

Introduction to the E6B: The Pilot's Flight Computer

Lesson Overview

By the end of this lesson, students will be able to:

1. Define what an E6B is.
2. Explain why pilots use an E6B.
3. Identify the two sides of an E6B.
4. Perform basic aviation calculations using an E6B.
5. Understand how the E6B relates to real-world flight planning.

Introduction

Put students into groups of four to brainstorm the below and have a brief class discussion with each group sharing out.

Imagine you're flying an airplane 5,000 feet above the ground. Your tablet battery dies, and your phone has no signal. How do you calculate:

- How much fuel will you need?
- How long will the trip take?
- How does the wind affect your flight path?

Pilots have been solving these problems for decades using a tool called the **E6B Flight Computer**.

Despite its name, it is not a computer in the modern sense. Discuss as a group, why the name might be confusing/misleading to some. It is a specialized circular slide rule designed for aviation calculations.

Watch video for brief introduction on tool: [ASA E6B Video Tutorial 1: Introduction](#)

If you have a class set of E6B's, pass them out now. If you have a classroom display, pull to front of room now as well. Instruct students to take notes-especially during the debrief pausing moments. Pause the video after she describes the circular slide rule (0:50). Ask the students which calculations this side of the tool is used for. Pause the video after she describes the wind side (0:56) Ask the students what this side of the tool solves for and why it is important. Review as a group which pieces move, which stay fixed what the most important reference point is and how it is used.

What is an E6B?

An **E6B** is a flight planning tool used by pilots. It is a reliable tool that uses ratios to calculate:

- Time
- Speed
- Distance
- Fuel consumption
- Wind correction
- Ground speed

Think of it as a combination of:

- A calculator
- A navigation tool
- A flight planner

Before electronic calculators and apps existed, pilots used the E6B for nearly every cross-country flight.

Today, many pilots use electronic flight computers, but learning the manual E6B helps pilots understand the math behind aviation and is a powerful resource to have when your batteries die in your electronic flight computers.

Discuss in groups why pilots must learn the E6B even though we have electronic versions of the tool now. What else can they think of where the skill must be learned even though there is technology to solve?

Why Do Pilots Need It?

Use this as an opportunity to have groups think this part out before explaining. Encourage them to draw it out to give a visual of what is occurring.

Imagine you're rowing a boat across a river.

If the river is flowing sideways:

- Pointing straight across won't get you straight across.
- You must aim slightly upstream.

The same thing happens in aviation. Wind constantly pushes aircraft sideways. The E6B helps pilots determine exactly how much correction is needed.

Let's Learn to Use the E6B

The traditional E6B has **two sides**.

Side 1: Circular Calculator Side. Used for:

- Speed calculations
- Fuel calculations
- Time calculations
- Unit conversions

It looks like two rotating circles. The inner circle moves/rotates, while the outer circle remains fixed. There is also a marked “rate” arrow at 60, which represents 60 minutes, or 1 hour.

Watch video for basics on the circular side: [ASA E6B Video Tutorial 2: Time, Speed, and Distance - YouTube](#) and try the examples that follow.

Encourage the students to take notes as she presents the example scenario. Pause and review the example as she proceeds. You can record on the board as well to give numerical visuals to what she is describing. Use this as an opportunity to answer any questions/confusion students may have.

Circular Calculator Side-Let's try it!

1. If I fly 120 miles in 1 hour, how fast am I traveling? **120 miles per hour**
2. How long will it take to travel 180 miles if I continue at the same rate? **1.5 hours**

Now that you can find time, speed and distance, what about fuel calculations? It is actually the same tool! You can find fuel calculations because fuel burn is simply a rate.

Watch video: [ASA E6B Tutorial 3: Fuel Calculations](#) and then try the examples that follow.

Encourage the students to take notes as she presents the example scenario. You can record on the board as well to give numerical visuals to what she is describing. Pause and review the example as she proceeds. Use this as an opportunity to answer any questions/confusion students may have. It is important to emphasize that the scale on the E6B must be interpreted correctly. Explain what she means by “moving the decimal.”



3. If I burn 8 gallons of fuel per hour, how much fuel will I use in 3 hours? **24 gallons**

Side 2: Wind Side

The wind side of an E6B flight computer is the side used to solve wind correction and ground speed problems. This side consists of a rotating disk with a compass rose and a transparent sliding grid.

Used to determine:

- Wind correction angle (WCA)
- Ground speed (GS)
- True Heading (TH)
- Heading corrections
- Crosswind and headwind/tailwind components

This side contains:

- A compass rose
 - A circular scale marked from 0° to 360°
 - Used to set the true wind direction, true course, or heading
- A Grommet
 - A small hole at the center of the rotating disk.
 - Represents the aircraft's position in the wind triangle calculations
- A transparent grid
 - Moves up and down
 - Contains horizontal and vertical lines used to plot wind velocity and determine drift
- A center line (True Index)
 - A vertical line running through the grid
 - Represents the aircraft's intended course
- Speed scale
 - Usually marked in knots along the center line
 - Used to measure wind speed and calculate ground speed
- Wind calculation scales
 - The center line above the grommet serves as a ruler for plotting wind velocity.
 - A wind dot is placed a distance from the grommet equal to the wind speed.

Pilots use it to compensate for wind pushing the airplane off course.

Watch the video for basics on the wind side of the E6B: [ASA E6B Video Tutorial 5: Wind Side](#) and then try the examples that follow.

Encourage the students to take notes as she presents the example scenario. Pause and review the example as she proceeds. Discuss as a group where each of the explained features on this side of the tool are and point out how she is using them. Use this as an opportunity to answer any questions/confusion students may have.

Wind Side-Let's try it!

4. If you have a true course heading of 090° and a true airspeed of 100 knots, and you encounter wind from 360° at 10 knots, find your wind correction angle. **6° Left**

5. If you have a true course heading of 090° and a true airspeed of 100 knots, and you encounter a direct headwind at 090° at 20 knots, what is your ground speed? **80 knots**