workfromanywhere

Become a Professional Drone Pilot

Operations & Procedures

Aeronautical Decision Making (ADM)

According to the FAA, 80% of all aviation accidents are the result of human error. Understandably, they're extremely concerned with preventing these errors.

That's why, for that past few decades, they've been coming up a web of frameworks and checklists for identifying hazards and risks, analyzing them, and taking the best available action. And they refer to that web as **Aeronautical Decision Making, or ADM.**

While making informed decisions is critical, there are way too many frameworks—CRM, SRM, SOP, DECIDE, TEAM, CARE, PAVE, WAT, IMSAFE, 3P, 5P. And they're all linked together in a convoluted mess where the P of PAVE contains all the steps of IMSAFE and 3P, 5P, and DECIDE are interchangeable.

But we'll work our way through ADM and you should be just fine!

II

During a dogfight in 1940, this pilot, Ray Holmes, ran out of ammunition and crashed his plane into an enemy, safely ejected, and called in for a pint at a local pub. He is the pinnacle of ADM.

Human error.

Let's start with the most important element of ADM—the pilot. As the probable cause of any aviation accident, the FAA wants you to know about the risks you might introduce to a flight.

There are two main topics: hazardous attitudes and hazardous physiological states.

Hazardous Attitudes

The FAA wants you to know about five hazardous attitudes that most commonly lead to trouble. The thing to remember here is that each attitude has an *antidote*, or opposite mindset to adopt if you find yourself with any of these afflictions. You should be able to match these attitudes with example situations and pick the correct antidote for a given attitude.

Anti-Authority ("Don't tell me.")

Anti-authority is intentionally rejecting rules.

Antidote: "Follow the rules. They are usually right."

Impulsivity ("Do it quickly.")

Impulsivity is acting without taking time to plan, consider flight conditions, or check airspace restrictions.

Antidote: "Not so fast. Think first."

Invulnerability ("It won't happen to me.")

Invulnerability is ignoring the possibility of repercussions.

Antidote: "It could happen to me."

Macho ("I can do it.")

Macho is taking unnecessary risks, usually to show off.

Antidote: "Taking chances is foolish."

Resignation ("What's the use?")

Resignation is giving up or giving in without considering what can be done.

Antidote: "I'm not helpless. I can make a difference."

Physiological Hazards

In addition to hazardous attitudes, you need to recognize the following physiological states, how they affect your abilities, and how to treat them.

Hyperventilation

Rapid breathing leading to a dizzying loss of Co2 in the blood.

Cause:	Unexpected situations.
Effects:	Visual impairment, unconsciousness, dizziness, muscle spasms.
Treatment:	Breathe normally or talk aloud.

Stress

The physiological response to physical and psychological demands.

Cause:	Anything from noise to fatigue to personal situations.
Effects:	Acute (short-term) stress can cause "flight or flight" responses.
Treatment:	Most people can cope with occasional stress, but seek a physicians help if it doesn't subside.

Chronic (long-term) stress can be caused by repeated episodes of acute stress and can dramatically impact the performance of a pilot.

Fatigue

Mental or physical tiredness that dulls coordination, communication, attention, and concentration.

Cause:	Sleep loss, exercise, or labor (physical). Stress or prolonged cognitive tasks (mental).
Effects:	Acute (short-term) fatigue can impact timing and vision/concentration.
Treatment:	A proper diet and enough rest.

Like stress, fatigue can be chronic and cause weakness, heart palpitations, and intestinal problems. If that's the case, see a physician.

Dehydration

A critical loss of water from the body causing headaches, cramps, fatigue, or dizziness.

Cause:	Heat, wind, humidity, and lack of water.
Effects:	Similar to fatigue—reduced performance with timing or concentration based tasks.
Treatment:	Drink two to four quarts of water per day.

Drugs & Alcohol

All you need to know is that it's the PIC's responsibility to avoid the adverse effects of drugs. Illicit drugs are obviously illegal, but it's up to the PIC to know whether a medication's side effects will impair their ability to fly safely. (Will this antihistamine make me drowsy, for example.)

And recall from the Regulations section, you can't fly if your BAC is above 0.04 or if it has been less than 8 hours after your last drink.

IMSAFE

The IMSAFE checklist is meant to help pilots assess themselves for all of the above conditions. It stands for Illness, Medication, Stress, Alcohol, Fatigue, Emotion.

Awareness (Scanning)

The last piece of the pilot puzzle is awareness, and there's a correct technique for looking out for potential hazards. Known as **scanning**, it consists of dividing your field of view into 30º sections and moving from left to right and far to near, spending 2-3 seconds at each section.

III ADM Frameworks

There are a few different ways to apply ADM (which is considered more of a concept.) Don't worry about remembering each step, just remember the names 3P, 5P, and DECIDE.

3P Model

- Perceive
- Process
- Perform

5Ps Check

- Plan
- Plane
- Pilot
- Passengers
- Programming

DECIDE

- Detect
- Estimate
- Choose
- Identify
- Do
- Evaluate

The 3P model most closely resembles ADM, so we'll use that as our framework. Each step of 3P has at least one framework or checklist within it, and it's okay if you don't remember the exact steps. Just try to remember what each one is for.

Step 1: Perceive

PAVE

PAVE is a framework for analyzing hazards, which is the first step of ADM.

P (**P**ilot)

"Am I okay?" (This is where the IMSAFE checklist comes in)

A (**A**ircraft)

"Is the aircraft working properly?"

V (En**v**ironment)

"How is the weather affecting my flight? Are there any flight restrictions in effect?"

E (**E**xternal Pressures)

"Am I under pressure to arrive on time? Is someone sick on board?"

Step 2: Process

CARE

Step two of the ADM framework is to assess risks by analyzing each element of the CARE checklist.

C (**C**onsequences)

A (**A**lternatives)

R (**R**eality)

E (**E**xternal Factors)

Step 3: Perform

TEAM

The final step of ADM is to act on the hazard or risk using **one** of the methods from TEAM.

T (**T**ransfer)

E (**E**liminate)

A (**A**ccept)

M (**M**itigate)

Quick Review

That was a ton of information, so here's a quick recap.

ADM Frameworks

3P or 5P or DECIDE

ADM Step 1: Identify Risks

PAVE, IMSAFE

ADM Step 2: Analyze Risks

CARE

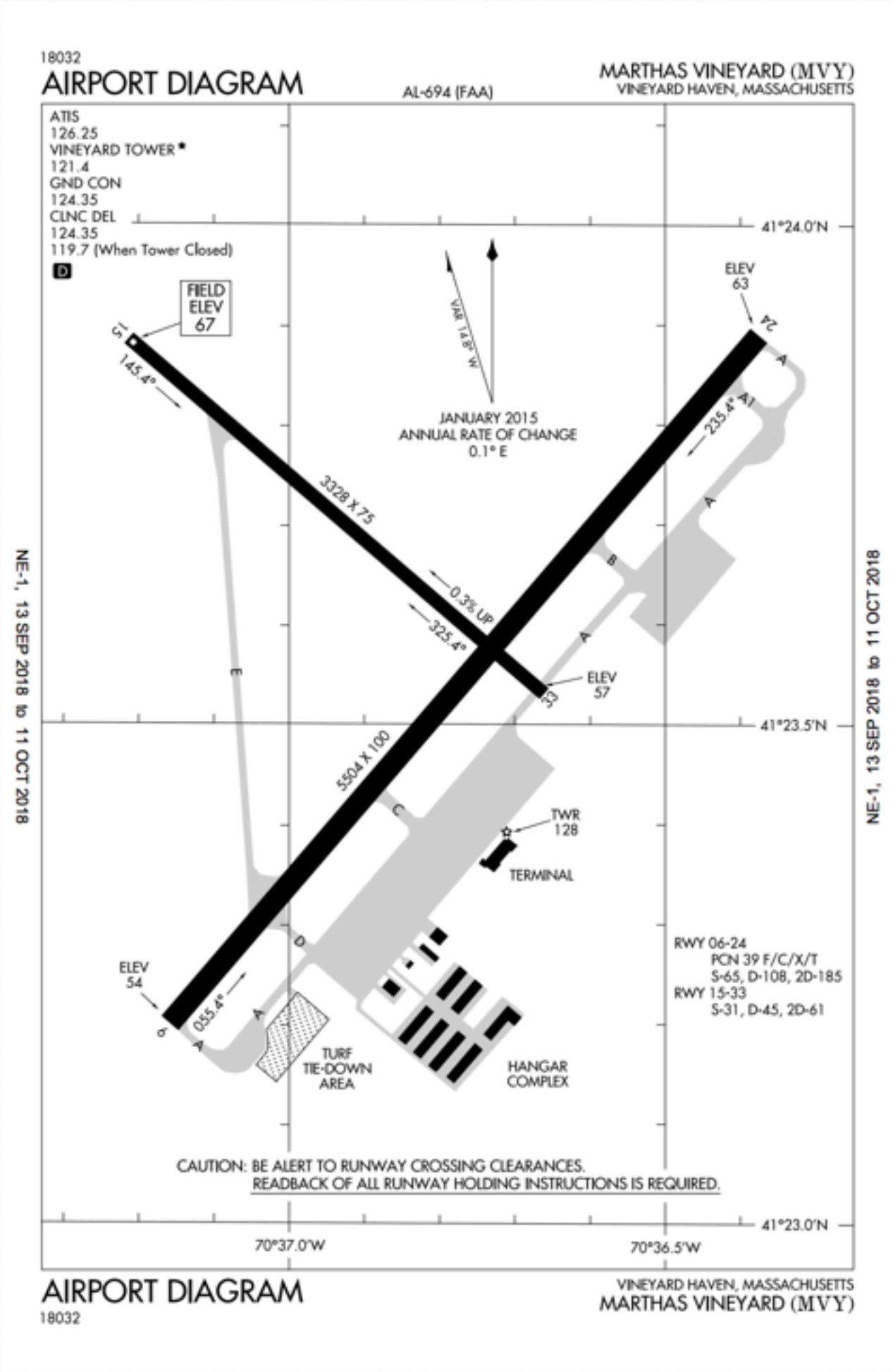
ADM Step 3: Take Action

TEAM

Crew Resource Management (CRM)

Crew Resource Management (CRM) is closely related to ADM. It refers to the utilization of all available resources—human, information, hardware—to ensure good decision making and safe flight across every stage of the operation.

IV Airport Operations



Runways

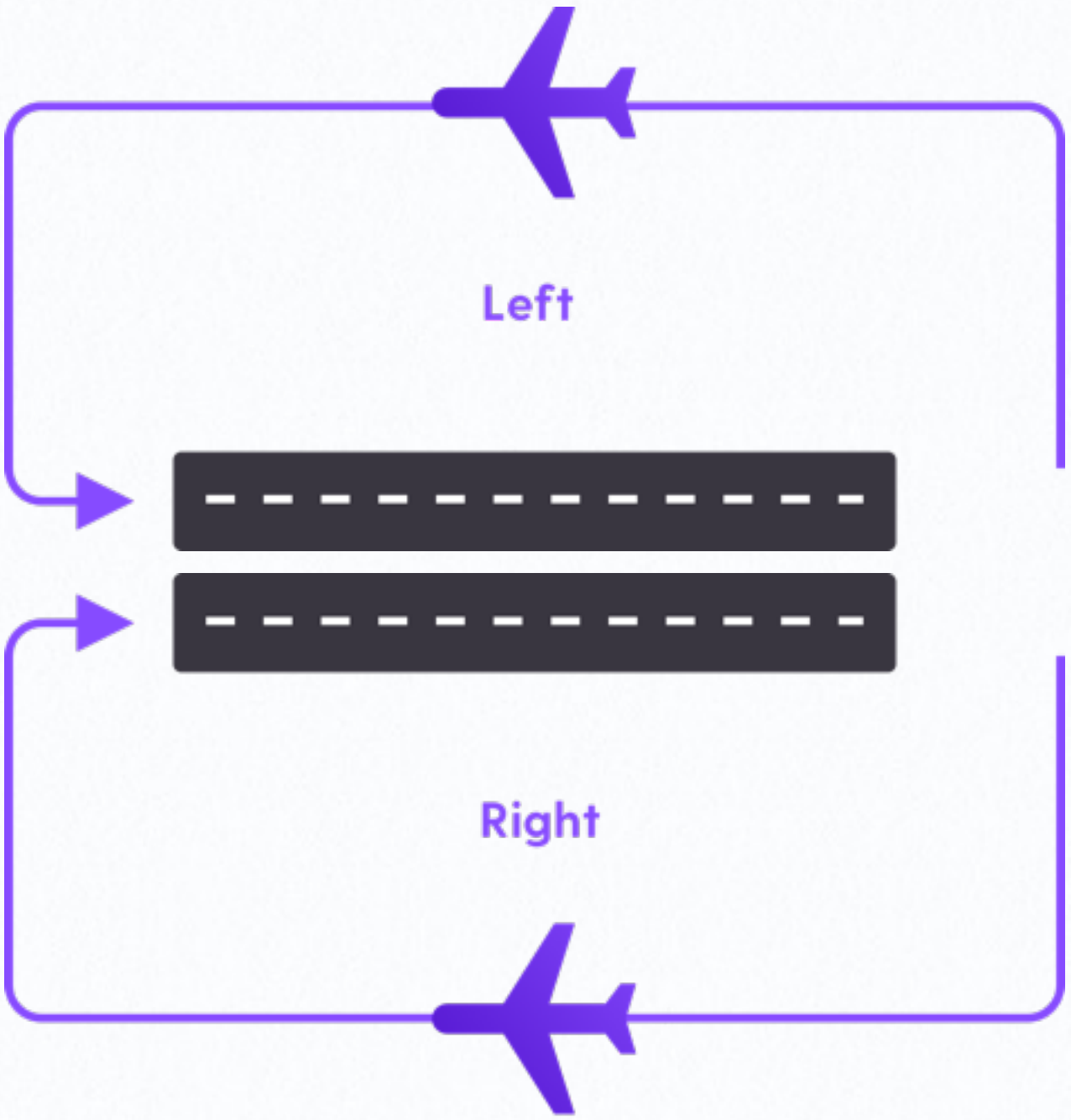
Runways names are predictable and consistent. That name is determined by its compass heading with one zero dropped. For example, a runway running from left to right, or a heading of 90º, would be named Runway 9. And since runways can generally be used from both directions, Runway 9 would also be known as Runway 27.

In the example on the previous page, we have the diagram for the airport on Martha's Vineyard. The larger of the two runways has two names—Runway 6 and Runway 24. The smaller of the two is both Runway 15 and Runway 33.

Traffic Patterns

Airports regularly update their active traffic patterns based on weather conditions. Wind is the primary factor, since planes take off and land into the wind. So if the wind is blowing from east to west over Runway 9-27, the airport would likely announce that Runway 9 is active.

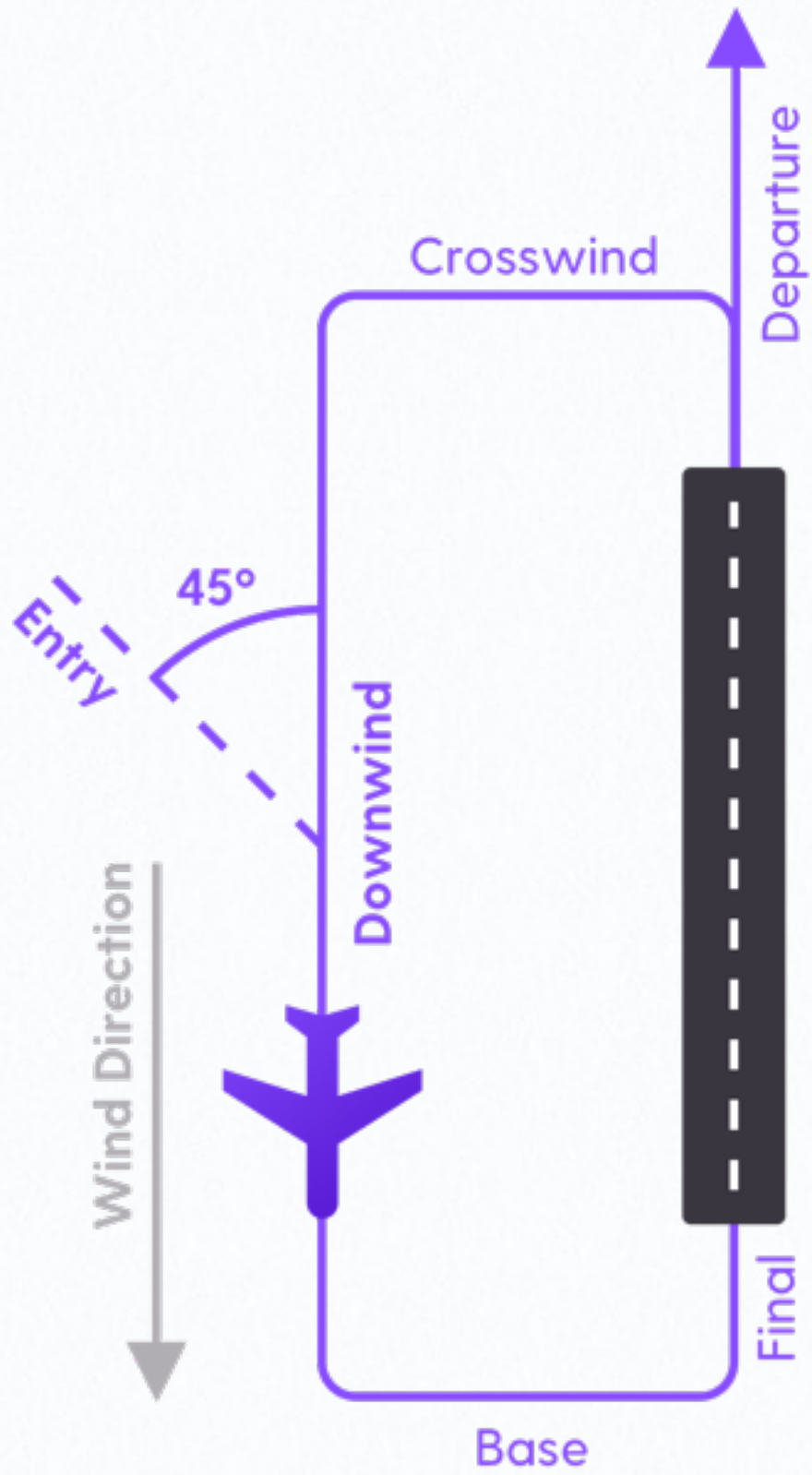
There are two types of traffic patterns for a runway—left and right. These refer to the turns aircraft take to circle or approach the runway. In a left traffic pattern, an aircraft approaches the runway from the right, taking all left turns. In a right traffic pattern, an aircraft takes all right turns.



Left traffic patterns are the most common, since it's easiest for pilots to look out the left side of the aircraft to see the runway.

Traffic Pattern Anatomy

Each segment of a traffic pattern has a name.



The most important segments of this traffic pattern are entry and downwind, though it can't hurt to be familiar with base, final, and crosswind. Notice the wind direction and the way it relates to the segments.

Also, take a look at how a typical entry is a 45º approach to the downwind segment of the traffic pattern.

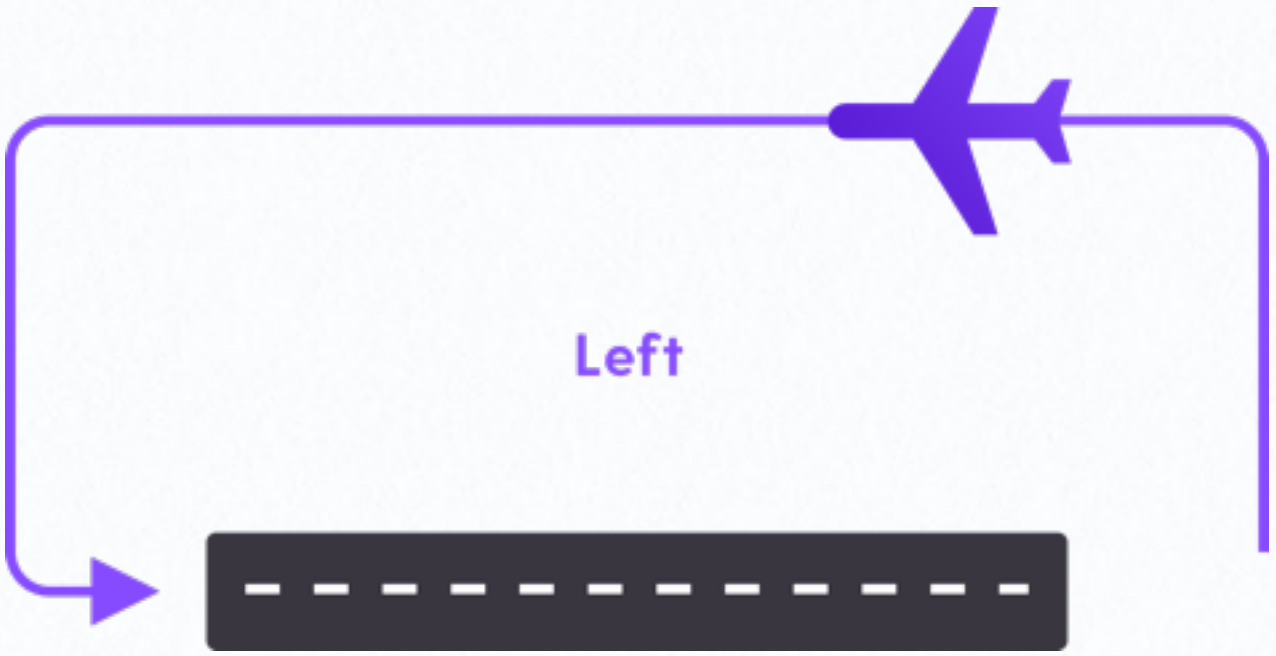
Example

There's an infamous question on the part 107 test based on this information, and it looks something like this:

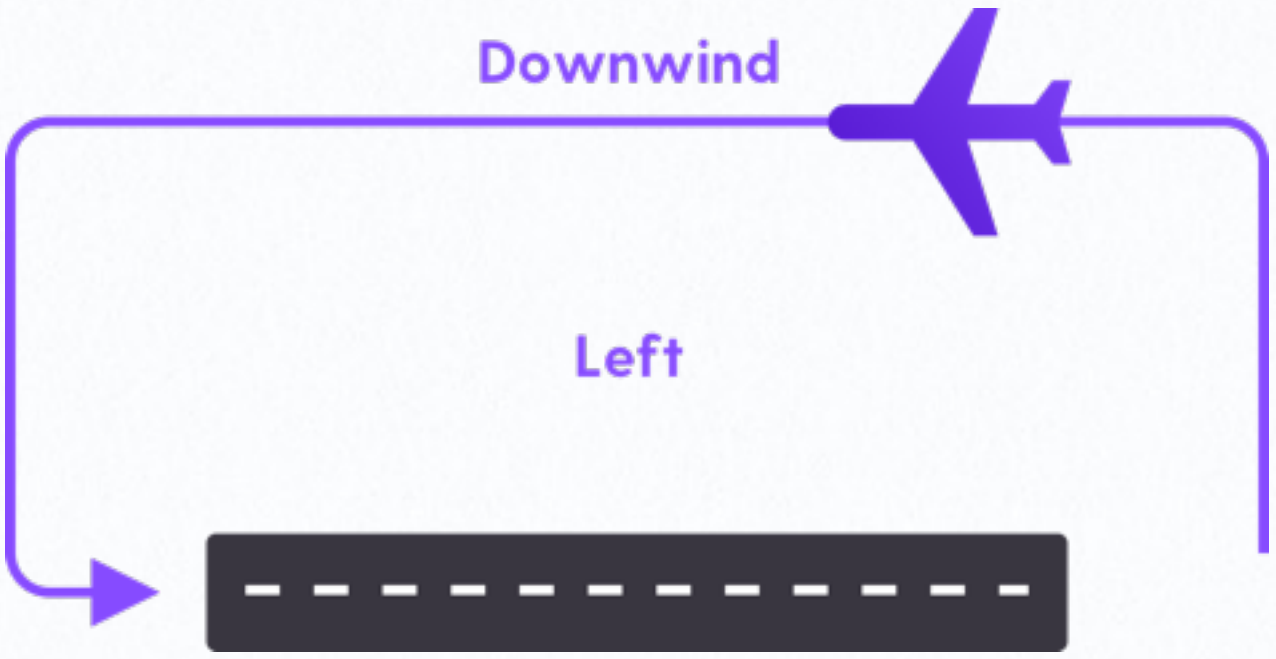
An aircraft announces, "left downwind for runway one six". This means that the aircraft is on a heading of:

Okay, so let's break this one down:

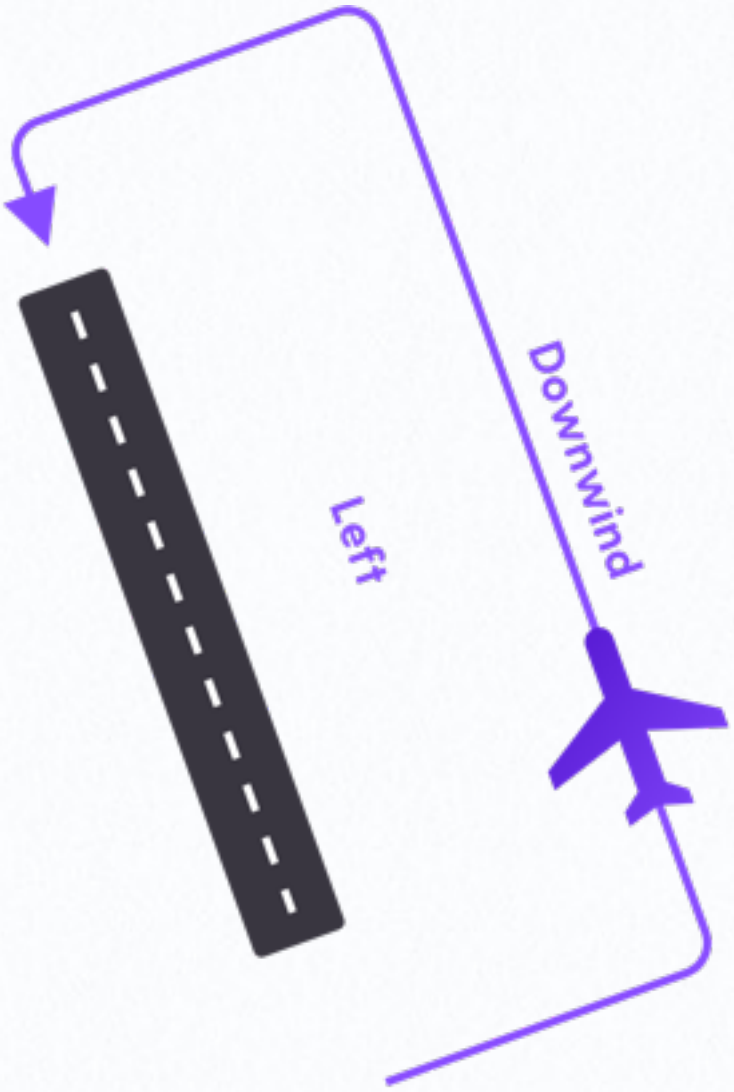
Left refers to the traffi c pattern, in this case left.



Downwind refers to the segment parallel to the runway.



Finally, **Runway One Six (16)** lets us know the orientation of the runway (160º), which is crucial since the question asks for the heading of the aircraft.



And here is our final result! Our aircraft, which is left downwind of runway one six, is currently at a heading of 340º.

If you see a question like this on your test, try to sketch it out.

V

Radio Procedures

While the FAA doesn't expect (or even want) drone pilots to chat on the airwaves, they do want you to monitor the chatter to make sure you avoid any and all air traffic.

The most important frequency to know about is the Common Traffic Advisory Frequency (CTAF). For the most part, an airport's CTAF is published on sectional charts, but if it isn't defined, then 122.9 is the default.

As a quick reminder, you can find the CTAF frequency for an airport by looking for the (C) icon on a sectional chart.

When Air Traffic Control does not operate at an airport, pilots are expected to announce their actions on the CTAF frequency starting 10 miles from the airport.

Town and Country traffic, Cessna 123 Bravo Foxtrot is 10 miles south inbound for landing, Town and Country traffic.

Note the way the name of the airport is said once at the beginning and again at the end. Cessna 123 Bravo Foxtrot is the name of the aircraft.

Town and Country traffic, Cessna 123 Bravo Foxtrot, left base, runway 18, Town and Country traffic.

Here's the next announcement. Check the traffic pattern example for a reminder of what "left base, runway 18" means.