

PROJECT 3 CONCEPT SKETCH

Here we go! The goal of this activity is to generate a set of coherent, feasible ideas for Project 3. Working with your project partner(s), generate ideas for each of the boxes below. Then select or refine these ideas to develop a single "concept sketch" by filling in the boxes. If you would like to develop multiple ideas, extra handouts are available — please feel free!

Lilo + Jacine

1 Question

What is the motivating question?
What kind of question is it?

☒ Predictive

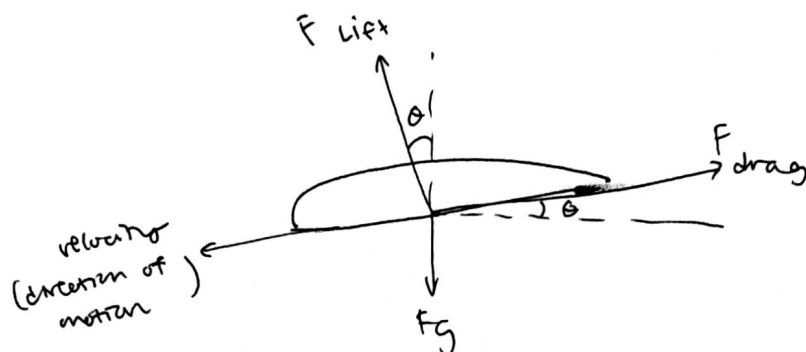
☐ Explanatory

☐ Design

How does the initial velocity of a glider affect its trajectory?

2 Diagrams

Draw a free body diagram for every part of your system, as well as a single well-labeled schematic diagram that includes a set of coordinate axes. If there are multiple phases of motion, draw a key frame for each and indicate the transitions between them (e.g., "rod on the ground" vs. "rod in the air").



3 Model

Using the diagrams above, summarize the key elements of the model (including state variables, parameters, and metrics). Write down mathematical expressions for forces if you know them. If you can, write your equations of motion as a set of first-order differential equations (but don't worry if you can't do that at this point).

State: θ , velocity, position

 vectors

$$\text{Equations: } L = \frac{1}{2} \rho v^2 C_L S$$

$$D = \frac{1}{2} \rho v^2 C_D S$$

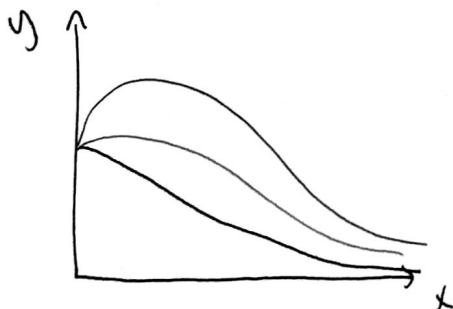
System Variables: ρ = density of air
 S = surface area of wings

size ratio $\rightarrow R = \frac{L}{D} = \frac{C_L}{C_D}$

C_L & C_D = lift + drag coeffs

4 Results

What does an answer to the question look like? What output would you expect the model to produce? Draw both a time-series graph (i.e., what does one "run" of the model look like?) and a graph that summarizes the result of a parameter sweep.



diff colors are diff velocities

5 Interpretation

Why would the results answer the question? What implications might they have in the real world? Why should people care? Also think about what you're choosing to leave out of your abstraction: how important might it be in affecting your results?

- The results answer the question bc it shows the position of the glider
- This is useful to ppl who fly gliders
- Use this model to fly further based on diff velocities