a published higher gradient, is:

A. 152 feet per nautical mile to the en route altitude

B. 250 feet per nautical mile for all departures

C. 200 feet per nautical mile to the en route structure

D. 300 feet per nautical mile until reaching cruise

4. A pilot is unable to meet a published climb gradient of 400 feet per NM on a departure. The pilot should:

A. Not accept the departure unless able to meet the gradient

B. Depart anyway and climb at the best rate available

C. Reduce the aircraft weight by burning off fuel first

D. Request a steeper gradient that the aircraft can achieve

5. A "diverse departure" assessment assumes that, in the absence of a published ODP, an aircraft can depart in any direction and clear obstacles if it:

A. Turns immediately after liftoff to avoid terrain

B. Maintains at least 500 feet per NM in the climb

C. Levels off at pattern altitude before proceeding

D. Crosses the departure end at 35 feet and climbs at 200 ft/NM

6. A Standard Instrument Departure (SID) differs from an ODP in that a SID is primarily designed to:

A. Provide ATC with traffic separation and efficient flow

B. Guarantee obstacle clearance with no ATC involvement

C. Replace the need to file an IFR flight plan entirely

D. Define the missed approach procedure at the airport

7. A pilot accepts a SID with a "climb gradient 280 ft/NM to 5,000." At a groundspeed of 120 knots, the required rate of climb is:

A. 280 feet per minute during the initial climb

B. 480 feet per minute during the initial climb

C. 560 feet per minute during the initial climb

D. 640 feet per minute during the initial climb

8. The "minimum crossing altitude" (MCA) at a fix requires a pilot to:

A. Cross the fix at or below the published altitude value

B. Maintain the altitude only after passing the fix outbound

C. Descend to the altitude before reaching the fix inbound

D. Cross the fix at or above the published altitude when continuing

9. A pilot departing into IMC from a non-towered airport without a published departure procedure should:

A. Climb directly on course at the best forward speed

B. Circle over the airport until reaching the en route altitude

C. Evaluate obstacles and use a safe climb gradient and route

D. Maintain runway heading indefinitely regardless of terrain

10. A "climb via SID" clearance requires the pilot to comply with:

A. All published lateral path and altitude restrictions on the SID

B. Only the lateral path, climbing at the pilot's discretion

C. The first altitude restriction, then leveling off to wait

D. The lateral path while disregarding speed restrictions

11. The effect of a tailwind during an IFR departure climb is to:

A. Increase the groundspeed and reduce the feet-per-NM gained

B. Decrease the groundspeed and steepen the climb gradient

C. Improve the rate of climb in feet per minute directly

D. Have no effect on the climb gradient over the ground

12. A pilot notes a departure procedure requires a climb to cross a fix 8 NM away at 4,000 feet, starting from a field elevation of 800 feet. The required gradient is:

A. 250 feet per nautical mile over the segment

B. 300 feet per nautical mile over the segment

C. 350 feet per nautical mile over the segment

D. 400 feet per nautical mile over the segment

13. The "minimum turning altitude" (MTA) published at a fix is established to:

A. Identify the lowest altitude for a holding pattern entry

B. Mark the altitude where the glideslope is intercepted

C. Provide obstacle clearance during en route descent only

D. Ensure obstacle clearance when a turn is required at the fix

14. A pilot must determine the takeoff minimums for a Part 91 flight. Under Part 91, takeoff minimums:

A. Are the same as the standard commercial operator minimums

B. Are not specifically prescribed, though good judgment applies

C. Require a 1,000-foot ceiling and 3 miles visibility always

D. Mandate a climb gradient check before every departure

15. During a climb at constant power, increasing the pitch attitude beyond the best-rate-of-climb attitude will:

A. Increase both the airspeed and the rate of climb

B. Decrease the airspeed and may reduce the climb rate

C. Maintain the same climb performance with no change

D. Cause an immediate uncommanded roll to the right

16. The "MEA" and "MOCA" on an airway differ in that the MOCA provides obstacle clearance but:

A. Guarantees radar coverage along the entire segment

B. Ensures separation from all other IFR traffic on the route

C. Assures navigation signal reception only within 22 NM of the VOR

D. Is always higher than the corresponding MEA for the segment

17. A "preferred IFR route" published in the Chart Supplement is intended to:

A. Facilitate traffic flow and reduce clearance delays

B. Provide the only legal routing between two airports

C. Guarantee the shortest distance between two cities

D. Replace the pilot's responsibility to plan the route

18. The maximum airspeed authorized below 10,000 feet MSL (and not in other speed-restricted airspace) is:

A. 200 knots indicated airspeed at all altitudes below 10,000

B. 250 knots indicated airspeed below 10,000 feet

C. 230 knots indicated airspeed in the climb only

D. 288 knots indicated airspeed in smooth air conditions

19. A pilot flying a departure procedure with a "VCOA" (Visual Climb Over Airport) option must:

A. Climb in visual conditions over the airport to a specified altitude

B. Use the procedure only at night with runway lighting active

C. Maintain instrument conditions throughout the climb segment

D. Fly the procedure without reference to the airport environment

20. The "transition routes" depicted on a SID connect the:

A. Common departure route to the en route airway structure

B. Runway threshold directly to the final approach course

C. Missed approach holding fix to the initial approach fix

D. Visual descent point to the runway touchdown zone

21. A pilot at a high-density-altitude airport will experience which effect on takeoff performance?

A. A shorter takeoff roll due to denser air over the wings

B. An improved climb gradient from increased engine power

C. No measurable change from a sea-level standard day

D. A longer takeoff roll and a reduced rate of climb

22. The "off-route obstruction clearance altitude" (OROCA) is used by pilots for:

A. Terrain and obstruction awareness on off-airway routes

B. Determining the assigned radar vectoring altitude

C. Calculating the required takeoff climb gradient

D. Establishing the minimum holding pattern altitude

23. A pilot accepting a SID is responsible for ensuring the aircraft can:

A. Meet any published climb gradient and altitude restrictions

B. Maintain the maximum forward speed throughout the climb

C. Fly the procedure without any navigation equipment aboard

D. Complete the departure using only pilotage and dead reckoning

24. The effect of increased aircraft weight on climb performance is to:

A. Improve the rate of climb due to greater momentum

B. Decrease the rate of climb and the climb gradient

C. Have no effect on climb performance whatsoever

D. Increase the best-rate-of-climb airspeed significantly

25. A "radar vector" departure is one in which:

A. The pilot navigates the published SID without ATC headings

B. The aircraft follows a charted obstacle departure procedure

C. ATC provides headings to guide the aircraft after takeoff

D. The departure is flown entirely under visual flight rules

26. When a SID chart specifies "expect radar vectors to assigned route," the pilot should:

A. Fly the published lateral track ignoring any ATC headings

B. Refuse the SID and request a different departure procedure

C. Anticipate ATC headings after departure to join the route

D. Maintain runway heading until reaching the cruising altitude

27. The "minimum IFR altitude" for operations off established airways is generally:

A. 1,000 feet above the highest obstacle within 4 NM (2,000 in mountains)

B. 500 feet above the highest obstacle within 1 NM of course

C. The minimum en route altitude of the nearest airway

D. The minimum vectoring altitude used by the controller

28. A pilot encounters a published "climb gradient to altitude" on a SID that exceeds the aircraft's capability. The correct action is to:

A. Accept the SID and climb at the best gradient achievable

B. Advise ATC and request an alternative departure or routing

C. Reduce the climb rate to conserve fuel during the departure

D. Depart and turn early to avoid the obstacle requiring the gradient

29. The principal aerodynamic reason a higher density altitude degrades climb is that:

A. Reduced air density lowers engine power and propeller thrust

B. The increased air density adds drag to the airframe surfaces

C. Colder air at altitude reduces the available lift directly

D. The higher pressure reduces the angle of attack available

30. A "Standard Terminal Arrival" and a "Standard Instrument Departure" are complementary in that the SID handles departures while the STAR:

A. Provides obstacle clearance during the missed approach

B. Establishes holding patterns for departing aircraft only

C. Defines the takeoff climb gradient over terrain near the field

D. Transitions arriving aircraft toward the approach environment

31. The published "top altitude" on a "climb via SID" clearance is:

A. The lowest altitude the aircraft may climb to on the SID

B. The highest altitude to climb to unless ATC amends it

C. A speed restriction expressed in altitude terms only

D. The altitude at which the aircraft must begin a descent

32. A pilot flying a departure in mountainous terrain should be especially aware that:

A. Climb gradients are always lower than at flatland airports

B. Higher minimum altitudes and steeper gradients may be required

C. Obstacle clearance is automatically provided by ATC radar

D. Standard sea-level performance figures always apply directly

33. The "minimum sector altitude" or MSA on a chart provides 1,000 feet of obstacle clearance and is intended for:

A. Emergency use and general terrain awareness only

B. Routine navigation throughout the entire approach

C. Determining the published decision altitude precisely

D. Replacing the minimum en route altitude on airways

34. A pilot reviewing performance charts finds the takeoff distance increases with all of the following EXCEPT:

A. A headwind component on the departure runway

B. A higher field elevation and density altitude

C. An increase in the aircraft's gross takeoff weight

D. A higher ambient temperature at the airport

35. A "departure frequency" assignment in an IFR clearance directs the pilot to:

A. Tune the destination tower frequency before takeoff

B. Monitor the common traffic advisory frequency only

C. Contact departure control after takeoff as instructed

D. Remain on the ground frequency throughout the climb

36. The "ceiling and visibility" minimums for a Part 91 IFR takeoff are:

A. Not regulated, though departing into very low conditions is unwise

B. A 600-foot ceiling and 2 statute miles for all aircraft

C. Identical to the published landing minimums for the runway

D. A 1,000-foot ceiling and 3 statute miles without exception

37. A pilot flying a SID with a charted speed restriction of "240 knots" at a fix must:

A. Maintain exactly 240 knots from takeoff to that fix

B. Increase to 240 knots only after passing the fix

C. Disregard the speed unless ATC restates it on frequency

D. Cross the fix at or below 240 knots as published

38. The best-angle-of-climb airspeed (Vx) is used when a pilot needs to:

A. Achieve the greatest altitude gain over a given time

B. Clear an obstacle in the shortest horizontal distance

C. Cover the greatest distance using the least fuel

D. Maintain the highest cruise airspeed during the climb

39. A "diverse vector area" (DVA) at an airport allows ATC to:

A. Assign departing aircraft to any altitude without restriction

B. Vector arriving aircraft below the minimum vectoring altitude

C. Provide radar headings below the MVA after departure for obstacle clearance

D. Clear aircraft for visual approaches in instrument conditions

40. The effect of a downhill-sloping runway on takeoff is to:

A. Increase the required takeoff distance noticeably

B. Have no effect on the takeoff ground roll at all

C. Decrease the takeoff distance by aiding acceleration

D. Require a steeper climb gradient after liftoff

41. A pilot flying an RNAV SID must ensure the aircraft and crew are:

A. Equipped with dual ADF receivers for the initial leg

B. Operating exclusively within continuous radar coverage

C. Authorized for circling approaches at the departure airport

D. Approved and equipped for the required navigation specification

42. The "minimum en route altitude" applies along an airway, while the minimum altitude for an off-airway direct route is determined by the:

A. Nearest airway's minimum en route altitude only

B. Off-route obstruction clearance altitude for the grid

C. Minimum vectoring altitude used by the controller

D. Standard service volume of the nearest VOR station

43. A pilot accepting "maintain runway heading" on departure should fly:

A. The magnetic heading matching the runway, without drift correction

B. A ground track aligned exactly with the runway centerline

C. A heading corrected for the crosswind to track the extended centerline

D. Any heading within 30 degrees of the runway direction

44. A pilot's takeoff performance is most favorable under which conditions?

A. High density altitude with a tailwind component present

B. High gross weight on an uphill-sloping runway surface

C. Low density altitude with a headwind on a level runway

D. Standard temperature with a quartering tailwind component

45. The "obstacle identification surface" (OIS) used in departure design assumes obstacles do not penetrate a sloping surface based on a climb gradient of:

A. 200 feet per nautical mile beyond the runway end

B. 152 feet per nautical mile (a 40:1 slope) from the runway

C. 250 feet per nautical mile from the departure threshold

D. 300 feet per nautical mile to the en route environment

46. A pilot reviewing a SID notes "RADAR REQUIRED." This means the procedure:

A. May be flown by any aircraft with a working transponder

B. Requires ATC radar monitoring or vectors to be flown

C. Is reserved for aircraft equipped with weather radar

D. Can only be flown when the pilot reports each fix crossing

47. During a normal IFR departure, the transition from the departure controller to the en route center (ARTCC) occurs when:

A. The aircraft reaches the published top altitude on the SID

B. The pilot cancels the IFR flight plan after departure

C. The aircraft enters the traffic pattern of the next airport

D. ATC instructs the pilot to contact the center on a new frequency

48. A pilot must compute the accelerate-stop or climb performance because a departure into IMC leaves:

A. Ample room to return visually if performance is marginal

B. No effect on safety since IFR departures are always safe

C. The option to circle and try again under visual conditions

D. Little margin to troubleshoot if obstacle clearance is not assured

49. The "minimum vectoring altitude" is lower than charted minimums in some areas because it:

A. Ignores obstacle clearance to expedite the traffic flow

B. Applies only to aircraft departing the airport, not arrivals

C. Relies on radar coverage to ensure obstruction clearance

D. Is calculated using a steeper climb gradient than the MEA

50. A pilot flying a SID is cleared to "climb via SID except maintain 7,000." This instruction means the pilot should:

A. Disregard the SID altitudes and climb directly to 7,000

B. Climb at the pilot's discretion ignoring the lateral path

C. Follow the SID lateral path and altitudes but cap the climb at 7,000

D. Level at the first SID restriction and hold until 7,000 is assigned

51. The aerodynamic best-rate-of-climb speed (Vy) provides:

A. The steepest climb angle over the shortest ground distance

B. The greatest altitude gain in a given amount of time

C. The most fuel-efficient cruise climb to altitude

D. The maximum forward speed achievable during a climb

52. A pilot departing under IFR must, when "cleared for takeoff" is not applicable at a non-towered field, comply with the:

A. Tower's sequencing instructions before departing the runway

B. Pattern entry requirements for arriving visual traffic

C. Mandatory wait of one hour after receiving the clearance

D. Clearance void time, departing before it expires

53. A pilot reviewing departure performance must account for runway contamination because standing water or snow will:

A. Decrease the takeoff distance by cooling the tires

B. Increase the takeoff roll due to added rolling resistance

C. Have no measurable effect on takeoff acceleration

D. Improve braking action during the takeoff abort

54. The principal purpose of a "climb gradient" requirement (e.g., 350 ft/NM) on a departure is to:

A. Reduce engine noise over nearby residential areas

B. Improve fuel efficiency during the initial climb phase

C. Ensure the aircraft outclimbs obstacles along the path

D. Sequence the departure with the arrival traffic flow

55. A pilot encountering an engine performance loss on an IFR departure in IMC should prioritize:

A. Continuing the climb on course to reach the en route altitude

B. Troubleshooting the engine before addressing the flight path

C. Cancelling the IFR flight plan to reduce the workload

D. Maintaining aircraft control and obstacle clearance first

56. The "departure end of runway" (DER) is the reference point from which:

A. The landing distance available is measured for arrivals

B. The obstacle departure climb gradient is typically measured

C. The glideslope intercept altitude is calculated on approach

D. The circling approach radius is determined for the category

57. A pilot flying a SID with multiple altitude restrictions ("cross WAYNE at or above 3,000, cross ZEKER at or below 6,000") must:

A. Cross both fixes at exactly the published altitudes shown

B. Disregard the restrictions once radar contact is established

C. Cross WAYNE below 3,000 and ZEKER above 6,000 respectively

D. Cross WAYNE at or above 3,000 and ZEKER at or below 6,000

58. A "non-standard" takeoff minimum at an airport is published because:

A. The runway is longer than the standard reference length

B. The airport has no instrument approach procedures at all

C. Obstacles in the departure path require higher minimums or a gradient

D. The field elevation exceeds 5,000 feet above sea level

59. The effect of high humidity on takeoff and climb performance is to:

A. Increase the available engine power and thrust output

B. Improve the air density over the wing for more lift

C. Have no measurable effect on reciprocating engines

D. Slightly reduce engine power and degrade performance

60. A pilot reviewing a departure procedure should cross-check the published gradient against aircraft performance because failure to meet the gradient could result in:

A. An automatic clearance cancellation by air traffic control

B. Inadequate obstacle clearance along the departure path

C. A required diversion to the nearest alternate airport

D. The loss of radar contact during the initial climb segment

+ Answer Key

1. D — An Obstacle Departure Procedure provides obstacle clearance from the runway to the en route structure. It is a pilot-flown procedure when no ATC routing is given. Its sole purpose is terrain and obstruction protection during the climb-out.

2. C — "Climb runway heading to 1,500 before turning" ensures the aircraft clears obstacles before any turn is made. Turning early could steer the aircraft into terrain not yet overflown. The straight climb segment keeps the aircraft within protected airspace.

3. C — The standard climb gradient assumed for obstacle clearance, absent a published higher value, is 200 feet per nautical mile to the en route altitude. This is the baseline the procedure design protects. A steeper published gradient overrides the default where obstacles require it.

4. A — A pilot unable to meet a published 400 ft/NM climb gradient should not accept that departure, since the gradient guarantees obstacle clearance. Departing below it risks terrain contact. The pilot must wait for better conditions, lighten the aircraft, or use an alternative.

5. D — Diverse departure obstacle assessment assumes the aircraft crosses the departure end at least 35 feet AGL and climbs at 200 ft/NM in any direction to clear obstacles. These are the design assumptions for a runway without a published ODP. Meeting them ensures the protected obstacle clearance.

6. A — A SID is primarily designed to provide ATC with traffic separation and an efficient departure flow, reducing frequency congestion. While SIDs also account for obstacles, their defining purpose is system efficiency. ODPs, by contrast, exist solely for obstacle clearance.

7. C — Required climb rate = 280 ft/NM × (120/60) = 280 × 2 = 560 feet per minute. Converting groundspeed to NM per minute scales the charted gradient to a VSI value. Meeting it guarantees the published obstacle clearance.

8. D — A minimum crossing altitude requires the pilot to cross the fix at or above the published altitude when continuing along the route. It protects against obstacles on the next segment. The MCA forces the needed altitude before proceeding past the fix.

9. C — Departing into IMC from a non-towered field without a published procedure, the pilot should evaluate obstacles and use a safe climb gradient and route. The pilot bears responsibility for terrain clearance. Planning the climb and departure path prevents controlled flight into terrain.

10. A — "Climb via SID" requires compliance with all published lateral path and altitude restrictions on the procedure. It is a clearance to fly the SID as charted, including top and bottom altitudes. Ignoring restrictions would violate the clearance and possibly obstacle protections.

11. A — A tailwind during the departure climb increases groundspeed, so the aircraft covers more ground per minute and gains fewer feet per nautical mile. The climb gradient over the ground is reduced. This can jeopardize obstacle clearance if the gradient was marginal.

12. D — Required gradient = (4,000 − 800) ÷ 8 NM = 3,200 ÷ 8 = 400 feet per nautical mile. The altitude to gain divided by the distance gives the gradient. The aircraft must climb at least this steeply to cross the fix at the required altitude.

13. D — A minimum turning altitude ensures obstacle clearance when a turn is required at a fix, accounting for the larger area swept during the turn. It is higher than the straight-segment minimum where turning obstacles exist. The MTA protects the aircraft through the turn.

14. B — Under Part 91, takeoff minimums are not specifically prescribed, though sound judgment applies. Part 91 pilots may legally depart in very low conditions, but doing so may be unwise. Commercial operators under Parts 121/135 do have prescribed takeoff minimums.

15. B — Increasing pitch beyond the best-rate attitude at constant power decreases airspeed and may reduce the climb rate, as the aircraft trades speed for a steeper but less efficient climb. Excess pitch can approach a stall. The best climb performance occurs at the published climb speed.

16. C — The MOCA provides obstacle clearance for the full segment but assures navigation signal reception only within 22 NM of the VOR. Beyond that distance, signal coverage is not guaranteed at the MOCA. This is why the MEA is generally used for navigation reliability.

17. A — A preferred IFR route facilitates traffic flow and reduces clearance delays by aligning with the routes ATC expects. Filing them speeds clearance issuance. They are not the only legal routing but improve system efficiency.

18. B — The maximum airspeed below 10,000 feet MSL (outside other speed-restricted airspace) is 250 knots indicated airspeed. This regulatory limit improves see-and-avoid and separation at lower altitudes. Special airspace such as near Class B may impose lower limits.

19. A — A Visual Climb Over Airport option requires the pilot to climb in visual conditions over the airport to a specified altitude before proceeding on course. It is used where a straight-out climb cannot clear obstacles. Visual conditions allow the pilot to see and avoid terrain during the climb.

20. A — Transition routes on a SID connect the common departure route to the en route airway structure. They guide the aircraft from the initial departure path onto the assigned route. This links the airport environment to the en route system.

21. D — High density altitude produces a longer takeoff roll and a reduced rate of climb because the thinner air degrades both aerodynamic and engine performance. Less dense air means less lift and power. Pilots must account for this at hot, high airports.

22. A — OROCA is used for terrain and obstruction awareness on off-airway routes, providing obstacle clearance within a latitude/longitude grid block. It is not a vectoring or takeoff-gradient figure. Pilots reference it for situational awareness on direct routes.

23. A — A pilot accepting a SID is responsible for ensuring the aircraft can meet any published climb gradient and altitude restrictions. The pilot must verify performance before accepting. If unable, the pilot requests an alternative.

24. B — Increased aircraft weight decreases both the rate of climb and the climb gradient, since more lift and power are needed just to sustain flight. Heavier aircraft climb more slowly. This must be considered when meeting departure gradients.

25. C — A radar vector departure is one in which ATC provides headings to guide the aircraft after takeoff. The controller assumes responsibility for obstacle clearance on assigned vectors within a diverse vector area. The pilot flies the headings as instructed.

26. C — "Expect radar vectors to assigned route" means the pilot should anticipate ATC headings after departure to join the route. The vectors replace part of the charted lateral navigation. The pilot complies with the headings when issued.

27. A — The minimum IFR altitude off established airways is generally 1,000 feet above the highest obstacle within 4 NM of course (2,000 feet in designated mountainous areas). This ensures terrain clearance where no airway minimum exists. It is a core §91.177 requirement.

28. B — When a SID's required climb gradient exceeds the aircraft's capability, the pilot should advise ATC and request an alternative departure or routing. Accepting it would risk inadequate obstacle clearance. ATC can provide a procedure the aircraft can fly.

29. A — Higher density altitude degrades climb principally because reduced air density lowers engine power and propeller thrust. Less dense air also reduces aerodynamic efficiency. The combined effect lengthens the takeoff and flattens the climb.

30. D — A STAR transitions arriving aircraft toward the approach environment, complementing the SID that handles departures. The STAR standardizes arrival routings into the terminal area. It does not address takeoff gradients or departing-aircraft holds.

31. B — The "top altitude" on a climb-via-SID clearance is the highest altitude to climb to unless ATC amends it. It caps the climb on the procedure. The pilot levels at the top altitude absent a new clearance.

32. B — Departures in mountainous terrain may require higher minimum altitudes and steeper climb gradients to clear the terrain. Standard sea-level figures do not apply. Pilots must plan for the increased performance demands.

33. A — The minimum sector altitude provides 1,000 feet of obstacle clearance and is intended for emergency use and general terrain awareness, not routine navigation. It is a safety reference off the published procedure. Pilots use it when needing terrain clearance information quickly.

34. A — Takeoff distance increases with higher field elevation/density altitude, greater gross weight, and higher temperature, but a headwind component decreases the takeoff distance. The headwind reduces the groundspeed needed for liftoff. Thus the headwind is the exception.

35. C — A departure frequency assignment directs the pilot to contact departure control after takeoff as instructed. It hands the aircraft to the appropriate controller for the climb. The pilot switches to that frequency once airborne.

36. A — Part 91 IFR takeoff ceiling and visibility minimums are not regulated, though departing into very low conditions is unwise. The pilot may legally depart in any conditions but should exercise judgment. Commercial operations have prescribed minimums.

37. D — A charted SID speed restriction of "240 knots" at a fix requires crossing the fix at or below 240 knots as published. The FMS honors the constraint. Meeting it maintains the planned departure sequencing.

38. B — Best-angle-of-climb airspeed (Vx) is used to clear an obstacle in the shortest horizontal distance, providing the most altitude gained per unit of ground distance. It is the steepest climb angle. Pilots use Vx for obstacle clearance on departure.

39. C — A diverse vector area allows ATC to provide radar headings below the minimum vectoring altitude after departure for obstacle clearance. It is evaluated for obstacles so controllers can vector departing aircraft at lower altitudes. This expands departure flexibility where terrain permits.

40. C — A downhill-sloping runway decreases the takeoff distance by aiding acceleration, since gravity adds to the forward acceleration. The aircraft reaches liftoff speed sooner. An uphill slope, by contrast, lengthens the roll.

41. D — An RNAV SID requires the aircraft and crew to be approved and equipped for the required navigation specification (such as RNAV 1). The capability and authorization must be in place. Lacking them prohibits flying the procedure.

42. B — The minimum altitude for an off-airway direct route is determined by the off-route obstruction clearance altitude for the grid block. OROCA ensures terrain and obstruction clearance off published routes. Airway MEAs apply only along those airways.

43. A — "Maintain runway heading" directs the pilot to fly the magnetic heading matching the runway, without correcting for wind drift. The aircraft's nose stays aligned with the runway direction. This differs from tracking the extended centerline, which would require drift correction.

44. C — Takeoff performance is most favorable with low density altitude, a headwind, and a level runway. Cool dense air, a headwind reducing required groundspeed, and no uphill slope all shorten the roll and improve climb. These are the optimal conditions.

45. B — The obstacle identification surface assumes obstacles do not penetrate a 40:1 sloping surface, equivalent to a 152 feet per nautical mile climb gradient. The required 200 ft/NM provides margin above this obstacle surface. Penetrating obstacles trigger a published higher gradient or ODP.

46. B — "RADAR REQUIRED" on a SID means the procedure requires ATC radar monitoring or vectors to be flown. Some segments lack pilot-navigable guidance without radar. The note ensures the necessary ATC support exists.

47. D — The handoff from departure control to the en route center occurs when ATC instructs the pilot to contact the center on a new frequency. It is a controller-initiated frequency change. The pilot switches when directed, not at a fixed altitude.

48. D — A departure into IMC leaves little margin to troubleshoot if obstacle clearance is not assured, so performance must be computed in advance. Without visual references, the pilot cannot see and avoid terrain. Pre-flight performance planning is essential for a safe IMC departure.

49. C — The minimum vectoring altitude can be lower than charted minimums because it relies on radar coverage to ensure obstruction clearance. The controller monitors the aircraft on radar. This permits lower vectoring altitudes than the chart-published minimums.

50. C — "Climb via SID except maintain 7,000" directs the pilot to follow the SID lateral path and altitudes but cap the climb at 7,000. The exception amends only the top altitude. All other SID restrictions still apply.

51. B — Best-rate-of-climb speed (Vy) provides the greatest altitude gain in a given amount of time. It is used to reach altitude most quickly. This contrasts with Vx, which gives the greatest altitude per unit of ground distance for obstacle clearance.

52. D — At a non-towered field, an IFR departure must comply with the clearance void time, departing before it expires. The void time reserves airspace for a limited window. Missing it requires obtaining a new clearance.

53. B — Runway contamination such as standing water or snow increases the takeoff roll due to added rolling resistance. The contamination impedes acceleration. Pilots must add distance margins for contaminated runways.

54. C — The principal purpose of a climb gradient requirement is to ensure the aircraft outclimbs obstacles along the departure path. The gradient is set by the obstacles needing clearance. Meeting it guarantees the protected obstacle margin.

55. D — An engine performance loss on an IFR departure in IMC requires prioritizing aircraft control and obstacle clearance first. Aviating precedes troubleshooting or communicating. Maintaining control and terrain clearance prevents an immediate accident.

56. B — The departure end of runway (DER) is the reference point from which the obstacle departure climb gradient is typically measured. The protected climb surface begins there. Obstacle assessments reference the DER for departure design.

57. D — The restrictions require crossing WAYNE at or above 3,000 and ZEKER at or below 6,000, exactly as published. "At or above" sets a floor; "at or below" sets a ceiling. Complying with both keeps the aircraft within the protected profile.

58. C — Non-standard takeoff minimums are published because obstacles in the departure path require higher minimums or a specified climb gradient. The "T" symbol directs the pilot to those notes. They alert crews that default minimums do not apply.

59. D — High humidity slightly reduces engine power and degrades takeoff and climb performance, because water vapor displaces oxygen in the induction air. The effect is real though modest on reciprocating engines. Pilots account for it at hot, humid airports.

60. B — Failing to meet a published departure gradient could result in inadequate obstacle clearance along the path. The gradient exists precisely to clear terrain and obstructions. Cross-checking aircraft performance against the gradient is therefore essential before departure.