PRACTICE EXAM 29 (60 QUESTIONS)

1. The pitot-static instruments comprise the airspeed indicator, the altimeter, and the:

A. Vertical speed indicator

B. Attitude indicator gyroscope

C. Turn coordinator instrument

D. Heading indicator display

2. The attitude indicator operates on the principle of:

A. Rigidity in space of a spinning gyroscope

B. Differential air pressure across a diaphragm

C. Magnetic alignment with the earth's field

D. Centrifugal force acting on a pendulum weight

3. A blocked pitot tube with a clear drain hole and clear static port will cause the airspeed indicator to:

A. Read accurately throughout the remainder of the flight

B. Freeze at the value present when the blockage occurred

C. Read zero airspeed regardless of the aircraft's speed

D. Fluctuate randomly with each change in altitude

4. The vertical speed indicator is a differential pressure instrument that displays:

A. The aircraft's absolute altitude above the ground

B. The rate of change of altitude in feet per minute

C. The indicated airspeed corrected for temperature

D. The angle of climb relative to the horizon line

5. A "glass cockpit" Primary Flight Display derives attitude information primarily from:

A. A traditional spinning vacuum-driven gyroscope

B. Pitot and static pressure differential sensors

C. The magnetic compass card and flux detector

D. Solid-state attitude and heading reference systems

6. The turn coordinator displays both rate of turn and:

A. Rate of roll into and out of a turn

B. The aircraft's precise pitch attitude

C. The magnetic heading being flown

D. The vertical speed during the turn

7. A common cause of attitude indicator error immediately after a rapid acceleration is:

A. A blockage in the static pressure system

B. Loss of electrical power to the instrument

C. A slight false indication of a nose-up pitch

D. Precession showing an exaggerated bank angle

8. The heading indicator (directional gyro) must be periodically realigned to the magnetic compass because it:

A. Loses electrical power intermittently in flight

B. Precesses gradually due to gyroscopic drift and friction

C. Responds only to changes in the static pressure

D. Reverses its indication when crossing the equator

9. A complete vacuum system failure on a conventional six-pack panel will disable the:

A. Turn coordinator and the vertical speed indicator

B. Attitude indicator and the heading indicator

C. Airspeed indicator and the altimeter together

D. Magnetic compass and the turn coordinator

10. The magnetic compass is subject to "acceleration error," which on an east or west heading causes:

A. An indication of a turn toward the north when accelerating

B. The card to spin continuously without stabilizing

C. A lag proportional to the aircraft's groundspeed

D. An immediate and permanent loss of all indication

11. The "control instrument" in the control-and-performance method of instrument flying is the:

A. Altimeter showing the aircraft's current altitude

B. Airspeed indicator reflecting the power setting

C. Vertical speed indicator showing the climb rate

D. Attitude indicator depicting pitch and bank directly

12. A pitot-static system's "alternate static source" is used when:

A. The pitot tube becomes blocked by ice or debris

B. The vacuum pump fails and the gyros become unreliable

C. The aircraft exceeds its maximum operating altitude

D. The primary static port becomes blocked or obstructed

13. The airspeed indicator's "never-exceed speed" is marked by:

A. The bottom of the green arc on the dial

B. A radial red line at the high end of the scale

C. The top of the white flap-operating range arc

D. A yellow caution arc spanning the mid-range

14. A pilot flying partial panel after losing the attitude indicator uses the turn coordinator, airspeed indicator, and altimeter to infer:

A. Pitch and bank without a direct attitude reference

B. The aircraft's exact position over the ground

C. The wind direction and velocity at altitude

D. The precise magnetic heading being maintained

15. The gyroscopic property that keeps the heading indicator pointing in a fixed direction is:

A. Precession in response to applied force

B. Rigidity in space of the spinning rotor

C. Magnetic attraction to the earth's poles

D. Differential pressure across the gyro housing

16. A pilot notices the vertical speed indicator shows a momentary reverse indication when initiating a climb. This is:

A. A sign of a failed instrument requiring replacement

B. Caused by a blocked pitot tube affecting the VSI

C. Normal lag (reversal) inherent to the instrument

D. An indication the static port is completely blocked

17. The "kollsman window" on a sensitive altimeter is used to set the:

A. Current barometric pressure (altimeter setting)

B. The aircraft's true altitude above sea level

C. The standard temperature for the flight level

D. The density altitude for performance planning

18. A magnetic compass exhibits "northerly turning error," which in the Northern Hemisphere means that when turning from a northerly heading the compass initially:

A. Indicates a turn in the correct direction immediately

B. Spins rapidly without settling on any heading

C. Lags, showing a turn in the opposite direction or none

D. Leads, showing a faster turn than is occurring

19. The angle of attack at which an airfoil stalls is:

A. Dependent entirely on the aircraft's airspeed

B. Variable with the aircraft's gross weight only

C. Different for every phase of instrument flight

D. A fixed critical angle regardless of airspeed or attitude

20. A pilot in a coordinated level turn must increase the angle of attack (back pressure) because:

A. The vertical component of lift decreases as the aircraft banks

B. The horizontal component of lift opposes the turn entirely

C. The aircraft's weight decreases during the turning maneuver

D. Drag is eliminated when the wings are banked steeply

21. Load factor in a turn is significant on instruments because as bank angle increases:

A. The stall speed decreases, allowing slower flight

B. The aircraft's weight is effectively reduced in the turn

C. The stall speed increases with the higher load factor

D. The rate of turn becomes independent of airspeed

22. A "standby" attitude indicator in a glass cockpit is typically powered by:

A. The same air data computer as the primary display

B. The aircraft's vacuum system shared with the primary

C. A separate independent power source such as a battery

D. The pitot-static system feeding the primary instruments

23. The airspeed indicator's green arc represents the:

A. Normal operating speed range of the aircraft

B. Flap-operating range for approach and landing

C. Caution range to be avoided in turbulence

D. The never-exceed speed limit of the airframe

24. A pilot experiencing the "somatogravic illusion" during acceleration may falsely perceive:

A. A roll to the left requiring opposite aileron

B. A descent when the aircraft is climbing normally

C. A spinning sensation in the opposite direction

D. A nose-up pitch, tempting a dangerous nose-down input

25. The "indicated airspeed" differs from "true airspeed" primarily because of changes in:

A. The aircraft's gross weight during the flight

B. The magnetic variation along the route flown

C. Air density with altitude and temperature

D. The pitot tube's alignment with the relative wind

26. A pilot flying on instruments relies on the "primary and supporting" instrument concept; in straight-and-level flight, the primary pitch instrument is the:

A. Altimeter, since altitude should remain constant

B. Attitude indicator showing the pitch reference

C. Vertical speed indicator showing zero rate

D. Airspeed indicator reflecting the cruise speed

27. "Empty-field myopia" affects a pilot transitioning to visual flight by causing the eyes to:

A. Focus sharply on the most distant visible object

B. Lose the ability to perceive depth entirely

C. Adapt instantly to changing light conditions

D. Relax to a near focus, missing distant traffic or terrain

28. The vacuum-driven gyros in a conventional aircraft are normally powered by:

A. The aircraft's main electrical bus and alternator

B. The pitot-static system's ram-air pressure

C. A direct mechanical linkage to the propeller shaft

D. An engine-driven vacuum pump creating suction airflow

29. A pilot notices the altimeter is not responding to a known climb while the airspeed and VSI behave abnormally. The likely cause is:

A. A failure of the attitude indicator gyroscope

B. An electrical failure of the primary flight display

C. A blockage in the static pressure system

D. A failure of the heading indicator's slaving unit

30. Spatial disorientation occurs because the human vestibular system:

A. Provides perfectly accurate motion cues at all times

B. Functions only when the eyes are closed in flight

C. Is enhanced by the absence of an outside horizon

D. Can produce false sensations without visual references

31. The "white arc" on an airspeed indicator denotes the:

A. Normal operating range for cruise flight

B. Flap-operating range including the stall speed with flaps

C. Caution range to be avoided in rough air

D. Maximum structural cruising speed limit

32. A pilot recovering from an unusual nose-low attitude on instruments should:

A. Increase back pressure first, then add power smoothly

B. Reduce power, level the wings, then ease out of the dive

C. Add full power immediately while pulling hard back

D. Apply opposite rudder to roll the aircraft level rapidly

33. The gyroscopic property of "precession" causes an applied force to be felt:

A. Immediately at the point where it is applied

B. In the direction opposite to the applied force

C. Approximately 90 degrees later in the direction of rotation

D. Only when the gyroscope is completely stationary

34. A pilot suffering from hypoxia at altitude will most likely experience:

A. A sudden sharp pain alerting them to the condition

B. Impaired judgment and a false sense of well-being

C. An immediate and total loss of consciousness

D. Enhanced color vision and quicker reaction times

35. The "magnetic dip" that causes compass errors is the tendency of the compass needle to:

A. Point toward the geographic North Pole precisely

B. Tilt toward the earth's surface near the magnetic poles

C. Spin freely without any directional reference

D. Align with the aircraft's longitudinal axis only

36. A pilot flying an approach on a glass cockpit loses the air data computer. The affected indications are:

A. The magnetic heading and the GPS course only

B. The engine RPM and fuel flow displays

C. The autopilot roll servo and trim function

D. The airspeed, altitude, and vertical speed displays

37. The "load factor" experienced in a 60-degree banked level turn is approximately:

A. 1.0 G, unchanged from level flight

B. 2.0 G's, doubling the effective weight

C. 1.5 G's during the turning maneuver

D. 3.0 G's in a coordinated steep turn

38. A pilot transitioning from instruments to a visual landing at night should be alert for the "black hole illusion," which tends to produce:

A. An approach that is too high and too far out

B. An approach flown lower than the safe glidepath

C. Excessive crosswind correction on short final

D. A premature flare well above the runway surface

39. The "rigidity in space" of a gyroscope increases with:

A. A higher rotational speed and greater rotor mass

B. A lower rotational speed of the spinning rotor

C. A decrease in the mass of the gyro rotor

D. The application of an external precessing force

40. A pilot must trust the instruments over physical sensations in IMC because:

A. The instruments are required by regulation to be used

B. Physical sensations are always more accurate at altitude

C. The vestibular system improves in instrument conditions

D. The vestibular system produces unreliable cues without a horizon

41. The airspeed indicator measures the difference between:

A. Ram (pitot) pressure and static pressure

B. Static pressure and the cabin altitude pressure

C. Total temperature and the ambient temperature

D. Manifold pressure and the atmospheric pressure

42. A pilot encountering carbon monoxide in the cockpit may first notice:

A. A sharp improvement in night vision acuity

B. Tingling in the extremities and increased alertness

C. Headache, dizziness, and impaired judgment

D. A sudden increase in tolerance to high altitude

43. The "true altitude" of an aircraft is its height above:

A. The standard datum plane of 29.92 inches of mercury

B. The nearest terrain or obstacle directly below

C. The pressure level set in the altimeter's window

D. Mean sea level under non-standard conditions

44. A pilot in a glass cockpit notices an "attitude fail" flag on the PFD. The correct response is to:

A. Continue using the failed PFD attitude display carefully

B. Re-boot the air data computer while in instrument flight

C. Transition to the standby attitude indicator immediately

D. Disregard the flag if the autopilot is still engaged

45. The "pressure altitude" is read when the altimeter's Kollsman window is set to:

A. The current local altimeter setting reported by ATC

B. The standard pressure of 29.92 inches of mercury

C. The field elevation of the departure airport

D. The temperature-corrected sea-level pressure value

46. A pilot flying instruments must scan continuously because fixating on one instrument leads to:

A. Improved accuracy on the fixated parameter alone

B. A breakdown of the overall instrument cross-check

C. Reduced workload during a high-stress approach

D. Automatic compensation by the autopilot system

47. The "vestibular system" of the inner ear senses:

A. Angular acceleration and linear acceleration of the head

B. Only the visual cues from the outside horizon

C. Changes in cabin pressure during climbs and descents

D. The aircraft's magnetic heading through the semicircular canals

48. A pilot experiencing "hyperventilation" can relieve the symptoms by:

A. Breathing more rapidly to increase oxygen intake

B. Slowing the breathing rate to restore the CO2 balance

C. Switching immediately to 100 percent oxygen flow

D. Climbing to a higher altitude to reduce the workload

49. The "indicated altitude" displayed on the altimeter is the altitude above sea level when the instrument is:

A. Set to the standard pressure of 29.92 inches of mercury

B. Set to the current local altimeter setting correctly

C. Reading the height directly above the terrain below

D. Adjusted for the non-standard temperature aloft

50. A pilot recovering from a nose-high, low-airspeed unusual attitude on instruments should:

A. Reduce power and raise the nose to slow the descent

B. Maintain the current pitch and add aileron pressure

C. Pull back sharply to regain altitude immediately

D. Add power, lower the nose, and level the wings

51. The "dewpoint" relative to the temperature is significant to instrument pilots because a small spread indicates:

A. Strong convective turbulence developing at altitude

B. Excellent visibility and unrestricted ceilings ahead

C. Likely fog or low cloud formation as air saturates

D. A rapidly rising freezing level over the route

52. A pilot's "time of useful consciousness" decreases as:

A. The cabin pressure altitude increases significantly

B. The outside air temperature warms toward standard

C. The aircraft's airspeed is reduced for the descent

D. The relative humidity in the cockpit decreases

53. The "turn-and-slip indicator" differs from the turn coordinator in that the turn-and-slip indicator shows:

A. The rate of roll as well as the rate of turn

B. Both pitch attitude and the bank angle directly

C. The magnetic heading along with the turn rate

D. Rate of turn only, without the rate-of-roll information

54. A pilot reviewing the "airspeed color codes" notes the yellow arc, which indicates the:

A. Normal operating range for all flight conditions

B. Flap-operating range for takeoff and landing

C. Caution range, to be flown only in smooth air

D. Never-exceed speed marked at the top of the scale

55. The "Coriolis illusion" is triggered when a pilot in a prolonged turn:

A. Stares at a single fixed light for several seconds

B. Accelerates rapidly during the takeoff ground roll

C. Looks at the wingtip during a level coordinated turn

D. Moves the head abruptly, stimulating multiple canals

56. The altimeter, airspeed indicator, and vertical speed indicator are all connected to the static system; a blocked static port therefore affects:

A. All three pitot-static instruments simultaneously

B. Only the airspeed indicator's ram-air reading

C. The gyroscopic instruments rather than the pitot-static ones

D. The magnetic compass and the heading indicator

57. A pilot must understand that "true airspeed" generally increases relative to indicated airspeed as the aircraft:

A. Climbs to higher altitudes where the air is less dense

B. Descends into denser air near the surface

C. Slows down during the approach to landing

D. Increases its gross weight by taking on fuel

58. A "partial panel" emergency most commonly results from the failure of:

A. The magnetic compass mounted on the windshield

B. The pitot tube heating element in icing conditions

C. The electrical bus powering all cockpit instruments

D. The vacuum system driving the attitude and heading gyros

59. The "leans," the most common spatial disorientation illusion, results from:

A. A rapid acceleration during the initial takeoff climb

B. Staring at the runway approach lights at night

C. A slow, unnoticed roll into a bank later corrected abruptly

D. Looking down at the instrument panel for too long

60. A pilot using the "control-and-performance" method adjusts the control instruments (attitude and power) and then verifies the result on the:

A. Magnetic compass and the outside visual horizon

B. Control instruments themselves a second time

C. Performance instruments such as the altimeter and airspeed

D. Standby instruments reserved for emergency use only

+ Answer Key

1. A — The pitot-static instruments are the airspeed indicator, the altimeter, and the vertical speed indicator, all driven by pitot and/or static pressure. The attitude indicator, turn coordinator, and heading indicator are gyroscopic. Knowing the grouping explains which instruments fail together with a static blockage.

2. A — The attitude indicator works on rigidity in space, the gyroscopic property by which a spinning rotor maintains its orientation. This fixed reference displays pitch and bank relative to the horizon. Loss of gyro speed degrades this rigidity and the indication.

3. B — A blocked pitot tube with a clear drain and clear static port turns the airspeed indicator into an altimeter, freezing at the value present when the blockage occurred and then changing with altitude. The trapped ram pressure no longer updates with speed. Recognizing this prevents acting on a false airspeed.

4. B — The vertical speed indicator displays the rate of change of altitude in feet per minute, sensing the rate at which static pressure changes. It is a differential pressure instrument with a calibrated leak. It shows trend and rate, not absolute altitude.

5. D — A glass cockpit PFD derives attitude from solid-state attitude and heading reference systems (AHRS), not spinning vacuum gyros. The AHRS uses accelerometers and rate sensors. This makes the display independent of the vacuum system.

6. A — The turn coordinator shows both rate of turn and rate of roll, sensing motion about the yaw and roll axes. The canted gyro responds to roll initially and then turn rate. This added roll information distinguishes it from a plain turn-and-slip indicator.

7. C — Immediately after a rapid acceleration, the attitude indicator commonly shows a slight false nose-up pitch due to the erection mechanism and pendulous vanes. The error is transient and self-corrects. Pilots cross-check other instruments to avoid reacting to it.

8. B — The heading indicator precesses gradually due to gyroscopic drift and bearing friction, so it must be realigned periodically to the magnetic compass. Mechanical imperfections cause the drift over time. Routine resetting keeps the heading accurate.

9. B — A complete vacuum failure on a conventional six-pack disables the vacuum-driven attitude indicator and heading indicator. The turn coordinator (usually electric), airspeed, altimeter, and compass remain. Knowing which fail enables partial-panel flying.

10. A — On east or west headings in the Northern Hemisphere, accelerating causes the compass to indicate a turn toward the north (the "ANDS" rule — Accelerate North). Decelerating shows a turn toward south. The error stems from magnetic dip acting on the tilted card.

11. D — In the control-and-performance method, the attitude indicator is the control instrument because it directly depicts pitch and bank, the attitudes the pilot sets. Power is the other control input. The performance instruments then confirm the result.

12. D — The alternate static source is used when the primary static port becomes blocked, restoring static pressure to the pitot-static instruments. It draws static air, often from inside the cabin. This recovers usable altimeter, airspeed, and VSI indications.

13. B — The never-exceed speed (Vne) is marked by a radial red line at the high end of the airspeed scale. Exceeding it risks structural failure or flutter. The red line is the absolute speed limit of the airframe.

14. A — Partial-panel flight without the attitude indicator uses the turn coordinator (bank), airspeed and altimeter (pitch), to infer pitch and bank without a direct attitude reference. The pilot integrates these to control the aircraft. This is the foundation of partial-panel technique.

15. B — Rigidity in space, the gyroscope's tendency of the spinning rotor to maintain its orientation, keeps the heading indicator pointing in a fixed direction. This stable reference is read against the compass card. Precession gradually degrades it, requiring realignment.

16. C — A momentary reverse indication when initiating a climb is normal lag inherent to the vertical speed indicator. The calibrated leak takes a moment to reflect the new rate. The instrument then settles to the correct trend.

17. A — The Kollsman window sets the current barometric pressure (altimeter setting), calibrating the altimeter to local conditions. Setting it correctly makes the altimeter read true altitude under standard temperature. An incorrect setting produces altitude error.

18. C — Northerly turning error in the Northern Hemisphere causes the compass to lag when turning from a north heading, initially showing a turn in the opposite direction or none. The pilot must roll out late (or use the UNOS lead/lag rules). Magnetic dip causes the error.

19. D — An airfoil always stalls at the same critical angle of attack regardless of airspeed, weight, or attitude. The stall is defined by exceeding that angle, not by a fixed speed. This is why a stall can occur at any airspeed or attitude.

20. A — In a banked level turn, the vertical component of lift decreases, so the pilot must increase angle of attack (back pressure) to maintain altitude. Total lift must rise to keep the vertical component equal to weight. This is why turns require back pressure and raise stall speed.

21. C — As bank angle increases in a level turn, the load factor rises and the stall speed increases accordingly. The wing must produce more lift, loading the structure and raising the speed at which it stalls. This is critical awareness during instrument turns.

22. C — A standby attitude indicator is typically powered by a separate independent source, such as a dedicated battery, so it survives failures of the primary system. Independence is the point of a standby instrument. This redundancy preserves attitude information.

23. A — The green arc on the airspeed indicator represents the normal operating speed range of the aircraft. Its lower end is the clean stall speed and its upper end the maximum structural cruising speed. Flying within the green arc is normal in smooth and rough air.

24. D — The somatogravic illusion during acceleration produces a false nose-up pitch sensation, tempting a dangerous nose-down input. Forward acceleration tilts the otolith organs like a climb. Trusting the attitude indicator prevents descending into terrain.

25. C — Indicated airspeed differs from true airspeed mainly because of changes in air density with altitude and temperature. As density decreases with altitude, true airspeed exceeds indicated. This is why TAS is higher than IAS at altitude.

26. B — In steady straight-and-level flight under the primary-and-supporting concept, the attitude indicator is the primary pitch instrument because it directly shows the pitch reference being held. The altimeter and VSI support it. The attitude indicator integrates the pitch picture.

27. D — Empty-field myopia causes the eyes to relax to a near focus when there is nothing to look at, missing distant traffic or terrain. It occurs in haze or featureless conditions. Deliberately focusing on a distant object counters it.

28. D — Vacuum-driven gyros are powered by an engine-driven vacuum pump that creates suction, drawing air across the gyro rotors. The airflow spins them to operating speed. A pump failure removes the suction and the gyros spin down.

29. C — When the altimeter fails to respond to a climb and the airspeed and VSI behave abnormally, the common cause is a blocked static system, since all three rely on static pressure. A single blockage affects all three. The alternate static source restores normal indications.

30. D — Spatial disorientation occurs because the vestibular system can produce false sensations of motion or attitude without visual references. The inner ear misinterprets sustained or sub-threshold motions. Reliable instrument cross-check overrides these false cues.

31. B — The white arc on the airspeed indicator denotes the flap-operating range, from the stall speed with flaps extended (its lower end) to the maximum flap-extended speed. It guides safe flap operating speeds. Operating within it protects the flaps and ensures controllability.

32. B — Recovery from a nose-low unusual attitude on instruments is to reduce power, level the wings, then ease out of the dive. Reducing power prevents overspeed, leveling the wings is done before pulling, and a smooth recovery avoids overstress. The sequence prevents a secondary stall or structural damage.

33. C — Precession causes a force applied to a spinning gyro to be felt approximately 90 degrees later in the direction of rotation. This property underlies how gyro instruments respond and drift. It is distinct from rigidity in space.

34. B — A pilot suffering hypoxia most likely experiences impaired judgment and a false sense of well-being. The euphoria masks the danger, delaying corrective action. This insidious onset is why altitude awareness and oxygen discipline matter.

35. B — Magnetic dip is the compass needle's tendency to tilt toward the earth's surface near the magnetic poles, following the inclined magnetic field. This dip causes the turning and acceleration errors. Compass design partly compensates but cannot eliminate it.

36. D — An air data computer failure on a glass cockpit affects the airspeed, altitude, and vertical speed displays, since the ADC derives these from pitot-static inputs. Heading and engine data come from other systems. Recognizing the affected parameters guides backup use.

37. B — In a 60-degree banked level turn, the load factor is approximately 2.0 G's, doubling the effective weight. Load factor equals 1 divided by the cosine of the bank angle. The increased load also raises the stall speed.

38. B — The black hole illusion at night tends to produce an approach flown lower than the safe glidepath, as the lack of visual cues makes the aircraft seem high. The dark foreground distorts perception. Cross-checking instruments guards against descending too low.

39. A — A gyroscope's rigidity in space increases with higher rotational speed and greater rotor mass. More angular momentum makes the gyro more stable in its orientation. This is why gyro instruments require adequate rotor speed to be reliable.

40. D — A pilot must trust the instruments over physical sensations in IMC because the vestibular system produces unreliable cues without an outside horizon. The inner ear misjudges sustained motions. Disciplined instrument reliance prevents spatial disorientation.

41. A — The airspeed indicator measures the difference between ram (pitot) pressure and static pressure, the dynamic pressure that corresponds to airspeed. The pitot supplies total pressure and the static supplies ambient pressure. Their difference drives the indication.

42. C — Early carbon monoxide exposure produces headache, dizziness, and impaired judgment as CO binds hemoglobin and starves tissues of oxygen. A cracked exhaust shroud can leak CO into cabin heat. Shutting off cabin heat and using fresh air is the response.

43. D — True altitude is the aircraft's actual height above mean sea level under non-standard conditions. It differs from indicated altitude when temperature or pressure deviate from standard. Cold temperatures make true altitude lower than indicated.

44. C — An "attitude fail" flag on the PFD requires transitioning to the standby attitude indicator immediately. The standby is independent of the failed primary system. Continuing on a failed display or troubleshooting first would risk loss of control.

45. B — Pressure altitude is read when the Kollsman window is set to the standard 29.92 inches of mercury. This references the altimeter to the standard datum plane. It is used for flight levels and performance computations.

46. B — Fixating on one instrument leads to a breakdown of the overall instrument cross-check, allowing other parameters to drift unnoticed. Continuous scanning maintains awareness of all instruments. The cross-check is the core of instrument flying.

47. A — The vestibular system of the inner ear senses angular acceleration (semicircular canals) and linear acceleration (otolith organs) of the head. These sensors can be fooled without visual references. Understanding them explains the origin of spatial illusions.

48. B — Hyperventilation is relieved by slowing the breathing rate to restore the carbon dioxide balance. Over-breathing depletes CO2 and causes the symptoms. Calm, slow breaths reverse the condition.

49. B — Indicated altitude reads height above sea level when the altimeter is set to the current local altimeter setting. The correct setting calibrates the instrument to local pressure. An incorrect setting produces altitude error.

50. D — Recovery from a nose-high, low-airspeed unusual attitude is power-up, nose-down, and wings-level, in that priority, to regain flying speed and prevent a stall. Adding power and lowering the nose restores airspeed before leveling. This sequence avoids a stall during recovery.

51. C — A small temperature/dewpoint spread indicates the air is near saturation, making fog or low cloud formation likely. As the spread approaches zero, condensation occurs. Monitoring it helps anticipate deteriorating ceilings and visibility.

52. A — A pilot's time of useful consciousness decreases as the cabin pressure altitude increases, because the reduced oxygen partial pressure brings on hypoxia faster. Higher altitude means less usable time after a pressurization loss. This underscores prompt oxygen use.

53. D — The turn-and-slip indicator shows rate of turn only, without the rate-of-roll information that the turn coordinator provides. The turn coordinator's canted gyro adds roll sensing. This is the key functional difference between the two instruments.

54. C — The yellow arc on the airspeed indicator marks the caution range, to be flown only in smooth air. It spans from the maximum structural cruising speed to the never-exceed speed. Turbulence in this range risks structural overload.

55. D — The Coriolis illusion is triggered when a pilot in a prolonged turn moves the head abruptly, stimulating multiple semicircular canals and producing a powerful tumbling sensation. It is among the most disorienting illusions. Avoiding abrupt head movements in turns prevents it.

56. A — Because the altimeter, airspeed indicator, and vertical speed indicator are all connected to the static system, a blocked static port affects all three pitot-static instruments simultaneously. The shared static source is the common point of failure. The alternate static source restores them.

57. A — True airspeed increases relative to indicated airspeed as the aircraft climbs to higher altitudes where the air is less dense. The thinner air means the same indicated airspeed corresponds to a higher true airspeed. This is why TAS exceeds IAS at altitude.

58. D — A partial-panel emergency most commonly results from failure of the vacuum system driving the attitude and heading gyros. Their loss removes the direct attitude and heading references. The pilot then flies using the remaining electric and pitot-static instruments.

59. C — The leans result from a slow, unnoticed roll into a bank that is later corrected abruptly, leaving the pilot feeling banked the opposite way. The sub-threshold roll goes undetected by the inner ear. Trusting the attitude indicator resolves the false sensation.

60. C — In the control-and-performance method, the pilot sets the control instruments (attitude and power) and then verifies the result on the performance instruments such as the altimeter and airspeed indicator. The performance instruments confirm whether the control inputs achieved the desired flight path. This cross-check is the basis of precise instrument flying.