

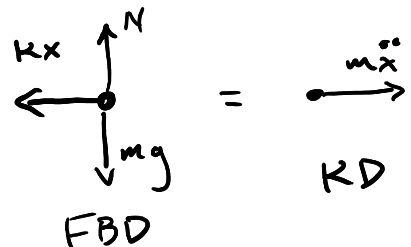
(a)  $\ddot{x} = -\mu g$

(b)  $\ddot{x} = -\frac{b}{m} \dot{x}$

(c)  $\ddot{x} = -\frac{k}{m} x$

$\hookrightarrow \ddot{x} = -\omega^2 x$

$\omega = \sqrt{\frac{k}{m}} = \sqrt{\frac{4 \text{ N/m}}{1 \text{ kg}}} = 2 \frac{\text{rad}}{\text{s}}$



$-\frac{k}{m} x = \ddot{x} \text{ eom}$

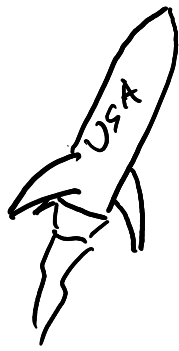
$x(t) = A \cos \omega t + B \sin \omega t$

$x(0) = 0 = A \cdot 1 + B \cdot 0 \Rightarrow A = 0$

$\dot{x}(0) = 10 \text{ m/s} = B \cdot \omega \cos(0)$

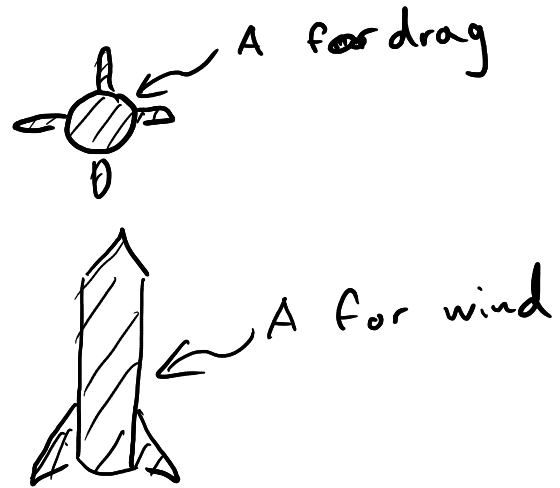
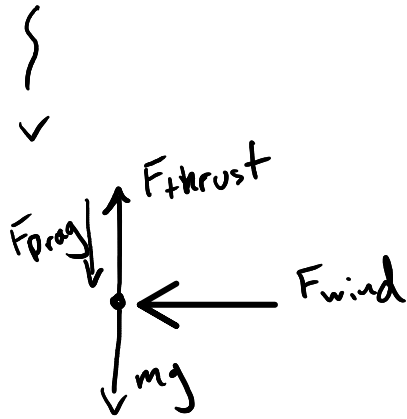
note  $\frac{d}{dt}(\sin \omega t) = \omega \cdot \cos \omega t$

$x(t) = \frac{10}{\omega} \cdot \sin \omega t = 5 \sin 2t$



thrust  
wind  
drag  
gravity

} FBD



## Quiz-01

- what was important?
- how do you demonstrate that?