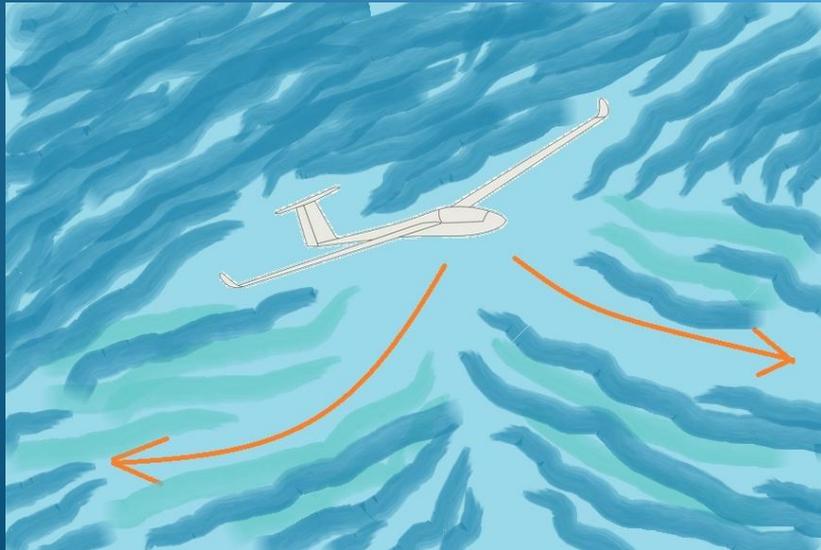


# Glider Math: by 2's & 3's Staying Above Glideslope



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Modified by Uwe Prigge  
for GHSA Cross Country Class

# How do You Know -

- You will make it to the home airport?
- You will make it to the next landable airfield?
- You will make it to the next landable location?

I am asked this question often . . .  
by pilots or passengers.

# Answer:

- You **must** know your distance from the objective.
- You **must** know your machine's glide performance.
- You **must** know your performance safety margin.

With those tiny bits of information, we can always stay above glide slope.

# Self Discipline:

Safety is possible by having information  
and making reasonable, informed choices.

I can teach you how to have the information.  
After that, staying above a glide slope is  
Your Choice.



# Knowing Distance:

- Sectional Chart: \$15  
Cheap, any glider, prep time before launch
- GPS: > \$100 Cell phone Google Map?  
On hand, any glider, iffy phone signals
- Glide Computer with Moving Map: > \$500  
Specific glider, biggest prep time and cost

# Knowing Performance:

- **Blanik L23** L/D = 28:1 (Ours 24:1 😞)

$$6076' / 24 = 253' \quad \text{300 ft per mile loss}$$



- 1<sup>st</sup> Gen Glass (**Grob 102**) L/D = 35:1

$$6076' / 35 = 173' \quad \text{200 ft per mile loss}$$



- 2<sup>nd</sup> Gen Glass (**Ventus b**) L/D = 44:1

$$6076' / 44 = 138' \quad \text{150 ft per mile loss}$$

# Knowing Safety Margins:

- Bronze Badge Program

Cut Performance by 50 % (discussion)

- Wind Adjustment – Head wind vs. Best L/D speed

10/50 mph(kts) = 20 % added alt. loss

15/50 mph(kts) = 30 % added alt. loss

- Arrivals -

Home – 1,500 AGL, Away - minimum 2,000 AGL

Long legs – add 10% to glide alt. If > 20 miles

# Knowing Safety Margins:

- **Thermal Days Only for these guidelines**  
**Other lift styles can wait for 'experience'**  
**Must use typical speed-to-fly adjustments**
- **Not Ridge Days –**  
**no time separation from cruise to landing**
- **Not Wave Flight Days --**
  - **Scale of variation exceeds these calculations**

# Performance + Safety Adjusted:

- **Blanik L23** 24:1 300 ft/mile Adjusted **400 ft/mile**
- 1<sup>st</sup> Gen 35:1 200 ft/mile Adjusted **300 ft/mile**
- 2<sup>nd</sup> Gen 40:1 150 ft/mile Adjusted **200 ft/mile**
- **Cessnas** 10:1 500 ft/mile Adj. 600 ft/mile

What safety margin ( %) is provided in these buffers? 

We will use these for the calculations practice that follows.

You can choose YOUR OWN VALUE for the buffers.

# Math for In-Flight Calcs:



The objective is SIMPLICITY.

We will sum field elevation and arrival into one number.

Tail wind? Disregard it. You'll just get there higher.

As a beginner, simply calculate and work primarily

INTO the wind or UPWIND of home until Glider Math is fluent.

# Math for In-Flight Calcs:

Distance X Performance with Wind Adjustment  
+ Arrival MSL (Arrival Height + Field Elevation)

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Required Altimeter Reading to GO !!

Task: L23, Airport 20 miles away, 800 feet elevation, no wind

20 miles X 400 ft/mi (No Wind) = 8,000 ft  
+ 2,800 MSL (2000' arrival + 800' field elevation)  
10,800 MSL (or 8,000/2 plus 2,800 6,800 at halfway)

# Chart Preparation:

- Use radii that are correct for statute or nautical ...  
(Based on your make/model airspeed units)
- Make **5-mile** & **10-mile** circles around Home.
- Make 10 mile circles around alternate sites
- Don't overclutter your chart.  
Use a sectional map or copy from  
<https://skyvector.com/> into e.g. PowerPoint



## Today's Task #1:

Fly to Eagle Lake from  
GHSA (Elevation 120 ft) with Blanik L23

No wind

Cloud Base: 5,500 ft

Calculate min altitudes for go/no-go  
decisions

(Distance x Perf. Factor)  
+ Arrival MSL  
= Required Altitude

15 x 400 = 6,000 ft  
+ Arrival 2,000 ft  
+ Field Elev. 184 ft  
Min Alt. 8,200 ft

15 x 400 = 6,000 ft / 2  
= 3,000  
+ Arrival 2,000 ft  
+ Field Elev. 184 ft  
Min Alt. 5,200 ft at  
the river

1. Measure Distance (15 miles)
2. Use formula to determine required altitude
3. What Altitude you need at half point?

Would you fly the task?

## Today's Task #2:

Fly to Columbus from  
Eagle Lake with the Blanik L23

Wind: 10 kts at  $270^\circ$

Cloud Base: 4,000 ft

Calculate min altitudes for go/no-go  
decisions

(Distance x Perf. Factor)  
+ Arrival MSL  
= Required Altitude

10 x 480 = 4,800 ft  
+ Arrival 2,000 ft  
+ Field Elev. 242 ft  
Min Alt. 7042 ft

10 x 480 = 4,800 ft / 2  
= 2,400  
+ Arrival 2,000 ft  
+ Field Elev. 242 ft  
Min Alt. 4,400 ft  
at the river

1. Measure Distance (10 miles)
2. Use formula to determine required altitude
3. What Altitude you need at half point?

Would you fly the task?

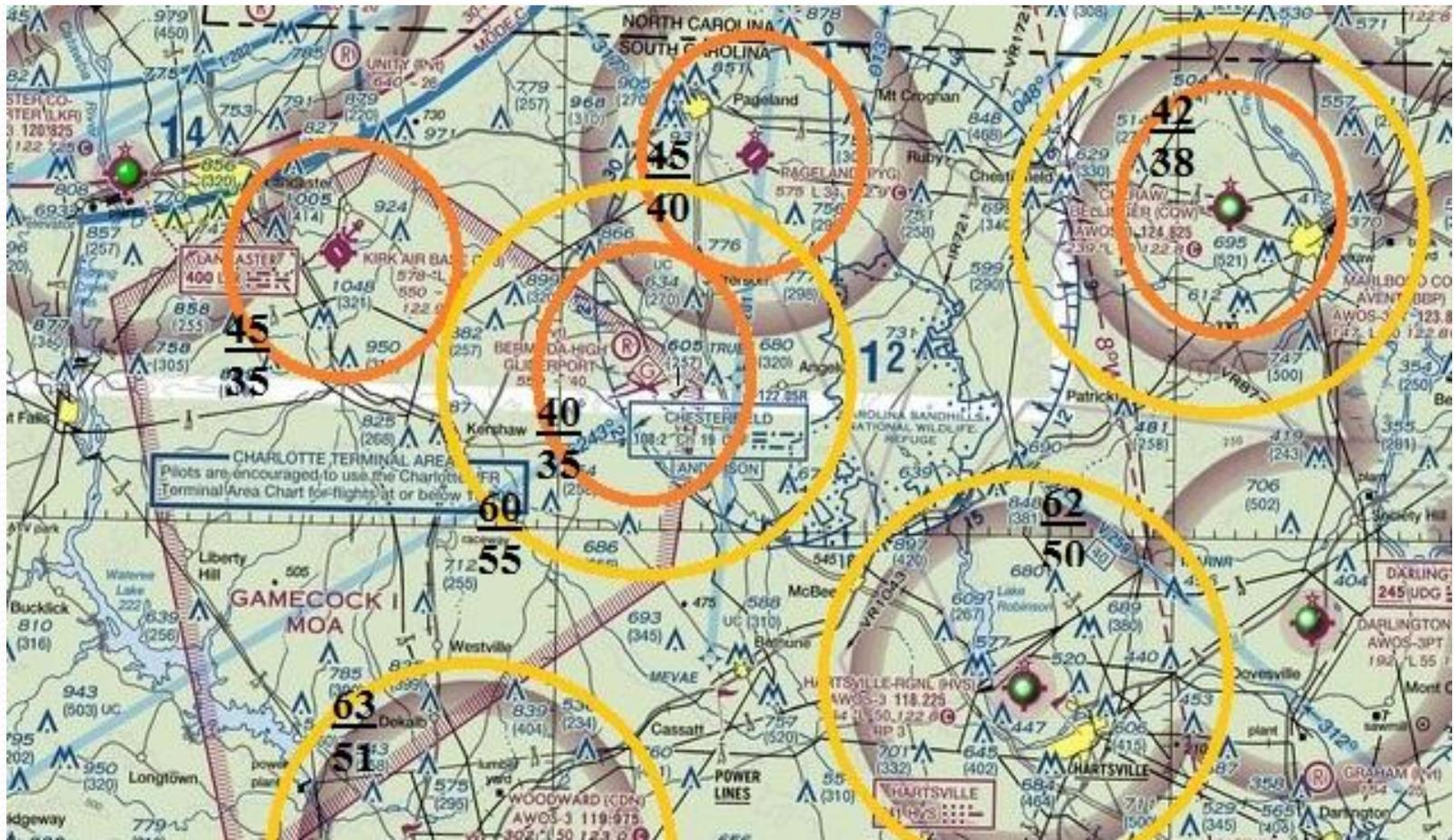
# Advanced Chart Prep:

- Pre-number your chart circles
  - in hundreds of ft MSL (45 = 4500')
  - Maybe in 2 scales - safety margin and actual L/D
- 1500 arrival home, 2000 arrival elsewhere -- in MSL
- Remember this is 'zero wind' .....

This preparation allows less calculation time.  
Locate yourself, know the altitude requirement.

# Bermuda High Area

- chart with 400/mi over 300/mi numbering
- 1500 arrival home, 2000 arrival elsewhere -- in MSL



# Keep Above Glide:

- Know Distances From Home
  - Make a Chart (free)
  - Spend Time on Google Maps (free)
  - Know Local Landmarks Around Home Field (free)
- Know your Sink Rate in Ft / Mile
- Work Upwind on Task Legs, or searching lift
- Learn GPS Instrumentation on the Ground
  - Sit in the cockpit with the instrument manual

# Before you go:

- IMSAFE, Weather Check, TFR Check, NOTAMs
- Review your task plan with CFI
- Trailer/Recovery Crew Ready
- Choose Landable Places BEFORE launching
- Stick to Your Choices
- Choosing before launch makes you active, not reactive
- Know your 7S to check before picking a land out field
  - Shape
  - Size
  - Slope
  - Surface
  - Surface Wind
  - Stock
  - Surroundings
- Students need Logbook sign-off
- If you get out of glide range do not panic. It becomes normal over time.
- Often the next thermal is away from the field you desperately want to go to. Do not return into sinking air rather go upwind and look for better air.
- Always use Speed to Fly rule (Fast in sinking air/Slow in rising air)
- Good rule:
  - 3,000 ft and above = Racing
  - 3,000ft to 2,000ft = Looking for Thermals and Landing Fields
  - 2,000ft to 1,000ft = Pick Field and alternate Field and 7S checks
  - 1,000ft = Land in the middle of the Field at minimum speed, break hard

# Thank You:

- Webinar Team for producing the Series  
<https://www.ssa.org/Webinars>
- Do we have questions?

Cross Country Flying  
is fun 😊

# Continue Learning:



Thank you Cindy!!!

Cindy Brickner

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760-373-1019 8 am – 8 pm only please - pacific zone

I am happy to train in CA, travel to your 2-seater, do on-line training, or speak to groups. Call or write for a training plan. Aero-tow, ground launch, self-launch, towing training. Choose your topic. Soar safely.



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