



Basic Instrument Flight

Pre-lesson Workbook

*CASA Recreational Pilot License (Aeroplane) – CASA Sample Syllabus
Lesson 26, Pre-lesson Workbook*

Complete this before your lesson – on your own, at your own pace. For each topic: watch a video, read an article, then answer the questions in the space provided. Print this out, or write your answers in a notebook. It should take about 30–45 minutes in total, and we'll check it together at the start of your pre-flight brief.

1. Instrument power sources

Most flight instruments don't work on their own – they need either engine suction (**vacuum**) or **electricity** to spin their gyros or move their needles. Knowing which instrument depends on which system tells you what fails *together*.

Watch:

- [Gyroscopic Instruments in 3D](#) - this excellent 4 minute video from Gold Seal Flight Training shows **how your gyroscopic instruments work** in addition to what power sources they use.

Read:

- [The Six Pack: Basic Flight Instruments](#) – An in-depth article from the Pilot Institute about the six main instruments - both the three gyroscopic and three pitot/static-driven instruments, but if you're short on time just read the introduction and the section on gyroscopic instruments.

Answer:

1. Name the three **pitot-static** instruments (work from air pressure alone):

2. Name the three common **gyroscopic** instruments:

3. In most training aircraft, which system spins the Attitude Indicator's and Direction Indicator's gyros? _____
4. Which instrument is usually **electrically** powered instead, so it survives a failure of that system? _____
5. If the vacuum system failed in flight, which two instruments would you expect to slowly become unreliable? _____
6. Check the Pilot's Operating Handbook for your training aircraft, find and read the information on instrument power. In which section and page number is it found?

2. Instrument checks & serviceability

A quick, deliberate check before you ever line up for take-off makes sure the instruments you're about to trust are actually trustworthy.

Read:

- Your aeroplane's checklist for taxi and pre-taxi instrument checks to find out what each should be checked for.
- [12 Steps For The Perfect Instrument Cockpit Check](#) — This article from Boldmethod is aimed more for instrument flight, but has good information about different pre-flight checks.

Answer:

1. During taxi, what should the Attitude Indicator's horizon bar do (or *not* do)?

2. During taxi turns, what should you check the Direction Indicator against?

3. If your aircraft has a vacuum gauge, what are you checking it for?

4. What should you do if an instrument doesn't behave the way you expect during these checks? _____

3. Instrument lag

Because of *how* they work, your flight instruments don't necessarily show you "now" – they show you a moment ago or more. Knowing which instruments lag more stops you "chasing the needle."

Read (pick one or both):

- [Flight Club's video explaining the Vertical Speed Indicator](#) – this excellent 3 minute video explains not only how it works and why there's a delay, but also what happens if the static port is blocked and why.
- FAA [Pilot's Handbook of Aeronautical Knowledge, Chapter 8](#) – specifically, read the section on the vertical speed indicator which has a great description and diagram which explains *why* it lags.

Answer:

1. *Why* does the Vertical Speed Indicator lag? Explain in your own words:

2. About how many seconds does the Vertical Speed Indicator take to "settle" after you change the pitch attitude (you may need the FAA chapter for this)?

3. What instrument can you check for a more direct answer to the question of whether you are going up or down?

4. Food for thought: What would happen to the VSI if the static port gets blocked by ice? What about the other pitot/static-driven instruments? (the Altimeter and the Airspeed Indicator)

4. Compass turning & acceleration errors

The magnetic compass needs no power at all – but it lies to you in a very predictable way whenever you turn or change speed on an easterly or westerly heading. The direction of the error depends on which hemisphere you're in – these videos and articles cover the Southern Hemisphere (Australian) version directly.

Watch (both – short, two parts):

- [Magnetic Compass Errors. Part 1. Acceleration Errors.](#) – Flight Club
- [Magnetic Compass Errors. Part 2. Turning Errors.](#) – Flight Club

Answer:

1. What does the mnemonic **ONUS** stand for, and when do you apply it?

2. What does the mnemonic **SAND** stand for, and when do you apply it?

3. Much of what else you'll find online (older textbooks, US-made videos and articles) teaches **UNOS/ANDS** instead – why doesn't that apply directly here?

4. If you roll out of a turn exactly on your desired heading using only the compass, why might you actually end up a little off? -----
5. On which two (roughly opposite) headings does acceleration/deceleration error *not* occur? -----

Test out your knowledge and understanding using [Flight Club's Magnetic Compass Error Trainer](#). Personally, I use this to verify my *understanding* (by visualising the compass and its centre of gravity) rather than memorising the acronyms – it's a great way to check actual understanding rather than memory.

5. A preview: can you trust your senses?

The live theory brief covers several ways your senses can mislead you once you lose sight of the horizon. This video is a great introduction – watch it now so the ideas aren't brand new when we cover them together.

Watch:

- [Spatial Disorientation](#) – A *very* informative 5 minute video from Gold Seal Flight Training

Answer:

1. Name one situation from the video where a pilot's senses gave a false impression of the aircraft's attitude or motion:

2. Which part of your body senses motion and balance, and why can it be fooled once you can't see the horizon? _____

Bring this to your lesson

- Bring your completed answers (printed, or your notebook) to the pre-flight brief
- We'll check through them together and answer anything that didn't make sense
- From there, the live theory brief builds on this: how we group and scan the instruments, the illusions that can fool you, avoiding and escaping unexpected cloud, and recognising and recovering from an unusual attitude

None of this is about memorising trivia – it's about trusting the instruments over your senses, every time. That trust is what today's lesson is really about.