

# PRACTICE EXAM 29 SIMULATION

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1. The pitot-static system supplies pressure information to the airspeed indicator, altimeter, and:

- A. Attitude indicator
- B. Heading indicator
- C. Vertical speed indicator
- D. Turn coordinator

2. The airspeed indicator is the only instrument that uses both:

- A. Static pressure and vacuum
- B. Ram pressure and electrical power
- C. Vacuum and electrical power
- D. Ram (pitot) pressure and static pressure

3. The altimeter measures altitude by sensing:

- A. Ram air pressure
- B. Static (ambient) pressure
- C. Vacuum
- D. Electrical signals

4. The vertical speed indicator senses the rate of change of:

- A. Ram pressure
- B. Vacuum

- C. Electrical current
- D. Static pressure through a calibrated leak

5. A blocked pitot tube with the drain hole open causes the airspeed indicator to:

- A. Read high in a climb
- B. Behave like an altimeter
- C. Freeze
- D. Drop toward zero

6. A blocked pitot tube with both the inlet and drain blocked causes the airspeed indicator to:

- A. Drop to zero
- B. Behave like an altimeter, reading higher in a climb
- C. Read correctly
- D. Freeze and not change

7. A blocked static port causes the altimeter to:

- A. Read continuously increasing
- B. Drop to zero
- C. Freeze at the altitude of the blockage
- D. Read correctly

8. The alternate static source, when used, typically causes the altimeter to read:

- A. Slightly higher than actual
- B. Exactly correct

- C. Lower than actual
- D. Zero

9. The attitude indicator and heading indicator in many traditional aircraft are powered by:

- A. The vacuum system
- B. Ram air
- C. The pitot tube
- D. Static pressure

10. The turn coordinator in most aircraft is powered by:

- A. Vacuum
- B. Ram air
- C. Electrical power
- D. Static pressure

11. Gyroscopic instruments rely on two properties: rigidity in space and:

- A. Inertia
- B. Precession
- C. Momentum
- D. Buoyancy

12. Rigidity in space, the property that keeps a gyro's spin axis fixed, is used by the:

- A. Attitude indicator and heading indicator
- B. Turn coordinator only

- C. Magnetic compass
- D. Altimeter

13. Precession, the property that causes a force to be felt 90 degrees later in the direction of rotation, is used by the:

- A. Attitude indicator
- B. Heading indicator
- C. Turn coordinator
- D. Altimeter

14. A vacuum failure affects which instruments in a traditional panel?

- A. Altimeter and airspeed indicator
- B. Attitude indicator and heading indicator
- C. Turn coordinator only
- D. Magnetic compass

15. After a vacuum failure, the pilot maintains bank control using the:

- A. Turn coordinator
- B. Failed attitude indicator
- C. Failed heading indicator
- D. Vertical speed indicator

16. A vacuum-driven attitude indicator that fails slowly is dangerous because it may:

- A. Drop to zero instantly
- B. Reverse-sense

- C. Lock in place obviously
- D. Sag or roll off, presenting a plausible but wrong attitude

17. The magnetic compass is subject to errors including variation, deviation, and:

- A. Turning and acceleration errors
- B. Precession
- C. Vacuum loss
- D. Slant range

18. Variation is the angular difference between:

- A. The aircraft heading and the wind
- B. True north and magnetic north
- C. The compass and the heading indicator
- D. The pitot and static pressure

19. Deviation is the compass error caused by:

- A. The Earth's magnetic field
- B. The aircraft's altitude
- C. The wind
- D. The aircraft's own electrical and metallic components

20. Acceleration and deceleration errors in the magnetic compass are remembered by:

- A. UNOS
- B. NDB

C. VOR

D. ANDS (Accelerate North, Decelerate South)

21. Turning errors in the magnetic compass are remembered by:

A. ANDS

B. GRABCARD

C. UNOS (Undershoot North, Overshoot South)

D. CRAFT

22. The heading indicator is aligned with the magnetic compass during:

A. Straight-and-level, unaccelerated flight

B. A standard-rate turn

C. An acceleration

D. A climb

23. The heading indicator drifts over time due to:

A. Vacuum loss

B. Acceleration error

C. Variation

D. Precession, requiring periodic realignment

24. In a glass cockpit, attitude and heading information is provided by the:

A. Air data computer

B. Pitot-static system

- C. AHRS (Attitude and Heading Reference System)
- D. Magnetometer alone

25. In a glass cockpit, airspeed, altitude, and vertical speed are derived by the:

- A. Air Data Computer (ADC)
- B. AHRS
- C. Magnetometer
- D. Transponder

26. The magnetometer in a glass cockpit provides a:

- A. Vertical speed reference
- B. Airspeed reference
- C. Magnetic heading reference to the AHRS
- D. Glidepath reference

27. An AHRS failure in a glass cockpit removes:

- A. Airspeed and altitude
- B. Engine data
- C. Attitude and heading
- D. Fuel quantity

28. An ADC failure in a glass cockpit removes:

- A. Attitude and heading
- B. Airspeed, altitude, and vertical speed

- C. Engine RPM
- D. Fuel flow

29. A red "X" through the airspeed and altitude tapes on a PFD indicates a failure of the:

- A. AHRS
- B. Air Data Computer
- C. Magnetometer
- D. Transponder

30. The standby instruments in a glass cockpit are valuable because they:

- A. Share the AHRS
- B. Share the ADC
- C. Operate on independent power and sensors
- D. Require the PFD

31. The PFD in a glass cockpit displays airspeed and altitude as:

- A. Vertical tapes flanking the attitude display
- B. Round dials only
- C. A single number
- D. A moving map

32. A pilot recognizes a pitot-static failure when the:

- A. Attitude indicator fails
- B. Heading indicator drifts

- C. Airspeed, altitude, or VSI behave abnormally
- D. Turn coordinator fails

33. The clock, required for IFR, supports:

- A. Attitude reference
- B. Heading reference
- C. Timed turns, holding, and approach timing
- D. Airspeed measurement

34. A pilot flying partial panel after a vacuum failure uses the turn coordinator for bank and the \_\_\_\_\_ for pitch.

- A. Attitude indicator
- B. Magnetic compass
- C. Heading indicator
- D. Altimeter and VSI

35. The Kollsman window on the altimeter is used to set the:

- A. Airspeed
- B. Local barometric pressure
- C. Heading
- D. Vacuum

36. Above 18,000 feet MSL, the altimeter is set to:

- A. 29.92 inches of mercury
- B. The local setting

- C. Field elevation
- D. The forecast pressure

37. True airspeed differs from indicated airspeed because of:

- A. Wind
- B. Magnetic variation
- C. Vacuum loss
- D. Air density changes with altitude and temperature

38. Calibrated airspeed is indicated airspeed corrected for:

- A. Installation and instrument error
- B. Wind
- C. Magnetic variation
- D. Vacuum

39. The turn coordinator displays both rate of turn and, via the inclinometer, the:

- A. Quality of the turn (coordination)
- B. Airspeed
- C. Altitude
- D. Heading

40. A slip is indicated by the inclinometer ball displaced to the:

- A. Outside of the turn
- B. Top

- C. Inside of the turn
- D. Center

41. A skid is indicated by the inclinometer ball displaced to the:

- A. Inside of the turn
- B. Center
- C. Outside of the turn
- D. Bottom

42. A pilot recognizes an electrical failure in a traditional panel by the loss of the:

- A. Turn coordinator and radios
- B. Attitude indicator
- C. Altimeter
- D. Magnetic compass

43. After an electrical failure, the vacuum-driven instruments:

- A. Fail immediately
- B. Reverse-sense
- C. Are unusable
- D. Remain usable

44. A pilot must cross-check instruments because any single instrument may:

- A. Always be reliable
- B. Fail or become misleading

- C. Replace the others
- D. Eliminate the need for a scan

45. The airspeed indicator's color-coded arcs include a green arc representing the:

- A. Never-exceed speed
- B. Normal operating range
- C. Flap operating range
- D. Caution range

46. The white arc on the airspeed indicator represents the:

- A. Normal operating range
- B. Never-exceed speed
- C. Caution range
- D. Flap operating range

47. The yellow arc on the airspeed indicator represents the:

- A. Caution range (smooth air only)
- B. Normal range
- C. Flap range
- D. Never-exceed speed

48. The red line on the airspeed indicator represents the:

- A. Stall speed
- B. Maneuvering speed

- C. Never-exceed speed ( $V_{NE}$ )
- D. Best glide speed

49. A pilot flying with a failed airspeed indicator can estimate airspeed using:

- A. The magnetic compass
- B. Known pitch and power settings
- C. The transponder
- D. The DME

50. The vertical speed indicator exhibits a brief lag because of its:

- A. Vacuum source
- B. Calibrated leak measuring the rate of pressure change
- C. Electrical power
- D. Gyroscope

51. A glass-cockpit aircraft losing the primary flight display reverts to the:

- A. Failed PFD
- B. GPS map only
- C. Engine instruments
- D. Standby instruments and magnetic compass

52. The directional gyro (heading indicator) provides a heading reference that is free of the compass's:

- A. Vacuum errors
- B. Electrical errors

- C. Turning and acceleration errors
- D. Slant-range errors

53. A pilot must realign the heading indicator with the magnetic compass approximately every:

- A. 5 minutes
- B. 60 minutes
- C. 30 minutes
- D. 15 minutes

54. The attitude indicator displays the aircraft's pitch and bank relative to the:

- A. Magnetic north
- B. The ground track
- C. The wind
- D. An artificial horizon

55. A pilot recognizes a slowly failing attitude indicator by:

- A. Trusting it more
- B. Cross-checking it against the turn coordinator and pitot-static instruments
- C. Covering the turn coordinator
- D. Relying on bodily sensation

56. The pitot heat system prevents:

- A. Vacuum failure
- B. Pitot tube icing

- C. Electrical failure
- D. Static port blockage only

57. A pilot must verify the vacuum (suction) gauge reads within limits because a low reading indicates:

- A. Normal operation
- B. An electrical failure
- C. A pitot blockage
- D. A failing vacuum system that may render the gyros unreliable

58. The fundamental advantage of the standby instruments and independent systems in a glass cockpit is:

- A. Redundancy if the primary displays or computers fail
- B. Lower cost
- C. Faster cruise
- D. Reduced weight

59. A pilot integrating the instrument systems must understand that, in a glass cockpit, a single computer failure can:

- A. Remove several displayed parameters at once
- B. Have no effect
- C. Improve accuracy
- D. Reset the database

60. The fundamental skill in using the instrument systems is to:

- A. Rely on one instrument

- B. Maintain a disciplined cross-check and recognize when an instrument or system has failed
- C. Ignore the standby instruments
- D. Trust bodily sensation over the instruments

## Answer Key

1. C — The pitot-static system supplies the airspeed indicator, altimeter, and vertical speed indicator. All three are pitot-static instruments.
2. D — The airspeed indicator is the only instrument using both ram (pitot) pressure and static pressure. It measures the difference between them.
3. B — The altimeter measures altitude by sensing static (ambient) pressure. As pressure decreases with altitude, the reading increases.
4. D — The VSI senses the rate of change of static pressure through a calibrated leak. The leak produces its characteristic lag.
5. D — A blocked pitot with the drain open lets trapped pressure bleed out, so the airspeed indicator drops toward zero. Only with the drain also blocked does it behave like an altimeter.
6. B — With both the inlet and drain blocked, the airspeed indicator behaves like an altimeter, reading higher in a climb. The trapped pressure responds to altitude change.
7. C — A blocked static port freezes the altimeter at the altitude of the blockage. It can no longer sense pressure change.
8. A — The alternate static source, venting to the lower-pressure cabin, causes the altimeter to read slightly higher than actual. The pilot corrects downward.
9. A — The attitude indicator and heading indicator are commonly powered by the vacuum system. A vacuum failure removes both.

10. C — The turn coordinator is commonly powered electrically. It remains usable after a vacuum failure.

11. B — Gyroscopic instruments rely on rigidity in space and precession. These two properties underlie their operation.

12. A — Rigidity in space is used by the attitude indicator and heading indicator. Their gyros hold a fixed spin axis.

13. C — Precession is used by the turn coordinator, which reacts to an applied force 90 degrees later in the direction of rotation. This senses the rate of turn.

14. B — A vacuum failure affects the attitude indicator and heading indicator in a traditional panel. Both are vacuum-driven.

15. A — After a vacuum failure, the pilot maintains bank control using the electrically driven turn coordinator. The vacuum gyros are unreliable.

16. D — A slowly failing vacuum-driven attitude indicator may sag or roll off, presenting a plausible but wrong attitude. The gradual error can mislead the pilot.

17. A — The magnetic compass is subject to variation, deviation, and turning and acceleration errors. These are its characteristic errors.

18. B — Variation is the angular difference between true north and magnetic north. It varies with geographic location.

19. D — Deviation is the compass error caused by the aircraft's own electrical and metallic components. It is corrected via the compass correction card.

20. D — Acceleration and deceleration errors are remembered by ANDS (Accelerate North, Decelerate South). They appear on east-west headings.

21. C — Turning errors are remembered by UNOS (Undershoot North, Overshoot South). They are greatest near north and south headings.
22. A — The heading indicator is aligned with the magnetic compass during straight-and-level, unaccelerated flight. The compass is accurate then.
23. D — The heading indicator drifts over time due to precession, requiring periodic realignment. Gyro precession causes the drift.
24. C — In a glass cockpit, attitude and heading information is provided by the AHRS. It replaces the mechanical attitude and heading gyros.
25. A — Airspeed, altitude, and vertical speed are derived by the Air Data Computer (ADC). It processes the pitot-static and temperature inputs.
26. C — The magnetometer provides a magnetic heading reference to the AHRS. It supplies the heading data.
27. C — An AHRS failure removes attitude and heading. Airspeed and altitude, from the ADC, remain.
28. B — An ADC failure removes airspeed, altitude, and vertical speed. Attitude and heading, from the AHRS, remain.
29. B — A red "X" through the airspeed and altitude tapes indicates an Air Data Computer failure. The ADC supplies both parameters.
30. C — The standby instruments operate on independent power and sensors. This independence preserves them if the primary systems fail.
31. A — The PFD displays airspeed and altitude as vertical tapes flanking the attitude display. This layout replaces the round dials.

32. C — A pitot-static failure is recognized when the airspeed, altitude, or VSI behave abnormally. These are the pitot-static instruments.
33. C — The clock supports timed turns, holding, and approach timing. It is required for IFR.
34. D — After a vacuum failure, the pilot uses the turn coordinator for bank and the altimeter and VSI for pitch. These pitot-static instruments are unaffected.
35. B — The Kollsman window is used to set the local barometric pressure. This makes the altimeter read true altitude.
36. A — Above 18,000 feet MSL, the altimeter is set to 29.92 inches of mercury. This is the standard setting for flight levels.
37. D — True airspeed differs from indicated airspeed because air density changes with altitude and temperature. TAS increases with altitude for a given IAS.
38. A — Calibrated airspeed is indicated airspeed corrected for installation and instrument error. Further correction for density yields TAS.
39. A — The turn coordinator displays rate of turn and, via the inclinometer, the quality of the turn (coordination). The ball shows whether the turn is coordinated.
40. C — A slip is indicated by the inclinometer ball displaced to the inside of the turn. The correction is to step on the ball.
41. C — A skid is indicated by the inclinometer ball displaced to the outside of the turn. The correction is to step on the ball (toward the outside).
42. A — An electrical failure in a traditional panel is recognized by the loss of the turn coordinator and radios. These are electrically powered.

43. D — After an electrical failure, the vacuum-driven instruments remain usable. They are not electrically powered.
44. B — A pilot must cross-check instruments because any single instrument may fail or become misleading. The cross-check catches a failed instrument.
45. B — The green arc represents the normal operating range. It spans the normal flap-up speeds.
46. D — The white arc represents the flap operating range. It spans the flaps-extended speeds.
47. A — The yellow arc represents the caution range, for smooth air only. Flight there is permitted only in smooth conditions.
48. C — The red line represents the never-exceed speed ( $V_{NE}$ ). It must never be exceeded.
49. B — With a failed airspeed indicator, the pilot estimates airspeed using known pitch and power settings. Pitch-plus-power yields a predictable performance.
50. B — The VSI exhibits a brief lag because of its calibrated leak measuring the rate of pressure change. The leak is inherent to its design.
51. D — Losing the PFD, the glass-cockpit aircraft reverts to the standby instruments and magnetic compass. These provide independent backup.
52. C — The directional gyro provides a heading reference free of the compass's turning and acceleration errors. It is steadier during maneuvers.
53. D — The heading indicator is realigned with the magnetic compass about every 15 minutes. Precession causes the periodic drift.

54. D — The attitude indicator displays pitch and bank relative to an artificial horizon. The horizon bar represents the true horizon.

55. B — A slowly failing attitude indicator is recognized by cross-checking it against the turn coordinator and pitot-static instruments. Disagreement reveals the failure.

56. B — Pitot heat prevents pitot tube icing. It keeps the ram-air inlet clear.

57. D — A low vacuum (suction) gauge reading indicates a failing vacuum system that may render the gyros unreliable. The pilot must watch for gyro errors.

58. A — The standby instruments and independent systems provide redundancy if the primary displays or computers fail. Redundancy is their purpose.

59. A — In a glass cockpit, a single computer failure can remove several displayed parameters at once. Recognizing which computer failed tells the pilot which data to distrust.

60. B — The fundamental skill is to maintain a disciplined cross-check and recognize when an instrument or system has failed. The scan catches failures and preserves control.