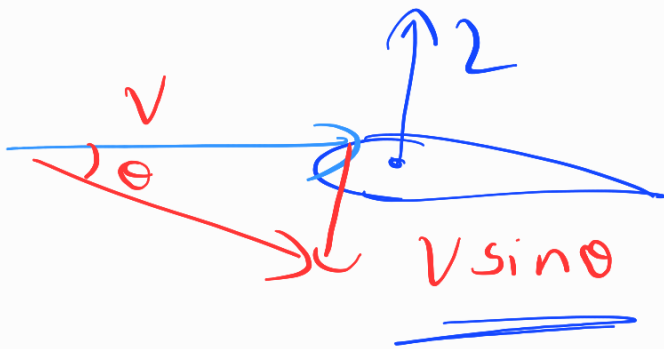
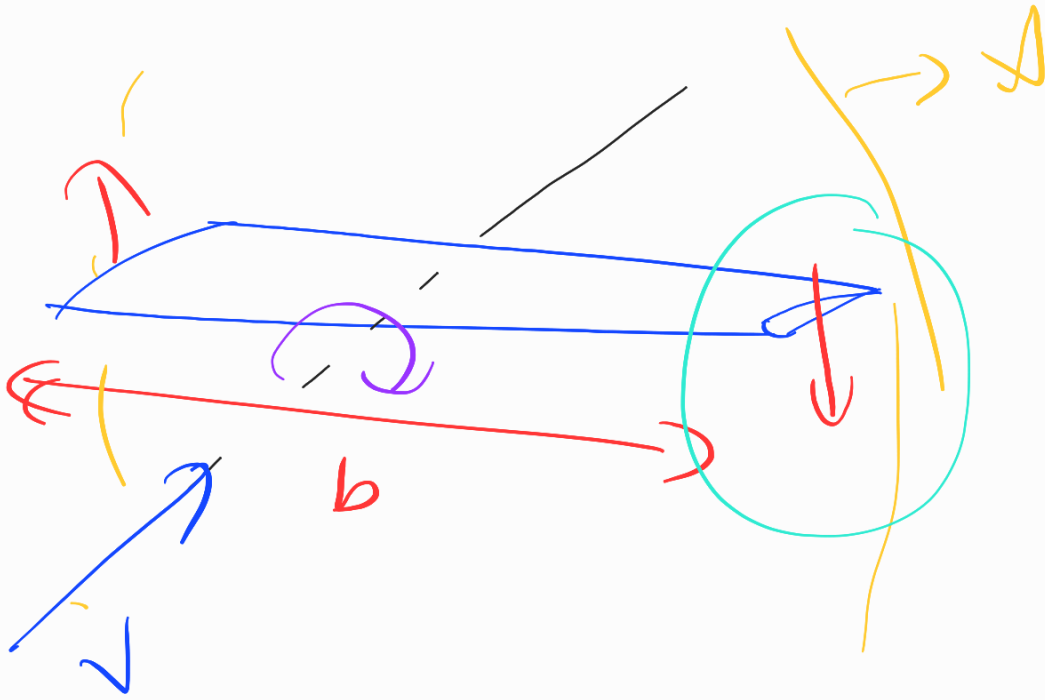


# Thrust generation.



Let us consider

$\rho \rightarrow$  density

$m \rightarrow$  mass

$A \rightarrow$  area swept by wing

$t \rightarrow$  time

$\theta \rightarrow$  angle upto which  
air is displaced

$v \rightarrow$  air stream velocity

Newton's 2<sup>nd</sup> Law

$$F = ma$$

$$T \rightarrow \text{Thrust} = F \Rightarrow \frac{dm}{dt} \times V$$

Power required for Thrust

$$P \Rightarrow \frac{dE}{dt} \rightarrow \frac{\text{Energy}}{\text{Time}}$$

$$P \Rightarrow \frac{1}{2} \frac{dm}{dt} V^2$$

Lift  $\Rightarrow$

$$L \Rightarrow \frac{dm}{dt} [v \sin \theta]$$

$$\sin \theta \Rightarrow \frac{L}{v} \left[ \frac{dt}{dm} \right]$$

Power required to generate lift

$$P \Rightarrow \frac{1}{2} \left[ \frac{dm}{dt} \right] (v \sin \theta)^2$$

$\frac{dm}{dt} \rightarrow$  mass flow rate

$$\Rightarrow \rho \times A \times v$$

$$\Rightarrow \rho \times \left[ \frac{\pi}{4} b^2 \right] \times v$$

$$P \Rightarrow \frac{1}{2} \left[ \rho \times \frac{\pi}{4} \times b^2 \right] \times v \sqrt{v^2 \left[ L \frac{dA}{dm} \right]^2}$$

$$e) \frac{1}{2} \left[ \frac{\rho v \times \pi b^2}{4} \right] \times v \left( \frac{L^2}{v^2} \right) \left( \frac{2 L^2}{\rho^2 v^2 \frac{\pi}{4} b^4} \right)$$

$$P = \frac{2 L^2}{\rho \pi v b^2}$$