Stage 1 Lesson 1
- Introduction to Flight & High Altitude Maneuvers -

COLLISION AVOIDANCE

Tiziano Bernard, CFI

Mission Objectives

- Recognize the importance of collision avoidance under VFR.
- Learn how to properly scan for traffic in-flight.
- Learn who has the right of way under various circumstances.
- Appreciate clearing procedures to avoid collisions.

COLLISION AVOIDANCE

“If you see something, say something” – TSA guidance

Visual Flight Rules (VFR)

- Flying under VFR requires pilots to “see and avoid”.
- Proper visual scanning and collision avoidance techniques are of paramount importance!
- Crew members but also passengers!
- Passenger Safety Brief: SAFETY. The T is for “traffic” and “talking”.
  - Brief your passengers to report visuals with other aircraft. Don’t assume the pilot sees everything!

VISUAL SCANNING

"Traffic, three o'clock, same altitude"– ATC when you're in a turn and have no idea where three o'clock is...

Foveated Field

- Eyes require a couple of seconds to focus on an object.
  - A continuous visual “sweep” is the equivalent of blurred vision.
- The eye sees most detail in the central part of the retina, called the **foveated field**.
- Foveated field: **1 degree** vertically and horizontally.
- Green airplane is visible from 5,000 ft if within foveated field.
- Red airplane is 5 degrees off. It becomes visible only at 500 ft!

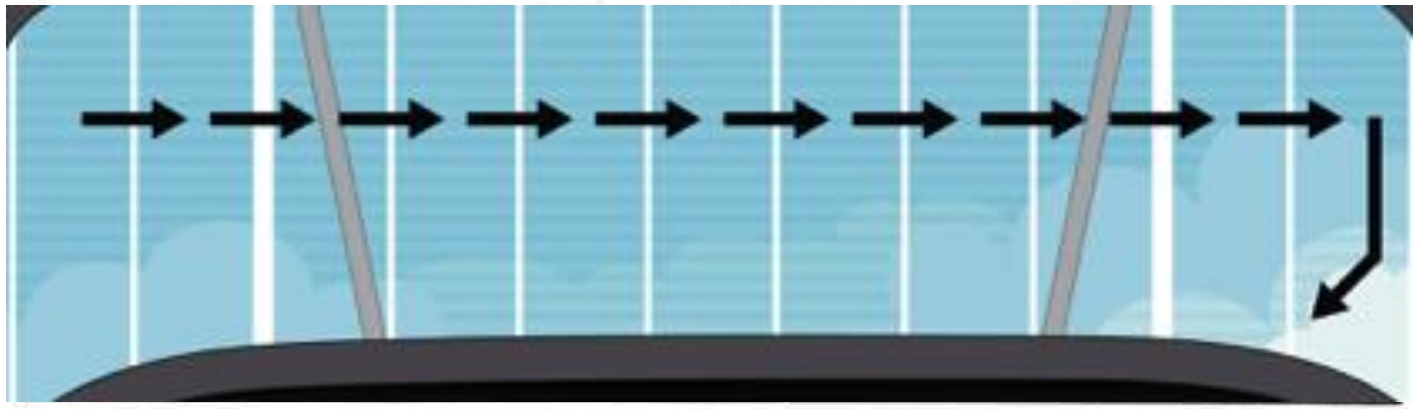
Focus

- To better see “far away” we need to keep the eye focused at a distance.
- If there is nothing to focus on, the eye will naturally relax back to an intermediate focal distance after **60-80 seconds**.
  - Empty field myopia
- Every so often, **focus your vision on the farthest object**.
  - Clouds at horizon, distant building, etc.

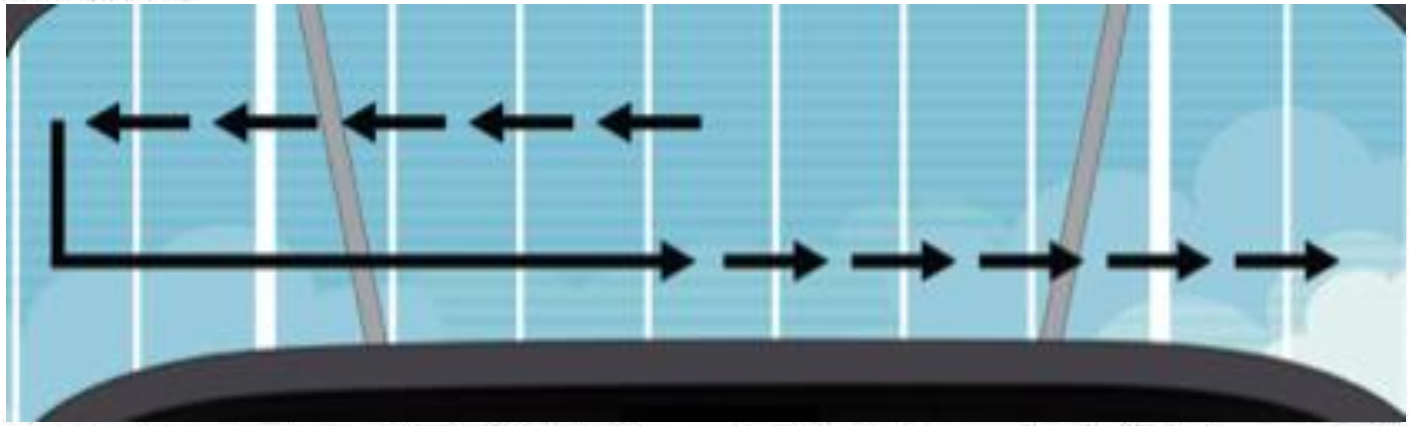
Technique

- Eyes require 2-5 sec to focus on an object.
  - A continuous visual “sweep” is the equivalent of blurred vision = BAD!
- Split scan in 10 deg increments.

Two scanning methods that have proved to be the most effective for pilots involve the "block" system of scanning, which is based on the theory that "traffic detection can be made only through a series of eye fixations at different points in space." In application, the viewing area (windshield) is divided into segments, and the pilot methodically scans for traffic in each block of airspace in sequential order.



Side-to-Side scanning method. Start at the far left of your visual area and make a methodical sweep to the right, pausing in each block of viewing area to focus your eyes. At the end of the scan, return to the panel.

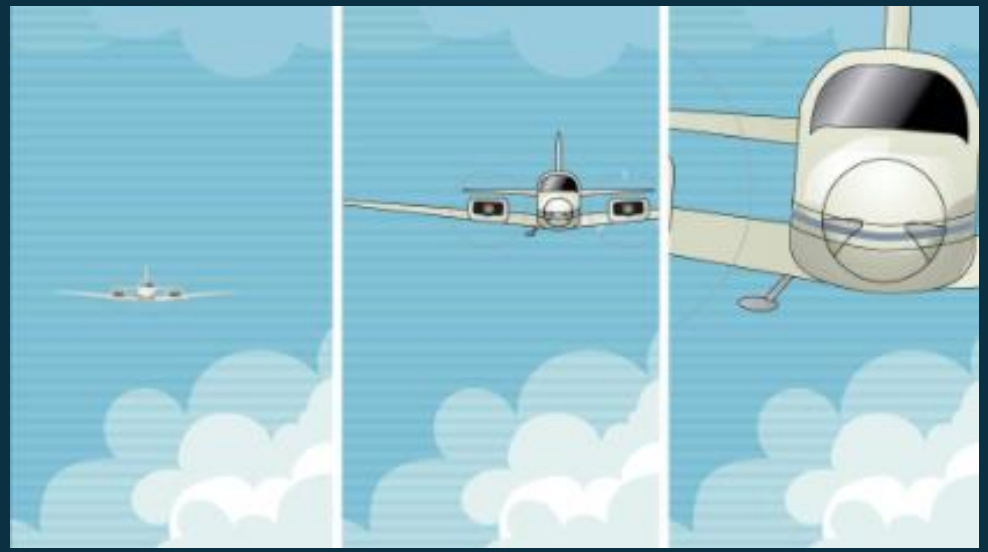


Front-to-side scanning method. Start in the center block of your visual field (center of front windshield); move to the left, focusing in each block, then swing quickly to the center block after reaching the last block on the left and repeat the performance to the right.

FIGURE 2

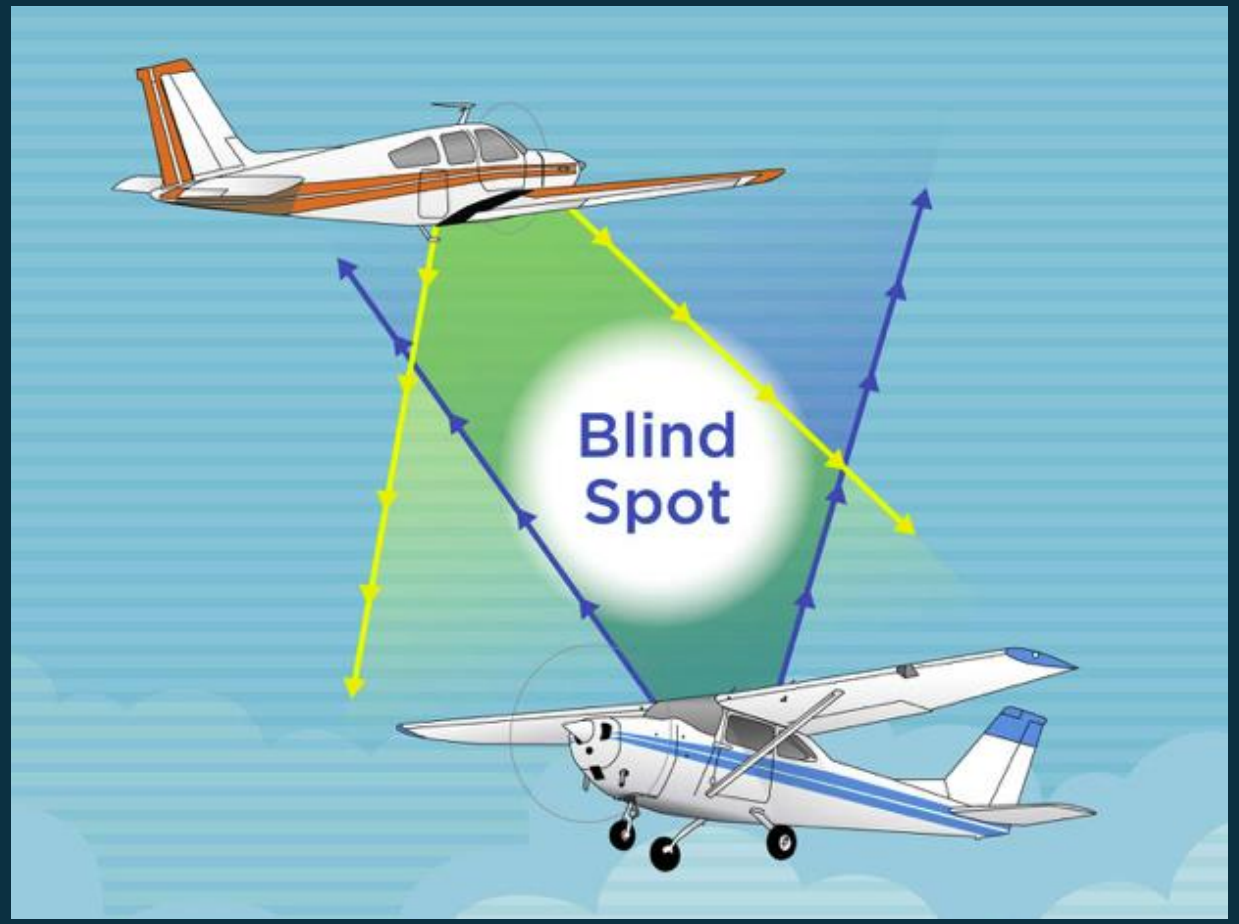
Blossom Effect

- Airplanes on a direct collision course with one another appear **stationary**.
- By the time you see it getting bigger, it may be too late to react and avoid a mid air collision (MAC).
- If stationary, react!!
- Both aircraft should turn right.



Blind Spots

- Consider that aircraft right on top of each other will not be able to see each other.
- Low wing pilots have difficulty seeing below.
- High wing pilots have difficulty seeing above.



RIGHT OF WAY

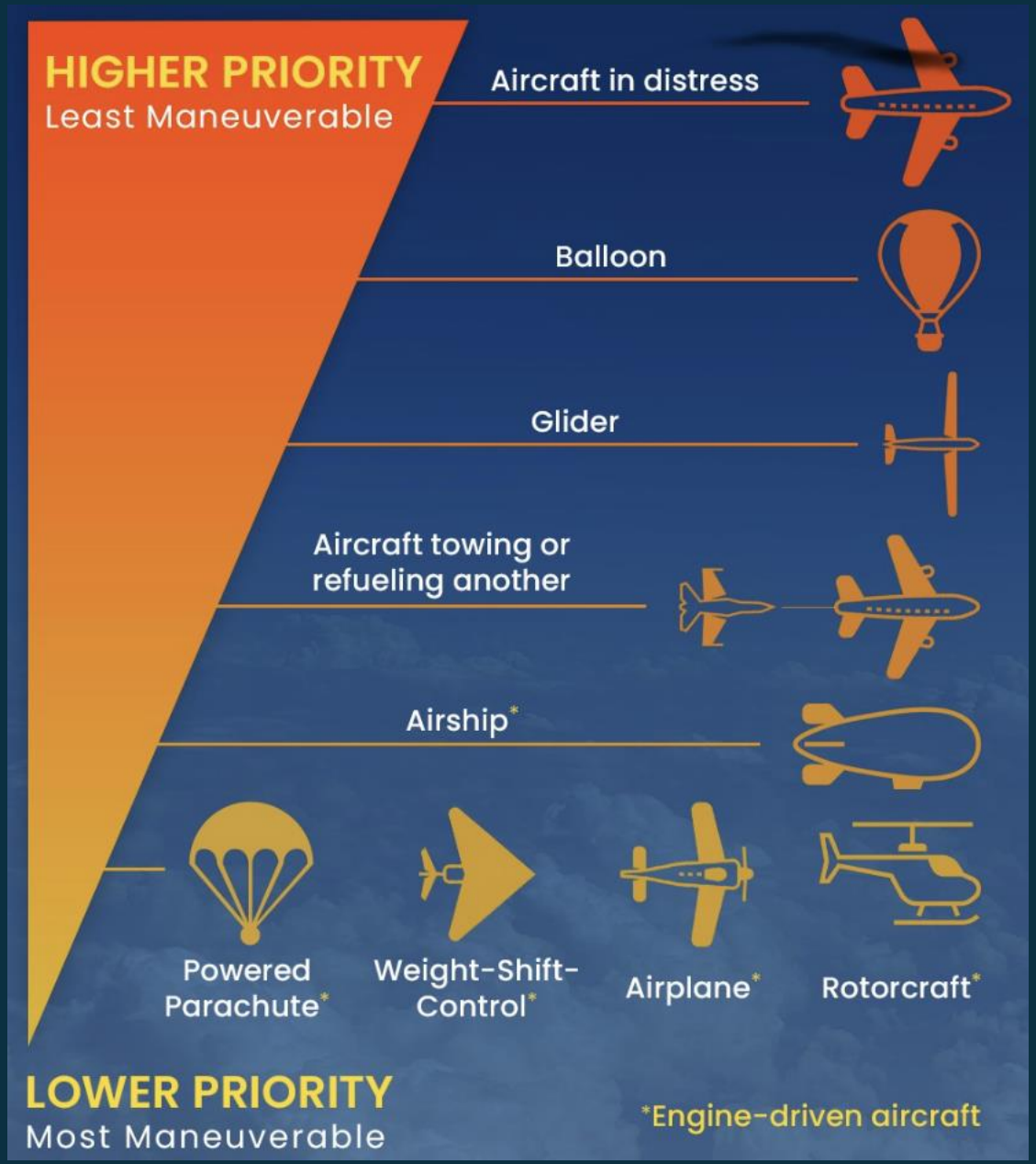
“Let’s play chicken”– Student pilot who is clearly not in Pearl Harbor

Overall order of priority

- Right of way rules are created to make sure air traffic is facilitated as much as possible.
- A powered airplane has more **maneuvering capability** than a glider or a balloon.
- Emergencies have priority over any other flight.
- The right of way rules are reported in 14 CFR 91.113.

Different Categories

- This priority order applies for all converging traffic, except for head on (see next slide).

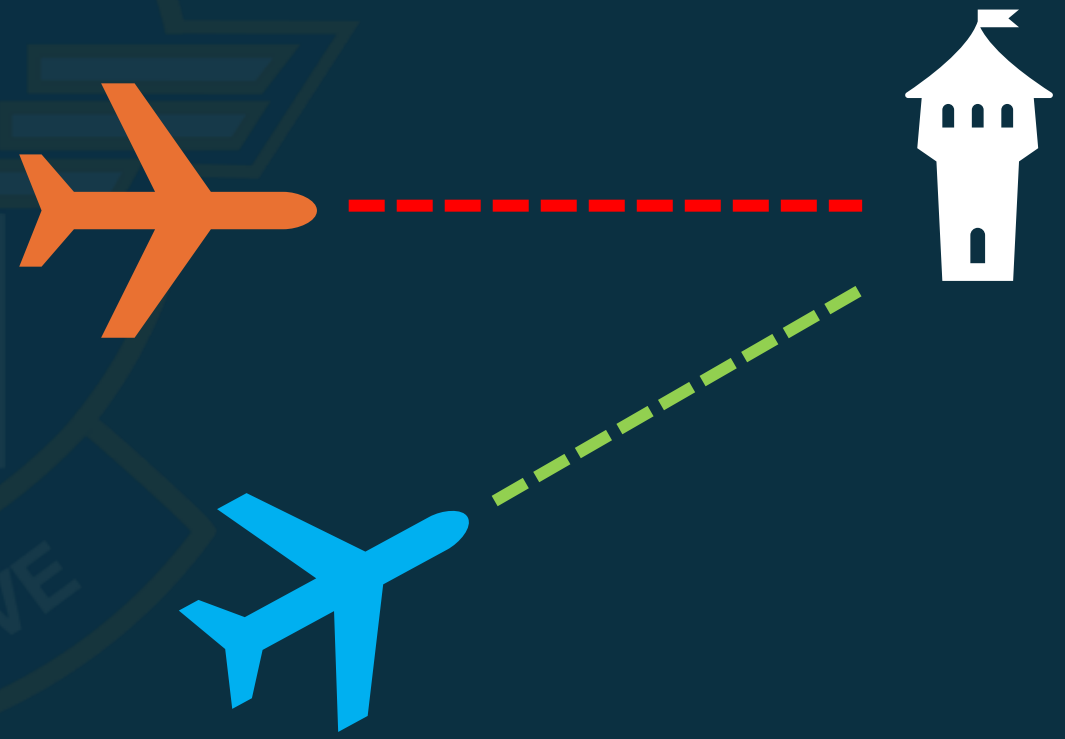


All Aircraft: Converging Head On

- Each pilot shall turn to the right.

Same Type: Converging to a point

- The pilot **coming from the right** has the right of way.

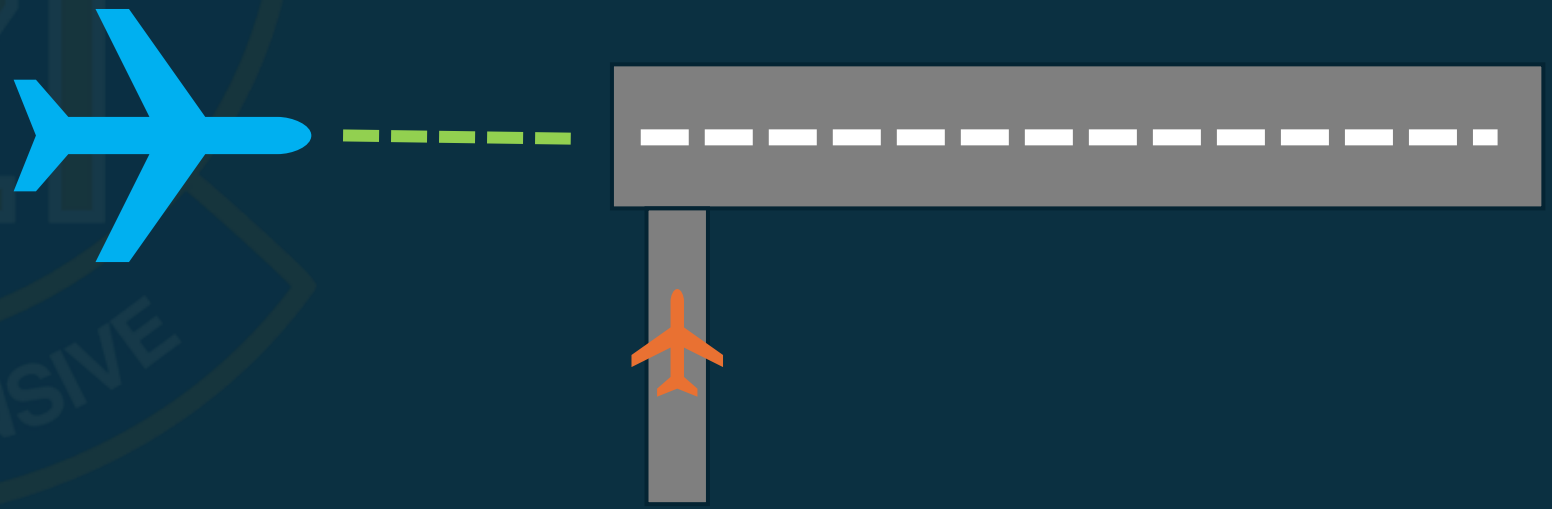


Same Type: Overtaking

- The pilot **being overtaken** has the right of way.
- The overtaking aircraft shall maneuver to the right.
- NOTE: This is why clearing turns are performed to the left, first.

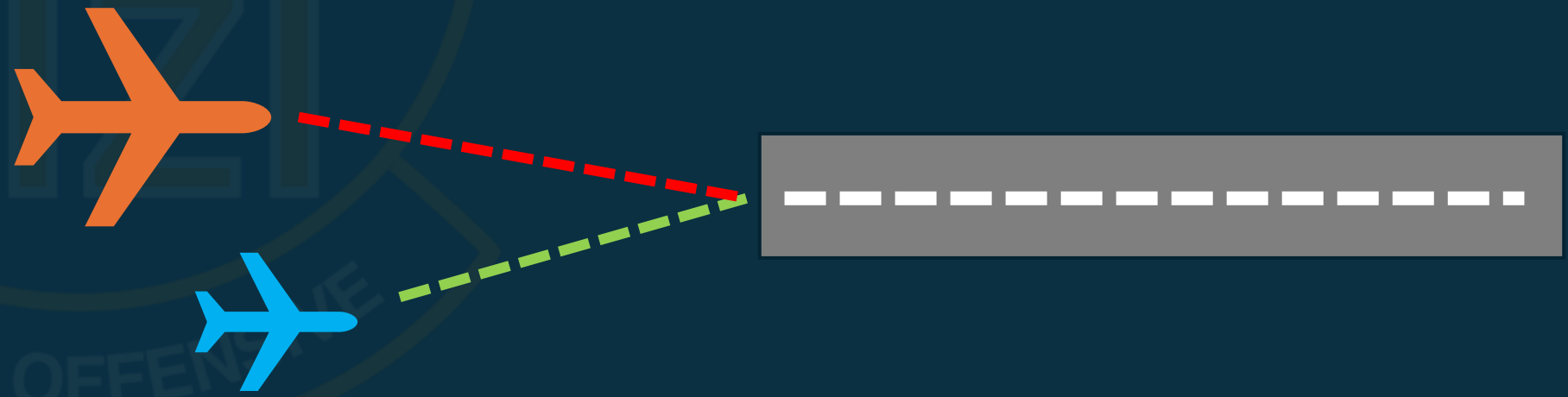
Same Type: Final Approach and Landing

- The aircraft **on final approach or landing** has the right of way over other aircraft, airborne or on the ground.



Same Type: Final Approach and Landing

- If two aircraft are on final approach, the one **at lower altitude** has the right of way over other aircraft.
- Pilots shall not change their altitude to take advantage of the situation.



CLEARING PROCEDURES

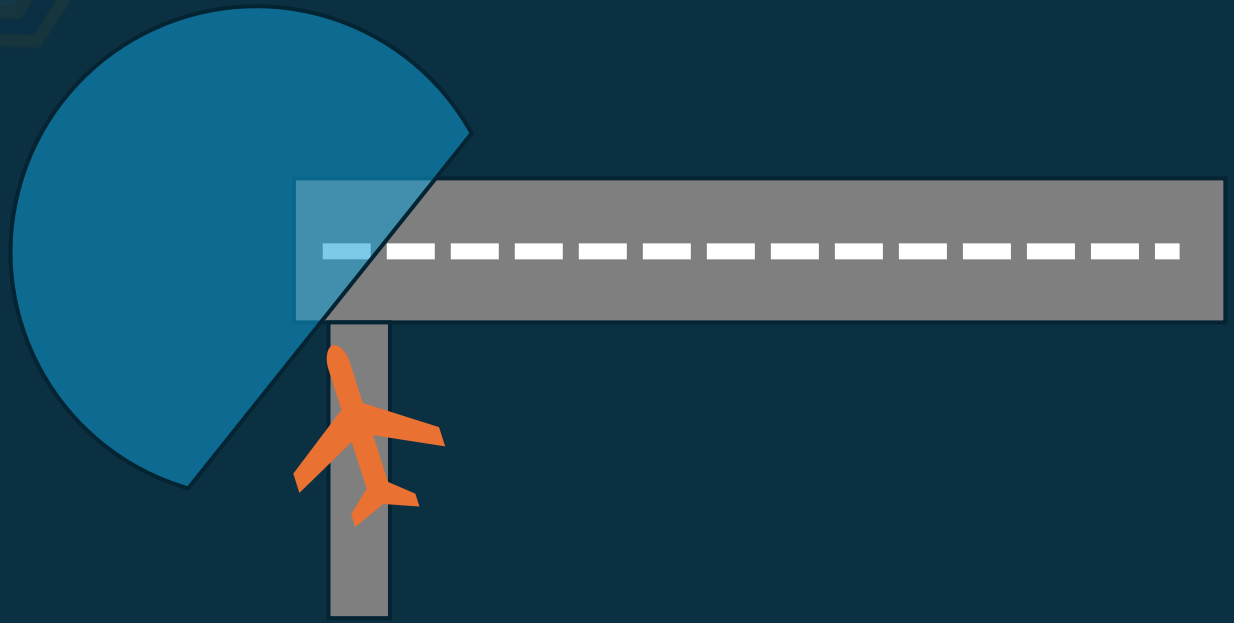
“Clear, left” – Student pilot looking to the right

Purpose

- Clearing procedures are scans done by pilots to verify there is no traffic present in the area.
- They are done at multiple locations in the various phases of flight.
  - Pre-takeoff;
  - Pre-maneuvers in a practice area, etc.
- These are great habits to have.

Before Takeoff

- When you hold short, visually scan “final” so that you can avoid landing aircraft that are not communicating their intentions.
- If needed, orient the nose towards final to help you see.

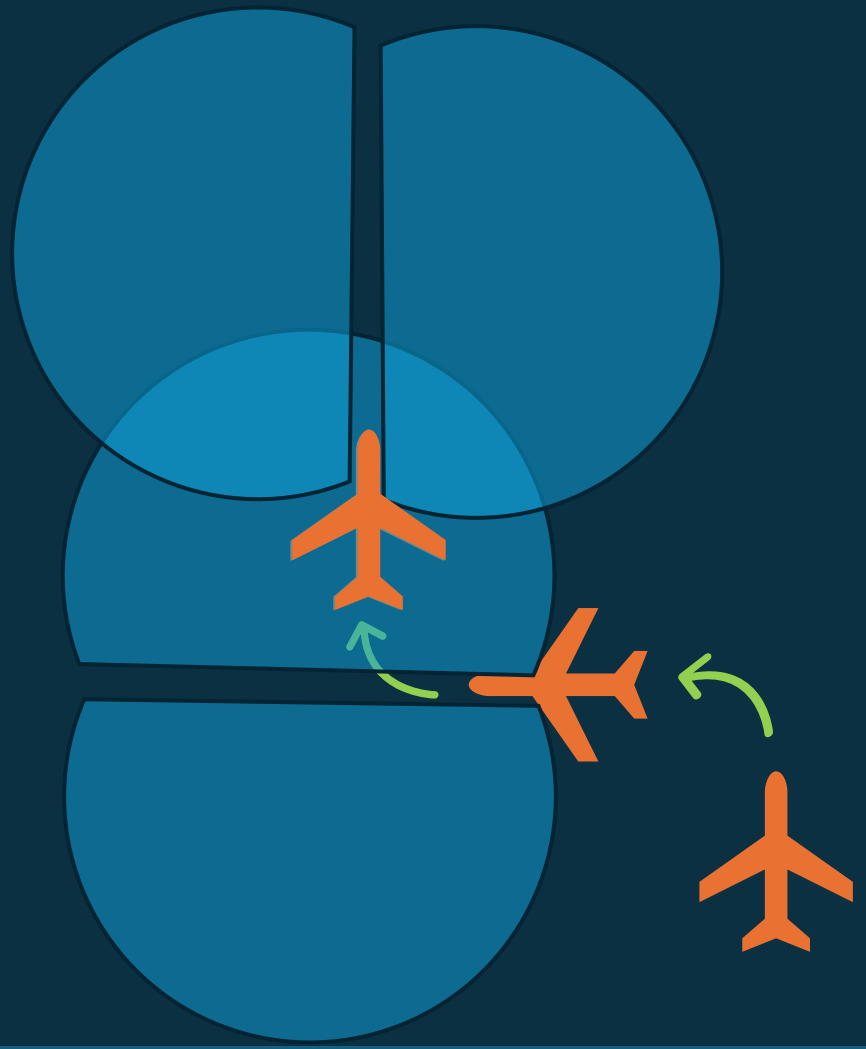


Climbs and Descents

- You are welcome to turn gently to the left and then the right as you climb or descend to help you avoid blind spots.

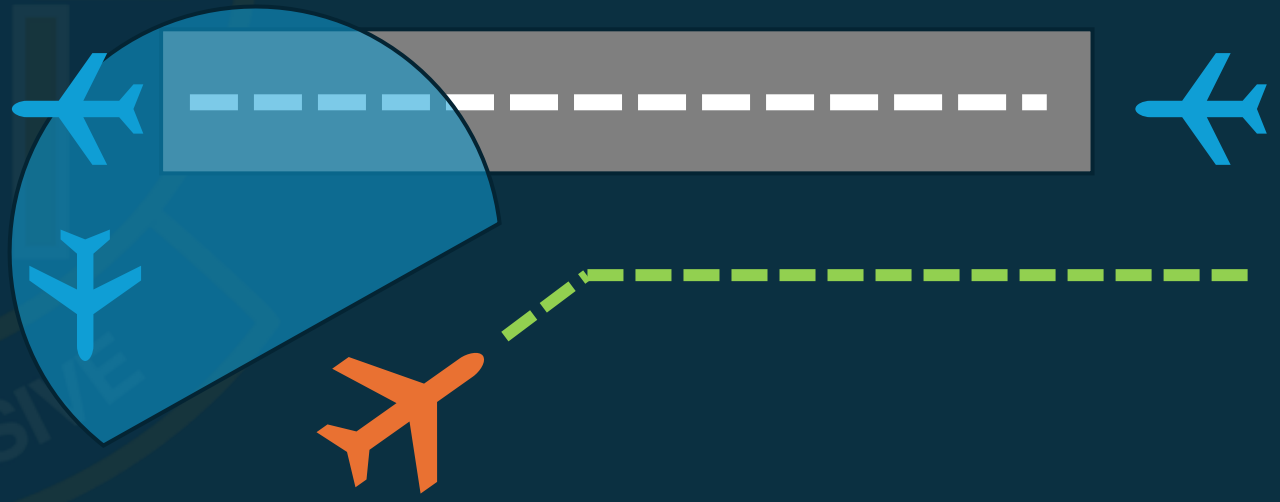
Clearing Turns (pre-maneuver/training)

- Before you begin training maneuvers (e.g., stalls), make sure to clear the area by turning 90 degrees **to the left** and **then to the right**.
  - Left first to avoid overtaking traffic.
- As you turn in the bank, look above you and below you.
- Failing to do a clearing turn prior to maneuvers may cost you your checkride.



Entering the Pattern and Congested Areas

- As you enter congested areas, be extra vigilant.
- Pattern entries, be mindful of who could join **behind you** or is **already in the pattern** but will now be **behind you**.



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