

SESSION 41: INSTRUMENT FLIGHT — INSTRUMENT INTERPRETATION AND NORMAL INDICATIONS

1. During a stabilized, coordinated standard-rate turn, the attitude indicator displays:
 - A. The aircraft's heading
 - B. The rate of turn
 - C. The vertical speed
 - D. The pitch and bank attitude of the aircraft

2. During the same coordinated turn, the turn coordinator's miniature aircraft shows the:
 - A. Rate and direction of turn, with the ball indicating coordination
 - B. Pitch attitude
 - C. Altitude trend
 - D. Airspeed change

3. A momentary lag exists in the vertical speed indicator, meaning a newly established climb will:
 - A. Show the full climb rate instantly
 - B. Show a descent first
 - C. Take a few seconds to stabilize at the actual rate
 - D. Never indicate the correct rate

4. The altimeter is the primary pitch reference in level flight because:

- A. It responds faster than the attitude indicator
- B. A constant altimeter reading confirms the pitch is maintaining level flight
- C. It shows the bank angle
- D. It indicates the airspeed trend

5. During a constant-airspeed climb that is properly established, the airspeed indicator should read:

- A. A steady value matching the target climb airspeed
- B. A continuously decreasing value
- C. The same as in cruise
- D. Zero

6. If, during a climb, the airspeed is slowly decreasing while pitch appears constant on the attitude indicator, the most likely interpretation is:

- A. The altimeter has failed
- B. The aircraft is in a descent
- C. The pitch attitude is slightly too high (or power insufficient) for the target airspeed
- D. The turn coordinator is malfunctioning

7. The magnetic compass exhibits "northerly turning error," summarized by the acronym ANDS, which means:

- A. Accelerate North, Decelerate South — when turning, the compass leads in the south and lags in the north
- B. Always North During Steep turns
- C. Add North, Drop South on climbs
- D. Accelerate Now, Descend Slowly

8. Per the ANDS/northerly turning error, when rolling out of a turn onto a northerly heading, the compass:

- A. Reads accurately
- B. Leads the actual heading
- C. Shows the reciprocal heading
- D. Lags the actual heading, so the rollout must be started early/under-turned

9. When rolling out onto a southerly heading, the magnetic compass:

- A. Reads accurately
- B. Lags the actual heading
- C. Shows the reciprocal
- D. Leads the actual heading, so the rollout is overshoot/over-turned

10. Magnetic compass acceleration/deceleration error is summarized by UNOS, meaning on an east or west heading:

- A. Under No circumstances Observe Speed
- B. Use North Or South only
- C. Accelerate North, Decelerate South (the compass shows a turn toward north when accelerating, toward south when decelerating)
- D. Use Normal Operating Settings

11. Because of compass errors, in turbulence or during turns the pilot should primarily reference the heading indicator and use the magnetic compass to:

- A. Replace the heading indicator
- B. Periodically realign the heading indicator during straight-and-level, unaccelerated flight
- C. Determine the airspeed

D. Set the altimeter

12. During a wings-level pitch change to a climb, the first instruments to show the change are the:

- A. Magnetic compass and heading indicator
- B. Altimeter only
- C. Attitude indicator (immediate) and airspeed/VSI (trend)
- D. Turn coordinator

13. A pilot interpreting a slight bank shown on the attitude indicator with the heading slowly changing should recognize:

- A. The aircraft is in level flight
- B. The altimeter has failed
- C. The airspeed is decreasing
- D. The aircraft is in a turn and the heading change confirms it

14. The vertical speed indicator is best used in normal maneuvers as a:

- A. Primary pitch instrument at all times
- B. Trend and rate instrument, supporting the altimeter
- C. Replacement for the attitude indicator
- D. Bank reference

15. If the altimeter is slowly increasing in what should be level flight, the correct interpretation is:

- A. The aircraft is climbing and pitch must be lowered slightly
- B. The aircraft is descending
- C. The airspeed is too high

D. The compass is in error

16. In a constant-rate descent, the VSI showing a steady 500 fpm down and the altimeter unwinding steadily together confirm:

A. A stabilized 500-fpm descent

B. A climb

C. Level flight

D. A turn

17. The "primary and supporting" interpretation during a level standard-rate turn assigns the airspeed indicator as the primary instrument for:

A. Bank

B. Heading

C. Pitch (when airspeed is held constant)

D. Turn rate

18. When the pilot interprets the turn coordinator and the ball is deflected to the right in a left turn, the correct interpretation is:

A. The turn is coordinated

B. The aircraft is in a slip (uncoordinated), requiring rudder correction

C. The aircraft is climbing

D. The airspeed is increasing

19. Instrument lag in the altimeter and VSI means that during rapid pitch changes the pilot should:

A. Rely on the immediate attitude indicator response and avoid chasing the lagging instruments

- B. Make large corrections based on the VSI
- C. Disregard the attitude indicator
- D. Trust the magnetic compass for pitch

20. During acceleration in straight-and-level flight on an east or west heading, the magnetic compass will erroneously indicate:

- A. A turn toward south
- B. The correct heading
- C. The reciprocal heading
- D. A turn toward north

21. During deceleration on an east or west heading, the magnetic compass will erroneously indicate:

- A. A turn toward north
- B. The correct heading
- C. A turn toward south
- D. The reciprocal heading

22. The heading indicator is preferred over the magnetic compass for heading control during maneuvers because the heading indicator:

- A. Is more accurate than the compass at all times without adjustment
- B. Is stable and not subject to the dip, turning, and acceleration errors of the compass
- C. Shows the airspeed
- D. Indicates the bank angle directly

23. A pilot interpreting the instruments during the entry to a climb should expect the airspeed to:

- A. Increase immediately
- B. Remain unchanged
- C. Spike then drop
- D. Decrease as the nose rises (at constant power) until a new equilibrium

24. The correct interpretation of a centered ball during a turn is that the:

- A. Turn is at standard rate
- B. Turn is coordinated (no slip or skid)
- C. Altitude is constant
- D. Airspeed is constant

25. The fundamental skill of instrument interpretation in normal maneuvers is to:

- A. Memorize the navigation chart
- B. Rely on a single instrument
- C. Correctly read what each instrument indicates about the aircraft's actual state and translate it into the needed control action
- D. Disregard instrument lag

ANSWER KEY & EXPLANATIONS – SESSION 41

1. D. Pitch and bank — In a stabilized coordinated turn, the attitude indicator displays the aircraft's pitch and bank attitude.

2. A. Rate/direction + ball — The turn coordinator shows the rate and direction of turn, with the ball indicating coordination.

3. C. Few seconds to stabilize — The VSI lags, so a new climb takes a few seconds to stabilize at the actual rate.
4. B. Constant reading confirms level — The altimeter is the primary pitch reference in level flight because a constant reading confirms the pitch is maintaining level flight.
5. A. Steady target airspeed — In a properly established constant-air-speed climb, the airspeed indicator reads a steady value matching the target climb airspeed.
6. C. Pitch too high/power low — Slowly decreasing airspeed at constant pitch indicates the pitch is slightly too high (or power insufficient) for the target airspeed.
7. A. Accelerate N, Decelerate S — ANDS: when turning, the compass leads in the south and lags in the north (northerly turning error).
8. D. Lags on north — Rolling out onto north, the compass lags the actual heading, so the rollout must be started early/under-turned.
9. D. Leads on south — Rolling out onto south, the compass leads the actual heading, so the rollout is overshoot/over-turned.
10. C. Accel N, Decel S — UNOS/acceleration error: on east/west headings the compass shows a turn toward north when accelerating, toward south when decelerating.
11. B. Realign HI when straight/level — Because of compass errors, the pilot references the heading indicator and uses the compass to periodically realign it during straight-and-level, unaccelerated flight.
12. C. AI immediate, ASI/VSI trend — A pitch change to a climb is shown first by the attitude indicator (immediate) and the airspeed/VSI (trend).
13. D. In a turn — A slight bank with the heading slowly changing means the aircraft is in a turn, confirmed by the heading change.

14. B. Trend/rate supporting altimeter — The VSI is a trend and rate instrument supporting the altimeter.

15. A. Climbing/lower pitch — A slowly increasing altimeter in level flight means the aircraft is climbing and pitch must be lowered slightly.

16. A. Stabilized 500-fpm descent — A steady 500-fpm VSI and steadily unwinding altimeter confirm a stabilized 500-fpm descent.

17. C. Pitch (constant airspeed) — In a level turn with constant airspeed, the airspeed indicator is the primary instrument for pitch.

18. B. Slip/needs rudder — Ball deflected right in a left turn indicates a slip (uncoordinated), requiring rudder correction.

19. A. Use AI, don't chase lag — Instrument lag means relying on the immediate attitude indicator response and not chasing the lagging instruments.

20. D. Turn toward north — Accelerating on east/west, the compass erroneously indicates a turn toward north.

21. C. Turn toward south — Decelerating on east/west, the compass erroneously indicates a turn toward south.

22. B. Stable, no dip errors — The heading indicator is preferred because it is stable and not subject to the dip, turning, and acceleration errors of the compass.

23. D. Decrease as nose rises — Entering a climb at constant power, the airspeed decreases as the nose rises until a new equilibrium.

24. B. Coordinated — A centered ball during a turn means the turn is coordinated (no slip or skid).

25. C. Read state, translate to action — Instrument interpretation in normal maneuvers means correctly reading what each instrument indicates about the aircraft's actual state and translating it into the needed control action.