Training aid only, not flight instruction. Review it with your CFI and get their approval before you use it in training or in the airplane. Check every number against the POH and current FAA sources. Last reviewed Nov 18, 2026 against the Pilot's Handbook of Aeronautical Knowledge, the Airplane Flying Handbook and 14 CFR Part 91.

AVIATION MNEMONICS

Private pilot · Memory aids by phase of flight

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HOW TO USE THIS GUIDE

A mnemonic is a hook for your memory, not a checklist. It helps you recall a list under stress or in an oral exam. The checklist in the airplane and the regulations themselves always win.

- **Ordered by phase of flight:** from deciding whether to go, through the walkaround, the run-up, the flight and the landing, to emergencies.
- **Each one says when you use it.** Some are for the oral exam, some you say out loud in the cockpit every flight.
- **Versions vary.** Instructors and books spell some of these differently (CIGARS is the classic example). Learn the one your CFI uses, and know what each letter protects you from.
- **Our airplanes:** where a letter means something different in the Cherokee or the 172M, we say so. The full flows are in the Cherokee Flow Cards and the Cessna 172M Checklist.
- The rules behind the regulation mnemonics are in Regulations for Private Pilots. The decision-making ones are covered in depth in Aeromedical Factors and Decision-Making.

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AT A GLANCE

Every mnemonic in this guide on one page.

Mnemonic	What it covers	When you use it
IMSAFE	Am I fit to fly?	Before every flight
PAVE	The four risk areas	Planning every flight
5 P's	Risk check-ins during the flight	At each phase change
ARROW	Documents in the airplane	Preflight, oral exam
AV1ATES	Required inspections	Logbook check, oral exam
A TOMATO FLAMES	Day VFR equipment (91.205)	Is it legal to go?
FLAPS	Night VFR equipment, added to the day list	Night flights
NWKRAFT	Preflight action (91.103)	Planning every flight
3-152	VFR weather minimums, Class C, D and E	Planning and in flight
East odd, West even	VFR cruising altitudes	Cruise above 3,000 AGL
Climb into, dive away	Control positions taxiing in wind	Every windy taxi
SAFETY	Passenger briefing	Before engine start
CIGARS	Before-takeoff check	At the run-up area
Who, who, where, what	The parts of a radio call	Every call
ANDS and UNOS	Magnetic compass errors	Using the compass
High to low, look out below	Altimeter errors	Flying into lower pressure or colder air
GUMPS	Before-landing check	Downwind, every landing
Aviate, navigate, communicate	Priorities	Any problem in flight
ABCDE	Engine failure	Engine quits in flight
5 C's	Lost procedures	Unsure of your position
PARE	Spin recovery	An inadvertent spin
DECIDE and 3P	Making a decision	In-flight decisions
Hazardous attitudes	Five risky ways of thinking	Self-check, oral exam
HHSS	Four types of hypoxia	Oral exam, altitude, CO

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Mnemonic	What it covers	When you use it
Port wine is red	Position light colors	Night flying
CRAFT and the 5 T's	Clearances and approaches	When you start instrument training

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BEFORE YOU DECIDE TO GO

These are about the pilot and the flight, not the airplane. Run them at home, before you drive to the airport.

IMSAFE: am I fit to fly?

When: before every flight, including the ones you really want to make.

- Illness: any symptoms at all, even a cold that blocks your ears.
- Medication: prescription or over-the-counter. Many are not safe to fly on. Check with an AME or the FAA's list.
- Stress: work, school, family, money. Stress uses up the attention you need for flying.
- Alcohol: at least 8 hours bottle to throttle and under 0.04 blood alcohol (14 CFR 91.17). Many pilots use 12 or 24 hours.
- Fatigue: tired pilots make slow, poor decisions and don't notice.
- Emotion (some versions say Eating): upset, angry or rushed, or hungry and dehydrated.
- **Why it matters:** the medical certificate says you were fit on the day of the exam. IMSAFE is how you decide you are fit today.

PAVE: the four risk areas

When: planning every flight. Look for risks in each area, then decide whether to go, change the plan or stay home.

- Pilot: IMSAFE, recent experience, your personal minimums.
- Aircraft: airworthy, fuel, performance for the load and the day, equipment you'll need.
- enVironment: weather, terrain, airspace, runway length, day or night.
- External pressures: a schedule, passengers who want to go, wanting to impress someone. The one that pushes good pilots into bad weather.
- **Why it matters:** a single risk you could handle often becomes too much when it stacks with two others. PAVE makes you look at all four together.

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The 5 P's: check-ins during the flight

When: at each change of phase: before takeoff, top of climb, before descent, before the approach, and when anything changes.

- Plan: is the plan still good? Weather, fuel, route, timing.
- Plane: anything abnormal? Gauges, fuel, systems.
- Pilot: how are you holding up? Tired, cold, behind the airplane?
- Passengers: comfortable, briefed, not pushing you?
- Programming: GPS, radios and autopilot set for what comes next.
- **Why it matters:** PAVE is done once on the ground. The 5 P's keep re-checking it in the air, where conditions change.

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IS THE AIRPLANE LEGAL?

The paperwork and equipment questions. You'll check them before flying an airplane you don't know well, and you'll be asked them in the oral exam.

ARROW: documents on board

When: preflight, especially in a rental or an airplane new to you. A favorite oral exam question.

- Airworthiness certificate: in the airplane and displayed where passengers can see it.
- Registration certificate: current. Registrations now expire, so check the date.
- Radio station license: only for flights to other countries, such as a trip to Canada. See The Border and Lake Erie.
- Operating limitations: the POH or AFM, placards and instrument markings.
- Weight and balance: the current data for this airplane, with its empty weight and CG.
- **Not in ARROW:** your own documents. You need your pilot certificate, a medical certificate (or BasicMed paperwork) and a government photo ID.

AV1ATES: required inspections

When: checking the logbooks before you fly an airplane, and in the oral exam. Not every item applies to every flight.

- Annual inspection: every 12 calendar months (91.409).
- VOR check: every 30 days, for IFR only (91.171).
- 100-hour inspection: only if the airplane carries people for hire or is used for flight instruction for hire (91.409).
- Altimeter and static system: every 24 calendar months, for IFR in controlled airspace (91.411).
- Transponder: every 24 calendar months (91.413).
- ELT: every 12 calendar months. Replace or recharge the battery after 1 hour of cumulative use or half its useful life (91.207).
- Static system: checked with the altimeter (91.411).

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- **Also check:** airworthiness directives (ADs) that apply to the airplane and its engine are complied with and recorded.

A TOMATO FLAMES: day VFR equipment

When: deciding whether the airplane is legal to fly in daytime VFR. Use it with 91.213 when something is inoperative.

- Anticollision lights: for airplanes certificated after March 11, 1996.
- Tachometer for each engine.
- Oil pressure gauge for each engine that uses a pressure system.
- Manifold pressure gauge for each altitude engine (not our airplanes).
- Altimeter.
- Temperature gauge for each liquid-cooled engine (not our airplanes).
- Oil temperature gauge for each air-cooled engine.
- Fuel gauge for each tank.
- Landing gear position indicator, if the gear retracts (not our airplanes).
- Airspeed indicator.
- Magnetic direction indicator (the compass).
- ELT, if required by 91.207.
- Seat belts for each occupant, and shoulder harnesses in the front seats of small airplanes built after July 18, 1978.
- **Also in 91.205(b):** flotation gear and a pyrotechnic signaling device when flying for hire over water beyond power-off gliding distance from shore.
- **Why it matters:** if something on this list doesn't work, you may not fly until it's fixed or properly deferred.

FLAPS: night equipment

When: any flight after sunset. Night VFR needs everything in A TOMATO FLAMES, plus these (91.205(c)).

- Fuses: one spare set, or three of each kind, where you can reach them in flight (if the airplane uses fuses).
- Landing light: only if the airplane is operated for hire.

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- Anticollision lights.
- Position lights (navigation lights).
- Source of electricity: enough for all the electrical and radio equipment installed.
- More is in Night Flying.

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PLANNING THE FLIGHT

What you must know before you leave, and the rules for where you may fly.

NWKRAFT: preflight action

When: planning every flight. 14 CFR 91.103 says you must become familiar with all available information concerning the flight; this is how most pilots remember what that includes.

- NOTAMs: runway and lighting closures, TFRs, and at KONZ the field and Fermi NOTAMs. Not named in 91.103, but part of "all available information".
- Weather reports and forecasts (required for IFR flights and flights away from the airport).
- Known traffic delays that ATC has told you about.
- Runway lengths at the airports you'll use.
- Alternatives if the flight can't be completed as planned.
- Fuel requirements, including the reserve (30 minutes day, 45 minutes night, 91.151).
- Takeoff and landing distances for the airplane, the load and the conditions.

3-152: VFR weather minimums

When: planning and in flight, below 10,000 MSL in Class C, D and E airspace (91.155).

- 3 statute miles of visibility.
- 1,000 ft above clouds.
- 500 ft below clouds.
- 2,000 ft horizontally from clouds.
- **Class B** is simpler: 3 miles and clear of clouds. Class G has its own minimums by altitude and time of day. The full table is in the Airspace Study Guide.

East is odd, West is even: VFR cruising altitudes

When: cruising more than 3,000 ft above the ground and below 18,000 MSL (91.159).

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- **Magnetic course 0° to 179° (eastbound):** odd thousands plus 500. For example 3,500, 5,500, 7,500.
- **Magnetic course 180° to 359° (westbound):** even thousands plus 500. For example 4,500, 6,500.
- It's the magnetic **course** over the ground, not the heading.
- **Below 3,000 AGL** the rule doesn't apply. Most of our local flying, including the practice area at 3,500 MSL (about 2,900 AGL), is below it.

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ON THE GROUND AND BEFORE TAKEOFF

From taxiing out to lining up.

Climb into, dive away from: taxiing in wind

When: every taxi with a crosswind or tailwind.

- **Wind from in front:** turn the yoke **into** the wind. In our nosewheel airplanes, keep the elevator neutral.
- **Wind from behind:** "dive away": yoke **forward** and turned **away** from the wind.
- **Why it matters:** a quartering tailwind can get under the tail and a wing. The interactive version is in Taxiing in Wind.

SAFETY: the passenger briefing

When: before engine start, every time you carry a passenger. You'll be asked to give it on the checkride.

- Seat belts and shoulder harnesses: how to fasten and release them; on for taxi, takeoff and landing. Seat position locked.
- Air vents and heat: where they are and how they work. What to do if they feel unwell.
- Fire extinguisher: where it is and how to use it.
- Exit doors and emergencies: how to open the door, what to do in an emergency landing, the survival kit.
- Traffic and talking: point out traffic you see; stay quiet during takeoff, landing and radio calls.
- Your questions: ask them now.

CIGARS: before takeoff

When: at the run-up area, after the engine run-up, before you taxi to the runway. Versions vary; this is the common one. Always follow the airplane's own checklist.

- Controls: free and correct, full travel, in every direction.
- Instruments: set. Altimeter to the field setting, heading indicator to the compass, radios and transponder set.

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- Gas: fuel selector on the right tank (fullest tank in the Cherokee, BOTH in the 172M), mixture rich, fuel pump ON in the Cherokee, quantity checked.
- Attitude: trim set for takeoff.
- Run-up: done, mags and carb heat checked.
- Safety: belts, harnesses and doors latched; passengers briefed. Some versions use S for Seats.

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IN THE AIR

Talking, navigating and keeping the instruments honest.

Who, who, where, what: making a radio call

When: every call to ATC or on a CTAF.

- **Who** you're calling: "Detroit Approach" or "Grosse Ile traffic".
- **Who** you are: your type and call sign.
- **Where** you are: position and altitude.
- **What** you want: your request or intention.
- On a CTAF, end with the airport name again so pilots who missed the start know which field you mean. More in Radio Calls for Our Flying.

ANDS and UNOS: magnetic compass errors

When: using the magnetic compass, for example after a vacuum failure. These work in the northern hemisphere.

- **ANDS, acceleration error:** on an east or west heading, Accelerate and the compass shows a turn to the North; Decelerate and it shows a turn to the South. Hold the airspeed steady before you read it.
- **UNOS, turning error:** when turning to a northerly heading, Undershoot: roll out before the compass reaches North. Turning to a southerly heading, Overshoot: roll out after it passes South.
- The amount grows with latitude. At KONZ, about 42° north, it is large. Ask your CFI for the numbers they teach.

High to low, look out below: altimeter errors

When: flying toward lower pressure or colder air without updating the altimeter.

- **High to low pressure:** if you don't reset the altimeter, it reads **higher** than you really are. You are lower than you think.
- **Hot to cold:** in air colder than standard, your true altitude is lower than the altimeter shows. Same warning: look out below.
- **The fix:** update the altimeter from stations along your route. In very cold weather, add margin over terrain and obstacles. See Winter Flying in Michigan.

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GUMPS: before landing

When: on downwind, or about 3 miles out on a straight-in. Every landing, out loud.

- **G**as: in the Cherokee, fullest tank and fuel pump ON. In the 172M, selector on BOTH.
- **U**ndercarriage: fixed gear in our airplanes, nothing to lower. Say it anyway; the habit matters if you fly a retractable later.
- **M**ixture: RICH. Carb heat as your airplane's procedure says.
- **P**rop: fixed pitch in our airplanes. Watch the RPM instead.
- **S**witches and seatbelts: landing light on, belts and harnesses snug, door latched.
- The pattern guides have the full flow for each airplane: Cherokee Runway 22, 172M Runway 22.

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WHEN SOMETHING GOES WRONG

These are the ones to know so well you never have to think about them.

Aviate, navigate, communicate

When: any problem in flight, in that order.

- **Aviate:** fly the airplane first. Hold attitude and airspeed.
- **Navigate:** know where you are and where you're going.
- **Communicate:** only then talk to ATC or anyone else.
- **Why it matters:** accidents happen when pilots stop flying to work a problem or talk on the radio.

ABCDE: engine failure in flight

When: the engine quits or loses power at altitude.

- Airspeed: best glide at once, and trim. 80 mph in the Cherokee, 75 mph (65 knots) flaps up in the 172M.
- Best field: pick one within gliding distance, into the wind if you can, and turn toward it.
- Checklist: the restart flow. In the Cherokee: other tank, pump ON, mixture rich, carb heat ON. In the 172M: carb heat ON, fuel BOTH, mixture rich.
- Declare: "Mayday" on the frequency you're on or 121.5, and squawk 7700.
- Execute: fly the landing. Secure the engine once you're committed, unlatch the door before touchdown.
- The memory items for each airplane are in the Cherokee Flow Cards and the Cessna 172M Checklist.

The 5 C's: lost procedures

When: you're unsure of your position.

- Climb: you see farther, and radios and GPS work better. Near KONZ, check the Class B floor first.
- Communicate: call ATC or Flight Service. They can find you on radar.
- Confess: tell them plainly that you're unsure of your position.
- Comply: follow their instructions.

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- Conserve: reduce power and lean to save fuel while you sort it out.
- See Navigation for using landmarks such as Lake Erie and the Detroit River.

PARE: spin recovery

When: an inadvertent spin. Spins are prohibited in the normal category; this is for recovering from one you didn't mean to enter.

- Power: idle.
- Ailerons: neutral.
- Rudder: full, opposite the rotation. The turn coordinator shows which way.
- Elevator: forward, briskly, to break the stall.
- When the rotation stops: rudder neutral, then pull out of the dive smoothly without overstressing the airplane.
- **Your POH wins:** check its spin recovery procedure and follow it.

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DECISIONS AND YOUR BODY

The human-factors mnemonics. Expect most of these in the oral exam.

DECIDE: making a decision

When: a change in the flight that needs a decision, such as weather ahead or a rough engine.

- Detect that something has changed.
- Estimate whether you need to react.
- Choose an outcome you want.
- Identify actions that get you there.
- Do the best action.
- Evaluate the result, and go round again if needed.

3P: perceive, process, perform

When: continuously in flight. A shorter loop than DECIDE.

- **Perceive** the hazards.
- **Process** them: how bad, and what can be done.
- **Perform:** act to remove or reduce the risk, then perceive again.

The five hazardous attitudes and their antidotes

When: a self-check, and a favorite oral question. Not an acronym; know each attitude and its antidote.

Attitude	It sounds like	Antidote
Anti-authority	"Don't tell me."	Follow the rules. They are usually right.
Impulsivity	"Do it quickly."	Not so fast. Think first.
Invulnerability	"It won't happen to me."	It could happen to me.
Macho	"I can do it."	Taking chances is foolish.
Resignation	"What's the use?"	I'm not helpless. I can make a difference.

HHSS: the four types of hypoxia

When: the oral exam, high-altitude flying and carbon monoxide.

- Hypoxic: not enough oxygen in the air you breathe. Altitude.

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- Hypemic (anemic): the blood can't carry enough oxygen. Carbon monoxide from a leaking exhaust, blood loss.
- Stagnant: the blood isn't moving well. Pulling g's, extreme cold, shock.
- Histotoxic: the cells can't use the oxygen. Alcohol and some drugs.
- A CO detector in the cabin catches the one most likely to get you in a Michigan winter.

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NIGHT AND LATER TRAINING

A last few you'll meet now or soon.

Port wine is red: position lights

When: night flying, to read another airplane's lights.

- **Left wingtip (port):** red. Port wine is red.
- **Right wingtip:** green. **Tail:** white.
- **Reading traffic:** red and green both visible means it is coming toward you. Only green means it is crossing from left to right; only red, from right to left. Only white means you are behind it.

CRAFT: copying a clearance

When: receiving an IFR clearance, or a VFR clearance out of some busy airports.

- Clearance limit: where you're cleared to.
- Route: how to get there.
- Altitude: to climb to, and when to expect higher.
- Frequency: departure control.
- Transponder: the squawk code.
- Write the letters down the side of your kneeboard before you call, and fill them in as you listen.

The 5 T's: on an instrument approach

When: at each fix on an instrument approach, in instrument training.

- Turn to the new heading or course.
- Time: start the timer if the approach needs it.
- Twist: set the course on the CDI or HSI.
- Throttle: set power for the descent or the new speed.
- Talk: report if ATC asked you to.

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SELF-CHECK

Tap a question to see the answer.

What does IMSAFE stand for, and when do you use it?
Illness, Medication, Stress, Alcohol, Fatigue, Emotion (or Eating). Before every flight, to decide whether you are fit to fly today.

What are the four letters of PAVE?
Pilot, Aircraft, enVironment, External pressures: the four areas to look for risk when planning a flight.

Which documents does ARROW say must be in the airplane, and which one only applies sometimes?
Airworthiness certificate, Registration, Radio station license, Operating limitations, Weight and balance. The radio station license is only needed for international flights.

In AV1ATES, when is a 100-hour inspection required?
When the airplane carries people for hire or is used for flight instruction for hire (91.409).

What does the FLAPS mnemonic add, and when?
The night VFR equipment, on top of A TOMATO FLAMES: fuses (spares), landing light (if for hire), anticollision lights, position lights and a source of electricity.

What is 3-152, and where does it apply?
3 miles visibility, 1,000 ft above, 500 ft below and 2,000 ft horizontally from clouds: the VFR minimums in Class C, D and E below 10,000 MSL.

You're flying a magnetic course of 240° at 5,000 ft above the ground. What altitudes may you choose?
Westbound, so even thousands plus 500: 4,500, 6,500 or 8,500 MSL, whichever keeps you more than 3,000 ft above the ground and fits the weather and airspace.

Taxiing with a quartering tailwind from the left, where do the controls go?
Dive away from it: yoke forward and turned to the right, away from the wind.

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What does each letter of GUMPS mean in our fixed-gear airplanes?
Gas (fuel selector, and the pump in the Cherokee), Undercarriage (fixed: say it anyway), Mixture rich, Prop (fixed pitch: watch RPM), Switches and seatbelts.

On an east heading, you accelerate. What does the compass do?
It shows a turn to the north (ANDS: Accelerate North, Decelerate South).

You fly from high pressure to low without resetting the altimeter. Are you higher or lower than it shows?
Lower. High to low, look out below.

The engine quits at 3,500 ft. What does ABCDE tell you to do first?
Airspeed: pitch for best glide and trim, before anything else. Then pick the Best field, run the Checklist, Declare and Execute.

What are the 5 C's?
Climb, Communicate, Confess, Comply, Conserve: the lost procedure.

What is the antidote to the "it won't happen to me" attitude?
"It could happen to me." That attitude is invulnerability.

Which type of hypoxia does carbon monoxide cause?
Hypemic (anemic) hypoxia: the blood can't carry enough oxygen.

At night you see only a red light on another airplane. Which way is it going?
You're seeing its left wingtip, so it is crossing from your right to your left.

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SOURCES

- Pilot's Handbook of Aeronautical Knowledge (FAA-H-8083-25C): aeronautical decision-making (PAVE, 5 P's, DECIDE, 3P, hazardous attitudes), IMSAFE, aeromedical factors, compass errors and altimeter errors.
- Airplane Flying Handbook (FAA-H-8083-3C): taxiing in wind, emergency procedures, the passenger briefing.
- 14 CFR 91.103, 91.151, 91.155, 91.159, 91.171, 91.17, 91.205, 91.207, 91.213, 91.409, 91.411 and 91.413.
- FAA Private Pilot ACS (FAA-S-ACS-6C) for the tasks these support.
- Mnemonics are common aviation knowledge; the explanations here are our own. Check every rule against the current regulations and your airplane's POH, and use the version your CFI teaches.

Training aid only, not flight instruction. The POH in the airplane and its placards win: check every number against them, and fly with your CFI.

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